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Casabianca, Elizabeth; Kovacic, Matija

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Social interactions, loneliness and health: A new angle on an old debate

Elizabeth Casabianca
* 1 and Matija Kovacic
 $^{\dagger 2}$

¹European Commission, Joint Research Centre (JRC), Ispra, Italy. ORCID: https://orcid.org/0000-0002-0451-5701 ²European Commission, Joint Research Centre (JRC), Ispra, Italy; Global Labor Organization (GLO):

https://glabor.org/user/matija.kovacic/ ORCID:https://orcid.org/0000-0002-3267-5518

Abstract

This paper investigates the relationship between historically rooted norms that drive individuals to adhere to predefined behavioural standards and attitudes towards loneliness. Focusing on a sub-population of second-generation immigrants, we identify an intergenerationally transmitted component of culture that reflects the importance of restrained discipline and rules characterising highly intensive pre-industrial agricultural systems. We illustrate how this cultural dimension impacts perceptions of the quality of social relationships and plays a substantial role in the likelihood of experiencing loneliness. Subsequently, we show the validity of the identified trait as an instrument for loneliness in a two-stage model for health. We also find that loneliness has a direct impact on body mass index and specific mental health issues, with these results being robust across a range of sensitivity checks. These findings contribute to the growing body of research emphasising the pivotal role of attitudes in predicting significant economic and health outcomes, thus opening up a new pathway through which deeply-rooted geographical, cultural, and individual characteristics can influence comparative economic development processes in both origin and destination countries.

Keywords: Loneliness, ancestral characteristics, social norms, health.

JEL Classification: I12, I14, J14, D91, Z13.

^{*}E-Mail: Elizabeth.CASABIANCA@ec.europa.eu; Tel: +39 0332 78 5783; European Commission, Joint Research Centre (JRC), Via E. Fermi 2749 - I-21027 - Ispra (VA) - ITALY.

[†]Corresponding author: E-Mail: Matija.KOVACIC@ec.europa.eu; Tel: +39 0332 78 9243; European Commission, Joint Research Centre (JRC), Via E. Fermi 2749 - I-21027 - Ispra (VA) - ITALY.

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1 Introduction

Loneliness is a subjective negative feeling defined as an unmet need in terms of quantity or quality of social interaction, or both (Perlman and Peplau, 1981; Peplau et al., 1982). Though it has been a recognised issue for a long time, loneliness is gaining increasing attention, particularly due to its farreaching consequences at both the individual and societal levels which have been well-documented by the (mostly psychological) literature (Cacioppo et al., 2014a; Cacioppo and Cacioppo, 2018; Cacioppo and Hawkley, 2009; Cacioppo et al., 2014b; Leigh-Hunt et al., 2017; Steptoe et al., 2013; Stickley et al., 2013; Stickley and Koyanagi, 2016; Valtorta et al., 2016; Park et al., 2020; Burlina and Rodríguez-Pose, 2021; Langenkamp, 2021, among others).

While there is a general consensus of the effects of loneliness, research examining its underlying causes remains inconclusive. Most studies concentrate on demographic and socioeconomic risk factors, often providing mixed evidence regarding which category is more susceptible to loneliness (Barreto et al., 2021; Maes et al., 2019; Pinquart and Sorensen, 2001; Morrish and Medina-Lara, 2021; Lena Dahlberg and Naseer, 2022). Some recent contributions emphasize the role of individuals' origin, suggesting that people with migration backgrounds are at a higher risk of experiencing loneliness (Delaruelle, 2023; Witte and Regenmortel, 2021).

A growing body of psychological research, on the other hand, investigates the impact of culture, defined as the collection of inherited or acquired social values and norms shared by people in a particular place or time. This research is based on the premise that specific cultural traits have a substantial impact on shaping individuals' social experiences (Heu et al., 2021b). Notably, the literature predominantly centers on the distinction between *individualistic* and *collectivistic* cultures (Hofstede et al., 2010), based on the size and scope of social networks within a society. These networks are more limited in the former compared to the latter. Based on this literature, people in individualistic societies with weaker social connections are more likely to experience loneliness compared to those in collectivistic societies. Yet, when it comes to cross-cultural comparisons, this association generally does not hold and the evidence is still rather mixed (Lykes and Kemmelmeier, 2014; Van Tilburg et al., 2004). One of the reasons for these discrepancies may be conceptual in nature, since loneliness is not just about the quantity or frequency of social interactions, rather it arises from the perceived mismatch between actual and ideal quality of social relationships. Indeed, when evaluating actual social relations, individuals are more concerned with the quality of their social ties independent of the perceived desired size of their social networks (Heu et al., 2021b; Pinquart and Sörensen, 2003; Hawkley et al., 2008; Beller and Wagner, 2018). Heu et al. (2021b), for instance, argue that more restrictive norms about social relationships positively influence the likelihood of emotional and perceived isolation.

This paper advances the existing research on the cultural determinants of loneliness by exploiting the historically determined and intergenerationally transmitted component of culture related to socially imposed rules and norms that constrain individuals to fit into predefined behavioural standards and limit their freedom to choose optimal social relations. To achieve this goal, we utilise a set of ancestral factors conducive to higher pre-industrial returns to agriculture that triggered a more intensive mode of production, which required restrained discipline, stricter rules, and adequate planning. We show that, under the assumption of persistence of these attributes across generations, the identified cultural trait strongly correlates with the occurrence of loneliness among second-generation migrants, who are identical in all aspects except for their parental cultural backgrounds. Once we have established the strong link between culturally embedded social norms and loneliness, we assess the validity of the derived component of culture as an instrument for loneliness in a model for health and estimate the causal effect of experiencing loneliness on a variety of physical and mental health outcomes.

The main cultural indicators of interest are taken from Hofstede et al. (2010). More precisely, we focus on the distinction between *indulgent* and *restraint* societies. The individuals originating from indulgent societies gratify the enjoyment of life without social restrictions that hamper one's freedom of choice, and are frequently involved in leisurely and other indulgent activities. Restraint societies, on the other hand, are characterized by stricter social norms and prohibitions. The prevalent belief in these cultures is that everybody should align with rules and norms governing socially acceptable behaviours. Following Minkov, 2009 and Hofstede et al., 2010, we show that the core component of restraint captures the degree to which individuals feel that have completely free choice over their lives ("life-control dimension"). Meanwhile, the residual component reflects the value placed on leisure and other indulgences. To separate the life-control component, we exploit a set of characteristics of pre-industrial agricultural systems to account for the evolutionary process that triggered the emergence and transmission of restrained discipline and stricter rules across generations. More precisely, we rely on Galor and Özak (2016) and consider the pre-1500 crop yield potential and growth cycle, and their changes in the post-1500 period ("Columbian Exchange") as proxies for the intensity of agricultural production in the individual ancestors' country of origin. As shown by the authors, potential crop yield is strongly associated with the historical degree of dependence on agriculture and its intensity. The link between historical agricultural intensity and restraint, on the other hand, can be traced back to Minkov (2009), according to which restraint is higher in societies with a strong cultural legacy of highly intensive agriculture. Regressing the index of restraint of contemporary cultures on this set of ancestral agro-climatic attributes, we isolate its life-control component from the residual component. Using an additional set of preferences from the European Social Survey (ESS) and the Gallup World Poll data for a large set of countries, we then show that the predicted life-control dimension significantly correlates with the individual perception of freedom in life as well as with their attitudes toward rules and socially accepted behaviours, while the residual component predicts preferences for leisure and indulgence. We also show that a direct association between agro-climatic factors and loneliness would not fully capture the effects of rules and restrictions, because the historical agricultural potential captures other important aspects of individual preferences, such as patience (Galor and Özak, 2016), which are not directly related to loneliness. The effect of predicted restraint, on the other hand, is orthogonal to individual long-term orientation and other preference dimensions.

In order to identify the effect of our preferred measure of culture on loneliness, we consider a sub-population of native individuals with one or both foreign-born parents (*i.e.*, second-generation immigrants). In this way, we are able to exploit the exogenous variation in parental cultural back-grounds while keeping the other country-specific factors invariant.

Once we have established robust association between the predicted life-control dimension and loneliness, we use it to instrument current experiences of loneliness in a two-stage model for health. Extensive literature (mostly psychological), documents consistent associations between loneliness and individuals' health, both physical and mental (Cacioppo et al., 2014a; Cacioppo and Cacioppo, 2018; Cacioppo and Hawkley, 2009; Cacioppo et al., 2014b; Leigh-Hunt et al., 2017; Steptoe et al., 2013; Stickley et al., 2013; Stickley and Koyanagi, 2016; Valtorta et al., 2016; Park et al., 2020, among many others). However, these studies generally reveal correlations and can say little about causation. We contribute to this literature by using our preferred cultural trait to isolate the causal impact of loneliness on a variety of health outcomes. Regarding potential concerns related to the exclusion restriction, we show that the predicted restraint has no effect on health outcomes, as well as on factors closely related to health, like risky behaviours and other individual-specific socio-economic characteristics. The only exception is the item related to depression (elicited as feelings of sadness or low spirits), which may partially overlap with the definitions of restraint and loneliness (Mann et al., 2022). As a precaution, we develop an alternative composite measure of mental problems that excludes this specific emotional disorder. Furthermore, the results of the over-identification test provide additional evidence that the exclusion restriction should not be violated.

Our empirical exercise relies primarily on the individual-level data drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE links information on the respondents' current situation to retrospective childhood data and parental origins, as well as widely recognised measures of loneliness. Moreover, it contains rich information on individuals' mental and physical health statuses and the sample is representative of the older population (aged 50 or older), who is especially vulnerable to loneliness and its health-related implications (Vozikaki et al., 2018).

Our key findings are as follows. A one standard-deviation rise in the ancestral agricultural yield potential corresponds to a 7.1-point increase in restraint (as measured on a scale of 1 to 100). This effect remains strong and statistically significant even after controlling for historical urbanisation rate and population density. The life-control component of the parental cultural backgrounds significantly affects the risk of loneliness independently of the variety and frequency of social connections. The effect of the aggregated measure of restraint is much weaker since it also captures the effect of the residual component related to leisure and other indulgences, which is not significantly related to loneliness. As for the health outcomes, we find a significant and direct impact of the instrumented loneliness on mental disorders, a high body mass index, and, albeit marginally, mobility limitations. Interestingly, these effects are significantly larger than those obtained from a simple OLS regression. In addition, loneliness has no direct impact on the incidence of chronic conditions, limitations with activities of daily living, or the perception of general health. We also find no evidence linking loneliness to cognitive functioning. These results are robust to a number of sensitivity checks.

The evidence provided in this paper adds to a growing body of research on the importance of attitudes and behaviours in predicting significant economic and health outcomes, opening up a new channel via which deeply-rooted cultural and individual characteristics may influence economic development processes. The link between loneliness and health and the resulting economic and social effects in both origin and destination countries complement the picture of the central role played by individual attitudes and behaviours in comparative development.

The rest of the paper is organized as follows: Section 2 discusses the association between loneliness and culture. Section 3 presents the empirical strategy and Section 4 describes the data used. Our main results are discussed in Section 5, followed by an empirical exercise linking loneliness and health in Section 6. Section 7 concludes.

2 Cultural roots of loneliness

A growing body of psychological literature suggests that certain cultural dimensions may also play a significant role in shaping individuals' social experiences (Heu et al., 2021b). One cultural aspect that may potentially interact with loneliness is that related to the degree of social embeddedness of individuals in networks, *i.e.*, the quantity or variety of social interactions people have. An important distinction here is between less and more socially embedded cultures. In the former, individuals are less embedded in tight social networks (e.g. families or communities), spend more time or are more likely to live alone, and are more independent from each other. Individuals in more socially embedded cultures, on the other hand, strongly integrate into cohesive groups and often make decisions based on what is best for the group rather than what is best for themselves.

Another dimension of culture intuitively linked to loneliness is that associated with the tightness of social restrictions that constrain individuals in choosing favoured behavioural patterns, which may lead to less fulfilling and less responsive relationships. Even though individuals face the same target in terms of the extent of social relations (*i.e.*, quantity or variety), norms and restrictions may shape the evaluations of such relationships (*i.e.*, perceived quality). Social norms and relationship quality, hence, are closely related - tighter norms may potentially restrain individuals by imposing the socially acceptable way of behaving, which may differ from the desired one, and increase the odds of experiencing dissatisfaction with social life due to one's lack of freedom to choose behaviours and relationships. This assumption finds support in Heu et al. (2021b)'s "culture-loneliness framework" according to which more restrictive norms about social relationships positively influence the likelihood of emotional and perceived isolation.¹ Interestingly, cultures that enforce a more severe compliance with rules and restrictions are those characterised by extended social ties and collectivism. Quality and variety, therefore, are distinct concepts, and there is no reason to assume a *priori* that higher (lower) quantity implies higher (lower) quality.

It is not straightforward which of these cultural dimensions wins the race in terms of affecting loneliness. The existing research has mainly focused on quantity of social interactions assuming that individuals in cultures with strong social networks and extended family ties (so-called "collectivist societies") should feel less lonely than individuals in societies with weaker social connections, tinier family ties and more individualistic values (so-called "individualistic societies"). Yet, when it comes to cross-cultural comparative data, this association generally does not hold. The empirical evidence

¹Emotional isolation occurs when an individual does not have individually fulfilling, high-quality, or responsive relationships. Perceived isolation, instead, results from perceived ideal-actual discrepancies regarding social relationships (Heu et al., 2021b).

mostly reports lower levels of loneliness in individualistic than in collectivist societies (Dykstra, 2009, Lykes and Kemmelmeier, 2014, Fokkema et al., 2012, van Tilburg et al., 1998, Anderson, 1999), which may seem counter-intuitive. In some cases, the evidence provides contradictory findings (van Tilburg et al., 2004, Rokach et al., 2001, Jiang et al., 2018, Heu et al., 2019, Heu et al., 2021b). This mixed evidence may be due to several factors. First, most empirical studies based on traditional cross-country comparisons fail to separate the effect of culture from other countryspecific factors. Second, attempts to identify the effect of culture across individuals who share the same current environment but were born and raised in different cultural contexts (Madsen et al., 2016) confound social values with the individuals' minority status, which may itself affect loneliness. Last, but not least, the issue might also be conceptual in nature and more emphasis should be put on alternative dimensions of culture. Indeed, several empirical findings suggest that the quality of social contacts is more relevant than their quantity in predicting loneliness (Pinquart and Sörensen, 2003; Hawkley et al., 2008; Beller and Wagner, 2018; Taylor et al., 2018; Heu et al., 2021b). If we place more emphasis on the quality of social interactions rather than their quantity, then individuals originating from cultures characterised by stricter social norms and prohibitions may be more at risk of loneliness compared to individuals in more indulgent societies where enjoyment of one's life is more loose, regardless of the extent of social networks or desired frequency of social interactions.

A useful framework to categorise cultures along the quantity *versus* quality dimensions used in economics and other social sciences has been introduced by Hofstede et al. (1991), and further extended by Hofstede et al. (2010).² Alongside the individualism - collectivism gradient, cultures

²Initially developed to analyze how the culturally embodied beliefs differ in terms of work objectives (Hofstede et al., 1991), the model has been further expanded by Hofstede et al. (2010) using the data from the Chinese Values Survey and from the World Values Survey data for representative samples of the population in 93 societies. The authors develop a six-dimensional model of national culture on the values of its members and how these values relate to behavior. The six-dimension data matrix is available at https://geerthofstede.com/research-and-vsm/dimension-data-matrix/. For further details see Hofstede et al. (2010).

can be categorised along the so-called restraint - indulgence dimension.³ According to the authors, indulgent societies gratify the enjoyment of life without social restrictions that hamper one's freedom of choice, are frequently involved in leisurely activities, have lenient sexual norms, etc. Restraint societies, on the other hand, are characterized by stricter social norms and prohibitions. Following Minkov, 2009 and Hofstede et al., 2010 the core component of this cultural dimension is "life-control", *i.e.*, the degree to which individuals feel they have completely free choice over their lives. The residual component captures the importance of leisure and other indulgences. The extent to which different cultures score within each dimension is captured by an index normalised between 0 and 100. The indices do not measure the absolute level of attributes rather they express the position of societies relative to each other.⁴ Worth noting is that, Beugelsdijk and Welzel (2018) show that the values within each cultural dimension are transferred from parents to children, and rarely change in later life.⁵

3 Empirical strategy

3.1 Framework

Our primary goal is to link individual-specific attitudes towards loneliness, net of the other factors, to individuals' cultural backgrounds, reflecting the socially accepted conduct of behaviour driven by social norms. To this end, we isolate the life-control component from the rest of the cultural traits captured by the index of restraint. According to Minkov (2009), restraint is higher in societies with

³As our focus is on the cultural traits specifically related to the quantity and quality of social relationships, we limit our analysis to the distinction between individualistic and restraint societies. The other four cultural dimensions are described in Appendix A.

⁴Table B.2 (in Appendix B) provides the full list of countries included in Hofstede et al.'s (2010) model of national culture and the corresponding index of individualism and restraint.

⁵By comparing two successive generations 30 years apart, the authors find only a modest worldwide shift towards more indulgence. However, the position of countries relative to each other remained the same. The country scores hence can be assumed to be stable over time.

a strong cultural legacy of highly intensive agriculture. The origins of the life-control component, therefore, can be traced back to the historical agricultural potential of the individual's ancestors' country of origin, under the assumption that these traits are persistent and intergenerationally transmitted across generations. In order to separate the two components of restraint, we exploit the historical processes in the ancestors' country of origin that may have contributed to the emergence and transmission of these community traits across generations. We claim that specific characteristics of ancestral economic systems during the pre-industrial era may have triggered the imposition of certain social norms, which had long-lasting effects on individuals' perceptions of social life. More precisely, highly intensive agricultural systems (*i.e.*, those with a higher potential yield) were characterised by hard work, alternation of food abundance and starvation, conflicts for the territory, and exploitation. Intensive production, hence, required restrained discipline and strict rules of conduct (Minkov, 2009). Higher exposure of ancestral populations to these factors in the preindustrial era may have fostered adaptation and learning processes that have gradually increased the persistence of traits related to stronger discipline and stricter social norms in the population (Galor and Özak, 2016; Galor et al., 2020). If this conjecture is correct, then part of the cross-country variation in the degree of restraint attributable to ancestral agro-climatic factors may represent a good proxy for the strength of social norms in contemporary environments.

Traditional estimation approaches, however, fail to separate the effect of selected dimensions of culture from the other country-specific factors such as economic and institutional arrangements. The identification of specific cultural traits is then achieved by comparing individuals born and raised in the same economic and institutional environments but whose cultural values are potentially different. This strategy underlies the so-called "epidemiological approach" (Giuliano, 2007, Fernández, 2011, Galor and Özak, 2016, Galor et al., 2020, Bernhofer et al., 2021) and focuses on native individuals with one or both foreign-born parents (*i.e.*, second-generation immigrants). For the cultural hypothesis to be consistent, immigrants who are identical in all aspects except for their cultural backgrounds should experience different levels of loneliness.⁶ Considering second-generation immigrants, therefore, allows us to exploit the exogenous variation in parental cultural backgrounds while keeping the other country-specific factors invariant.

3.2 Hypotheses and empirical model

A set of hypotheses underlie our framework. The first hypothesis relates the origins of contemporary differences in restraint with the pre-industrial intensity of agricultural production:

Hypothesis 1 Historical agricultural productivity and restraint

Higher historical intensities of production that triggered the imposition of restrained discipline and restrictions translate into a higher degree of restraint in contemporary environments.

The second hypothesis predicts that a greater general tendency to evaluate actual social relationships negatively as a result of the stricter social norms and prohibitions that characterise restraint cultures increases the risk of loneliness:

Hypothesis 2 Social norms and loneliness

Individuals with cultural backgrounds characterized by stricter social norms and prohibitions are, on average, more likely to feel lonely, regardless of the extent of social networks, frequency of social interactions, and degree of integration into social groups, ceteris paribus.

⁶The epidemiological approach relies on the following assumptions: i) cultural values and beliefs are vertically transmitted from parents to children, ii) cultural heritage is long-lasting, meaning that it affects individual's beliefs, emotions and choices throughout their life, iii) cultural values systematically vary across individuals having different cultural backgrounds; and iv) despite the heterogeneity in their cultural backgrounds, individuals living in the same country (or region) face identical economic and institutional arrangements.

The relationship between social norms and prohibitions and loneliness, hence, should hold regardless of the ideal variety of social connections. We do not rule out the possibility of loneliness occurring at all levels of social embeddedness (van Staden and Coetzee, 2010; Heu et al., 2021a), but argue that individual satisfaction with social situations is more important than the size of social networks or the degree of physical isolation.

According to the above hypotheses, the strictness of social norms in contemporary societies is determined by ancestral characteristics. Stricter norms may, in turn, have a direct influence on an individual's perception of social life and increase the odds of experiencing loneliness. This chain mechanism can be empirically tested as follows.

To isolate the component of culture reflecting social norms and prohibitions (Hypothesis 1), we estimate the following OLS model:

$$Res_p = a_0 + b_0 \mathbf{Agr}_p^{anc} + c_0 \mathbf{Geo}_p + d_0 \mathbf{H}_p + \epsilon_p, \tag{1}$$

where Res_p indicates the degree of restraint in the parental country of origin, Agr_p^{anc} is the set of factors capturing pre-industrial agricultural potential, Geo_p is the vector of geographic and climatic conditions, and H_p contains additional historical controls at the parental country of origin level. According to the theory, the obtained predicted values, \hat{Res}_p , represent the component of parental culture related to social norms and restrictions, *i.e.*, the "life-control" dimension. In Section 5.2 we empirically show that \hat{Res}_p strongly correlates with individuals' attitudes toward rules and socially accepted behaviours.

Next, we empirically validate Hypothesis 2 and regress loneliness on \hat{Res}_p associated to individuals parents' country of origin and other covariates:

$$L_i = \alpha + \pi_{i1} Res_{i,p} + \pi_{i2} \mathbf{X}_i + \pi_{i3} F E_i + \zeta_i$$
(2)

We expect the coefficient π_{i1} to be positive. In all models we cluster the robust standard errors at the country of residence and the parental country of origin level. Since the component of restraint predicted by historical agro-climatic factors originates from a different distribution with respect to the overall index of restraint, as a robustness check, we bootstrapped and clustered standard errors at the country of residence and the parental country of origin level. The results do not differ significantly.⁷

4 Data

Cultural indices and historical economic potential

The main cultural indicator of interest is taken from Hofstede et al. (2010).⁸ The index varies between 0 (full indulgence) and 100 (full restraint). This measure is positively correlated with the importance ascribed to social norms and prohibitions (life-control), and leisure (and other indulgences) as a personal value. The set of ancestral agro-climatic conditions of the parental country of origin conducive to higher historical returns on agriculture, restrained discipline and adequate planning are taken from Galor and Özak (2016) and include: (i) the yield (measured in millions of kilo calories per hectare per year), (ii) growth cycle (measured in days) for the crop that maximizes potential yield before the Columbian Exchange (Putterman and Weil, 2010), and (iii) the post-1500 changes in the yield and growth cycles of the dominant crop due to the Columbian Exchange. Crop

⁷These results are available upon request.

⁸Hofstede's cultural dimension variables have been extensively used in the empirical literature. For example, Figlio et al. (2019) use the index of long-term orientation as a proxy for time preferences when explaining educational choices, Galor and Özak (2016) test the association between historical agricultural potential and long-term orientation as well as other cultural dimensions, while Kovacic and Orso (2023) explore the causal effects of long-term orientation on individuals' perceptions of immigration. Moreover, (Proto and Oswald, 2017) include Hofstede's cultural dimensions as control variables in their model exploring cross-country differences in happiness and their link with genetic advantages in the well-being of their populations, while (Hanushek et al., 2021) employ them as alternatives for patience and risk-taking behavior included in the Global Preference Survey.

growth cycle measures the days elapsed from the planting to full maturity. The evolution of crop yield in the post-1500 period, on the other hand, captures the expansion of agricultural potential when all regions were equally able to adopt all crops for agricultural production.

Since crop yield in the parental country of origin is distinct from that in the country of residence, the estimated effect of the historical agricultural potential of the parental country of origin should capture the culturally embodied effect of crop yield on traits related to norms and restrictions and their transmission across generations. Furthermore, we also include a set of geographical factors potentially correlated with agricultural productivity such as absolute latitude, mean elevation above sea level, terrain roughness, neolithic transition timing, precipitation, percentage of population living in tropical, sub-tropical and temperate zones, distance to coast or navigable rivers, as well as landlocked region dummies.

Loneliness

The individual-level data employed in this study are drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE, Börsch-Supan, 2008). SHARE is a multidisciplinary longitudinal survey on ageing which focuses on individuals aged 50+ and their spouses.⁹ We consider the data collected in four different waves, namely 5, 6, 7, and 8 (release 8.0.0) as they include information on loneliness. Moreover, the retrospective component of the SHARE data allows to link the information on the respondents' current situation to the retrospective childhood data.¹⁰ Table B.1

⁹The survey contains both the regular and retrospective waves (SHARELIFE). The regular rounds collect information on the individuals' current situation, such as health, working situation, social network/relations, accommodation, economic situation/assets, behavioural risks, and expectations. In addition, two survey rounds add retrospective information on multiple dimensions of the respondents' past (health, health care, accommodation, working career, household situation and performance at school during childhood, number of children, childbearing for women, emotional experiences in early life, relationship with parents, adverse childhood experiences, etc.).

¹⁰In a similar fashion, the European Social Survey (ESS) collects information on individual attitudes, behavioral patterns, and parental origins and is representative of the entire population in terms of age structure. It contains only a direct question on loneliness and lacks most of the health outcomes considered in this study. The available indicators (such as body mass index, depressive symptoms, and single physical health issues) have been collected in

(in Appendix B) reports summary statistics, while Table B.3 (in Appendix B) reports the list of countries included in the analysis.

To assess loneliness, a short three-item version of the Revised UCLA Loneliness scale (henceforth, R-UCLA) was used (Hughes et al., 2004; Russell et al., 1978). It has been shown that this tool has favorable psychometric characteristics (Hughes et al., 2004). The exact wording of the items are: 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. Often, 2, Some of the time, 3. Hardly ever or never. A sum score was computed, therefore the scale ranges from 3 (not lonely) to 9 (very lonely). A multi-item measure that does not mention loneliness directly can be particularly useful when dealing with particular population groups, such as older people because they are often reluctant to admit to loneliness (Qualter et al., 2021). Also, there is variation in how people understand the term "loneliness" and a multi-item measure that does not mention loneliness directly can help to alleviate these concerns.

Other controls

Among demographics, we include age, gender, marital status, number of children, and whether a respondent lives alone in the household.¹¹ Socio-economic variables include the highest educational attainment and occupational status. The retrospective SHARELIFE component of the survey allows us to consider a set of early-life conditions called "Adverse Childhood Experiences (ACE)". According to the adult attachment theory proposed by Hazan and Shaver (1987), early social experiences are likely to influence adult attachment styles and general perception of social relations.

one or a few survey rounds, resulting in a very low number of observations. For all these reasons, we did not consider ESS as an alternative analytical sample.

¹¹Marital status is dichotomized into a binary variable, assigning value 1 if the respondent is legally married, or in a legally registered civil union, and 0 otherwise.

Individuals with secure attachments early in life tend to be more positive about themselves and their relationships than their peers with insecure early-life attachments.¹² This set of variables includes the exposure to child neglect and childhood physical abuse, either from mother, father or third parties.¹³ As a sensitivity check, we consider an additional set of childhood circumstances, including financial hardship, the number of books at home, the absence of a parent, loneliness in childhood, and the respondents' health status when they were 15 years old. Finally, we control for the frequency of contact with kids, participation in socially related activities in the last 12 months, the informal care received by or provided to family members from outside the household, a friend or neighbour, and a set of behavioural risks including frequency of sports activity and smoking.

5 Results

5.1 Historical roots of restraint

In Table 1 we show the relationship between agricultural potential during the pre-1500 period and crop expansion associated with Columbian Exchange in the post-1500 period and contemporary restraint, controlling for continental fixed effects and other geographic and climatic conditions that may have influenced historical agricultural productivity. In order to account for immigration patterns of ancestral populations in the post-1500 period and potential mismatches between the crop yield in the parental country of origin and the crop yield to which their ancestors were exposed prior to migration, we follow Galor and Özak (2016) and adjust crop yield, growth cycle, and timing of

¹²Moreover, adverse childhood conditions have been shown to have a significant impact on health and unhealthy behaviors (Kovacic and Orso, 2022; Brugiavini et al., 2022).

¹³We consider the following item capturing the quality of the child-parent relationship: How would you rate the relationship with your mother/your father (or the woman/man that raised you)? 1. Excellent 2. Very good 3. Good 4. Fair 5. Poor. The relationship with mother/father in childhood is rated as problematic/negative, if the respondent answers "4. Fair" or "5. Poor". Physical harm, on the other hand, is addressed by the following question: How often did your mother/your father push, grab, shove, throw something at you, slap or hit you? 1. Often 2. Sometimes 3. Rarely 4. Never.

transition to agriculture to capture the geographical attributes that existed in the homelands of the ancestral populations of each contemporary country of origin (models "mRIV7" - "mRIV9").¹⁴ This adjustment permits the analysis to capture the culturally embodied transmission rather than the direct effect of geography (Galor and Özak, 2016). We also account for pre-industrial population density and urbanisation, which may have been influenced positively by higher crop yield potential and, as a result, had a direct impact on the degree of restraint. In this way, we are able to separate the effect of potential crop yield from the long-term effect of the other historical traits.

The findings confirm Hypothesis 1. Increased degrees of restraint are closely linked to higher crop yield potential in the pre-1500 period, and to its growth in the post-1500 era. A one-standarddeviation rise in the ancestry-adjusted agricultural yield potential (for a given growth cycle) corresponds to a 7.1-point increase in contemporary restraint, while a one standard deviation increase in the change in yield in the course of the Columbian Exchange increases restraint by 8.56 points (model "mRIV7"). Even after controlling for urbanisation and population density (models "mRIV8" and "mRIV9"), the effect of historical yield remains strong and statistically significant.¹⁵ The negative and economically significant effects of urbanisation and population density may be attributed to the fact that highly intensive agricultural societies were characterised by extended (communitarian) families and village communities, characterised by strong family ties, rules and social norms. In more urbanised societies, on the other hand, the predominant family structure was nuclear (Hofstede et al., 2010) based on weaker ties, more freedom and independence of family members (Todd, 1990; Duranton et al., 2009).

¹⁴In particular, for each country of origin, the adjusted crop yield is the weighted average of the crop yield in the countries where the ancestral populations resided.

¹⁵When using the Hofstede et al. (2010)'s measure of restraint vs. indulgence instead of long-term orientation as the dependent variable, Galor and Özak (2016) obtain similar effects of historical agriculture. The authors stress that the results are somewhat weaker compared to long-term orientation, suggesting that restraint may be driven as well by institutional and/or religious factors. Part of the restraint predicted by historical agro-climatic factors, however, captures the importance of discipline and planning embedded in attitudes toward long-term oriented behaviors.

	mRIV1 not adj.	mRIV2 not adj.	mRIV3 not adj.	mRIV4 not adj.	mRIV5 not adj.	mRIV6 not adj.	mRIV7 adj.	mRIV8 adj.	mRIV9 adj.
Crop Yield (pre-1500)	5.945*** (9.007)	7.126^{***}	7.133***	8.676***	9.262***	10.600^{***}			
Crop Yield Change (post-1500)	(790.7)	(2.071) 4.463^{*}	(2.101) 2.136 (3.060)	(2:592) 3.524 (3.554	(2.780) 3.115 (2.441)	(3.000) 4.808 (3.301)			
Crop Growth Cycle (pre-1500)		(170.7)	(006.2)	(020.0) -4.442* (020.0)	(0.441) -2.329 (0.956)				
Crop Growth Cycle Change (post-1500)				(2.209) 2.386 (9.591)	(2.200) 3.448 (2.000)	(4.449) 0.448 (3.154)			
Crop Yield (Anc., pre-1500)				(170.2)	(076.7)	(+01.6)	7.099***	8.230*** /0 FOF)	7.094^{**}
Crop Yield Change (Anc., post-1500)							(2.410) 8.555** (9.717)	(520-2) 8.729** 6.710)	(2.8(4)) 10.055** (2.070)
Crop Growth Cycle (Anc., pre-1500)							(5.010) -8.129**	(3./19) -5.037 (1.027)	(3.900) -8.714**
Crop Growth Cycle Change (Anc., post-1500)							(3.703) 2.401	(c00.4) 3.097	(4.1(1)) 1.473 (2.127)
Population density in 1500 CE					-6.184***		(969.2)	-5.879***	(201.67)
Urbanization rate in 1800 CE					(1777)	-1.726		(11,30)	-2.601
Absolute Latitude			-7.926	-12.311**	-9.444	(1.044^{**})	-13.920^{**}	-10.386	(1.190) -13.273**
Mean Elevation			(5.667) 4.008	(6.154) 2.295	(6.198) 0.850	(6.381) 0.241	(6.622) 0.683	(6.668) -0.160	(6.603) -0.268
Terrain Roughness			(2.725) -4.188	(2.625) -4.180	(2.506)-2.373	(2.963) -2.295	(2.634) -2.363	$(2.480) \\ -1.187$	$(2.747) \\ -0.684$
Precipitation			(2.923) -5.370	(2.850) -5.065	(2.550) -4.031	(2.908) -4.126	(2.682) -7.630*	(2.441) - 6.658	(2.666) - 8.647^{**}
Pet Land in Tronics			(3.969)	(3.820) -5 170	(3.671)	(4.037) -7.435	(4.222)	(4.216) -3.545	(4.020) -1 520
			(4.082)	(4.341)	(4.459)	(5.140)	(4.215)	(4.269)	(4.551)
Neolithic Transition Timing (Anc.)			·		·	·	-5.536^{**} (2.545)	-5.000° (2.593)	-6.031^{**} (2.550)
Continent controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Neolithic Transition Timing N. Observations	No 88	No 88	No 88	No 88	No 88	No 84	${ m Yes}_{86}$	$_{ m Yes}$ 86	Yes 83
Notes: The table shows the association between period) and restraint (measured on a scale of 0 parenthesis. Significance levels: $* p < 0.1, ** p$	t historical ag to 100). TP < 0.05, ***	ro-climatic le method o p < 0.01.	conditions (₁ f estimation	pre-1500 pote i is OLS. Rol	ential crop yie bust standar	eld and growt d errors clust	h cycle, and t sered at the co	heir change i ountry level	n the post-150 are reported ii

Table 1: The effect of historical agro-climatic conditions on contemporary restraint. Country-level analysis based on Hofstede et al. (2010) and Galor and Özak (2016).

5.2 Life-control dimension of restraint

Before presenting the evidence on the relationship between social norms and loneliness, an intermediate step is necessary in order to show that the composite measure of restraints captures two different preference dimensions. Table B.4 (in Appendix B) considers a wide range of individual opinions regarding compliance with rules, norms, traditions, and socially acceptable behaviour, as well as preferences for leisure and having fun, regressed on the predicted restraint and residuals from model "mRIV7" (Table 1), together with the full set of individual specific demographic and socio-economic characteristics. Since these alternative preferences are not available in SHARE, in this exercise we rely on the European Social Survey (ESS henceforth), a biennial cross-country survey covering a large set of European countries.¹⁶ Models L1 - L4 refer to preferences for leisure and indulgence, while models R1 - R4 consider attitudes toward rules and socially accepted behaviours. Predicted restraint strongly correlates with rules and norms, while it has no effect on leisure and indulgence. In particular, cultural backgrounds characterised by more stringent social norms and restrictions translate into a higher importance attached to socially acceptable behaviours, respect of traditions and customs, safe and controlled environment, and lower tolerance towards members of the LGBTQIA+ community (panel A). The residual component of restraint related to leisure does not correlate with the compliance of rules but significantly impacts preferences for seeking fun and things that give pleasure in life (panel C). Since agro-cultural factors have been shown to be good predictors of contemporary time preferences (Galor and Özak, 2016; Galor et al., 2020), in panel B we control for the Hofstede et al. (2010)'s index of long-term orientation to rule out the possibility

¹⁶ESS is a cross-sectional survey carried out every two years starting from 2002 (round 1) to 2018 (round 9). It contains nationally representative samples of individuals who reside in private households regardless of nationality, citizenship, or language, and collects information on beliefs, attitudes, and behavioral patterns.

that part of the restraint predicted by historical agricultural productivity captures the component of individual time preferences. The effect of our proxy for social norms is unaltered.

5.3 Life control and loneliness

We have shown that part of the restraint predicted by ancestral agro-climatic factors should reflect the culturally embedded life-control dimension conducive to stronger discipline and compliance with rules, whereas the residual component is likely to capture the value placed on leisure and other indulgences.

As a next step, we explore the effects of the predicted restraint on loneliness. Table 2 reports the coefficients from an OLS model in which loneliness is regressed on the parental cultural backgrounds and the full set of covariates. In some models we control for the parental degree of individualism from Hofstede et al. (2010) as a proxy for the average size of social networks at the parental country of origin. Together with the standard definition of second-generation immigrants, *i.e.*, natives with either one or both foreign-born parents, we also consider two alternative definitions, namely, native individuals with a foreign-born mother and a native or foreign-born father, those with a foreign-born father and a native or foreign-born immigrants with both foreign-born parents (Table B.5 in Appendix B).¹⁷

The results strongly support Hypothesis 2. Parental cultural backgrounds with a stronger tendency to frame individual behaviour according to social norms and restrictions positively affect the

¹⁷Even though second-generation immigrants (approximately 10% of the sample) were born and raised in the same economic and institutional environment as native individuals, they may still feel "marginalized" compared to their peers because of their parental foreign origin and/or because they belong to ethnic enclaves (minorities), which may affect the risk of loneliness (Madsen et al., 2016). The difference in means of loneliness between second-generation immigrants and the rest of the population in our sample, however, is not statistically different from 0, which alleviates potential concerns related to representativity. The t-test statistic is -1.0470 with a corresponding two-tailed p-value 0.2951 > 0.05. Furthermore, according to the Kolmogorov-Smirnov test, the null hypothesis of equal distribution of loneliness between second-generation immigrants and the rest of the sample cannot be rejected (p = 0.315).

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	(1) UCLA	(2) UCLA	(3) UCLA	(4) UCLA	(5) UCLA	(6) UCLA
RIV (pred), M	0.009***	0.008***			0.008***	0.007***
Individualism, M	(0.002)	(0.001)			(0.002)	(0.001) -0.000
RIV (pred), F		(0.002)	0.006*	0.006**	0.004	(0.002) 0.005
Individualism, F			(0.003)	(0.003) -0.001	(0.004)	(0.003) -0.000
Age	0.002***	0.001***	0.002**	$(0.002) \\ 0.001$	0.002**	$(0.002) \\ 0.001$
Female	$egin{array}{c} (0.001) \ 0.036 \end{array}$	$(0.000) \\ 0.038$	$egin{array}{c} (0.001) \ 0.029 \end{array}$	$(0.001) \\ 0.018$	$egin{array}{c} (0.001) \ 0.029 \end{array}$	$egin{array}{c} (0.001) \ 0.015 \end{array}$
Low Education	$(0.049) \\ 0.143^{**}$	$(0.056) \\ 0.121^*$	$(0.049) \\ 0.147^{**}$	$(0.058) \\ 0.133^{**}$	$(0.050) \\ 0.146^{**}$	$egin{array}{c} (0.062) \ 0.118^* \end{array}$
High Education	$(0.062) \\ -0.106^{**}$	$(0.062) \\ -0.091^*$	$(0.063) \\ -0.108^{**}$	(0.063) - 0.088^{**}	$(0.064) \\ -0.108^{**}$	$(0.062) \\ -0.089^*$
Retired	$(0.046) \\ -0.108$	$(0.049) \\ -0.082$	$(0.046) \\ -0.110$	$(0.042) \\ -0.089*$	$(0.046) \\ -0.108$	$(0.049) \\ -0.102^{**}$
Unemployed	$(0.084) \\ 0.091$	$egin{array}{c} (0.053) \ 0.092 \end{array}$	$(0.081) \\ 0.147$	$(0.046) \\ 0.186$	$(0.084) \\ 0.135$	$(0.041) \\ 0.153$
Disabled	(0.128) 0.587^{***}	(0.138) 0.645^{***}	(0.131) 0.541^{***}	(0.125) 0.587^{***}	(0.132) 0.545^{***}	(0.138) 0.585^{***}
Employed	(0.135) - 0.306^{***}	(0.120) - 0.286^{***}	(0.145) - 0.297^{***}	(0.122) - 0.294^{***}	(0.147)-0.301***	(0.129) - 0.311^{***}
Married	(0.104) - 0.249^{**}	(0.088) - 0.277^{***}	(0.093) - 0.252^{***}	(0.066) - 0.240^{**}	(0.095) - 0.257^{***}	(0.065) - 0.262^{**}
Divorced	$(0.098) \\ -0.191^*$	$(0.104) \\ -0.214^*$	$(0.097) \\ -0.168$	$(0.107) \\ -0.139$	$(0.098) \\ -0.174$	$(0.108) \\ -0.154$
Widowed	$(0.115) \\ -0.181$	$(0.121) \\ -0.167$	$(0.117) \\ -0.176$	$(0.132) \\ -0.133$	$(0.118) \\ -0.179$	$(0.132) \\ -0.142$
Number of children	$(0.157) \\ -0.021*$	(0.159)- $0.031**$	(0.155) - 0.025^{**}	(0.155) - 0.037^{***}	(0.156) - 0.024^{**}	(0.157)- $0.036***$
Lives alone	(0.011) 0.472^{***}	(0.014) 0.436^{***}	(0.011) 0.455^{***}	(0.012) 0.458^{***}	(0.011) 0.455^{***}	(0.012) 0.437^{***}
Poor HH (when 10)	(0.033) 0 104	(0.024) 0.115	(0.032) 0.104	(0.012) 0.094	(0.033) 0.106	(0.032) 0.104
N books (when 10)	(0.072)	(0.075)	(0.075)	(0.074)	(0.073)	(0.076)
Harm (parents or third)	(0.013) 0.242***	(0.016) 0.238***	(0.012) (0.014) 0.230***	(0.012) (0.016) 0.236***	(0.011) (0.014) 0.240***	(0.016) 0.230***
Relationship (advorse)	(0.047)	(0.051)	(0.048)	(0.055)	(0.048)	(0.058)
About no port	(0.034)	(0.047)	(0.043)	(0.047)	(0.043)	(0.050)
Absent parent	(0.028) (0.062)	(0.025)	(0.012) (0.052)	(0.001)	(0.013)	-0.008 (0.049)
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes
wave of interview N. Observations	Yes 5823	${}_{ m Yes}$	Yes 5646	${ m Yes}\ 5205$	Yes 5646	${ m Yes}$ 5080

Notes: The table shows the association between the predicted restraint (measured on a scale of 0 to 100) in parental countries of origin and loneliness (measured on a scale of 3 to 9). The method of estimation is OLS. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

 Table 2: Direct association between predicted restraint and loneliness (UCLA loneliness scale)

 among second-generation immigrants.

This is true independently of the variety of connections or the extent of social networks as approximated by the index of individualism (Columns [2], [4] and [6]). Interestingly, only the mother's cultural heritage shows a significant impact, indicating that parents' cultural origins have unequal effects on shaping children's attitudes in the process of socialisation and perception of the quality of their social relationships. This is in line with the existing empirical evidence on intergenerational transmission of attitudes and behaviour (Fernández et al., 2004, Cipriani et al., 2013, Dohmen et al., 2012, Farré and Vella, 2013, Dohmen et al., 2011, Sgroi et al., 2020, among others). The results also suggest that loneliness is particularly pronounced for individuals living alone and among those with disabilities.¹⁸

Similarly, adverse early life conditions such as the absence of a parent or a low-quality parentchild relationship correlate positively with loneliness.¹⁹ Meanwhile, more educated, married, and/or employed individuals with more kids feel less lonely. These findings are in line with previous research (Beutel et al., 2017; Menec et al., 2019; Soest et al., 2018; Hajek and König, 2020).

The evidence in Table B.6 (in Appendix B) further confirms the strength of the life-control dimension of restraint in predicting loneliness. The association between loneliness and the aggregated measure of restraint is lower in magnitude (Column [1]) since it also captures the effect of the residual component, which is not directly related to social norms and the quality of social relationships.²⁰ Indeed, the coefficient of the residual component of restraint is not statistically different from zero (Column [2]). On the other hand, ancestral crop yield (as the main proxy for historically rooted rules and discipline) positively correlates with loneliness, which can be attributed to ances-

 $^{^{18}}$ The results do not change significantly if we exclude from the sample the individuals affected by some forms of disability (4.2% of the sample).

¹⁹The interpretation of the association between loneliness and emotional experiences such as the parent-child relationship requires caution since it may be subject to recall bias and "coloring". However, by assessing the internal and external consistency of the measures of childhood socio-economic status and health, Havari and Mazzonna (2015) found that overall respondents seem to remember fairly well their childhood conditions.

²⁰The residual part of restraint is given by residuals from model "mRIV7" (Table 1).

tral processes that have contributed to the emergence and persistence of cultural traits reflected in the contemporary degree of restraint (Column [3]). In the presence of the predicted restraint, the effect of ancestral crop yield vanishes (Column [4]). Since historical crop yield potential also captures other aspects of individual preferences which are not directly related to loneliness, such as patience and generalized trust (Galor and Özak, 2016), in Table B.7 (in Appendix B) we show that the indicator of long-term orientation from Hofstede et al. (2010) as well as the component of time preferences captured by Galor and Özak (2016) have no effect on loneliness and do not alter the statistical and economic significance of predicted restraint.²¹ Moreover, the life-control component of restraint does not capture other cultural characteristics, such as masculinity (intensity of internal cooperation and competition), uncertainty avoidance (aversion to ambiguity) and power distance (the level of hierarchy and inequality of power). Finally, the results in Column [7] show that originating from countries in which the predominant family structure is of the "stem" or "communitarian" type (*i.e.*, authoritarian families characterized by tight ties where rules and social norms are strongly transmitted across generations) has no impact on the effect of restraint.

5.4 Freedom, satisfaction and restraint

In this section we aim at exploring the underlying mechanism linking rules and restrictions to loneliness. To this end we first establish a relationship between individuals' perceptions of freedom and their degree of satisfaction with social life. The assumption is that in the presence of stricter norms, individuals face less freedom in choosing their optimal behaviours, which may result in lower satisfaction, *ceteris paribus*. This is particularly relevant for the perceived quality of social

²¹The predicted component of long-term orientation is obtained from a model equivalent to "mRIV7" (Table 1), in which we regressed the index of time preferences from Hofstede et al. (2010) on the full set of agro-climatic factors and controls from Galor and Özak (2016).

connections, which represent the main conceptual element of loneliness.

We rely on the Gallup World Poll Survey and consider native individuals living in more than 145 countries worldwide.²²We first show that respondents with weaker perceptions of freedom are significantly less satisfied and more unhappy. The perception of freedom is captured by the following question: "Satisfaction with your freedom to choose what you do with your life", while the degree of satisfaction is measured by three different variables, namely "Have you experienced happiness yesterday?", the "Life-evaluation index" expressed on a scale from 0 to 10, where 0 indicates the worst possible life and 10 the best possible life; and the "Social-life index" which assesses a respondent's social support structure and opportunities to make friends in the city or area where he or she lives.²³ Figure 1 panel A shows the effects of the perceived restricted freedom and low leisure on the probability of feeling unhappy, and having low perceptions of social life quality. The dots represent marginal effects expressed as a percentage point difference. The results suggest that having no freedom to choose the optimal way of living significantly correlates with all the dissatisfaction measures considered.

As a next step, we show that restraint reflects lower perceived freedom to choose optimal social behaviours and lower satisfaction with social life. The mechanism driving more restraint societies into having lower satisfaction with social relationships quality, however, may not be straightforward. One can argue that less restraint may correlate with a more competitive market economy or a capitalist society. Competition for resources in such societies might just leave its members less time to spend on high-quality interactions. Hence, less restraint societies might have more individuals

 $^{^{22}}$ Gallup surveys residents in more than 150 countries and areas, using randomly selected, nationally representative samples. We consider the pooled sample over seventeen waves of the survey, for a total of 1,521,544 individual-level observations. We exclude first-generation immigrants since they are likely to be characterized by an upward bias in the perception of freedom.

²⁵We categorize the responses to these questions as follows: being unhappy; low life-evaluation index ("suffering"): individuals who rate their current and future lives as 4 or lower; and low social-life index (low quality of social life).

dissatisfied with social life. Alternatively, societies with more rules (restraint societies) could be argued to improve the group cohesion of its members and increase each member's sense of belonging. Religion, in a way, would do precisely that. The latter mechanism should be reflected by the degree of collectivism as opposed to individualism. In order to rule out these alternative mechanisms, we control for the total number of hours worked per week as a proxy for leisure, individuals' religion, and regress the individuals' perception of freedom and social life satisfaction on the societies' degree of collectivism as a proxy for group cohesion and extension of social networks. Figure 1 panel B reports the associations between restraint, freedom and social life satisfaction. It suggests that individuals living in more restraint societies, are significantly more likely to perceive that their freedom is limited (Panel B).

Finally, in order to show that freedom does not relate significantly with group cohesion, in panel C of Figure 1 we report the associations between the degree of collectivism, freedom and social-life satisfaction. While there is a significant correlation between more collectivism and lower satisfaction, the relationship with the perceived freedom is not statistically significant.

Figure 1: Marginal effects: restricted freedom and low leisure on satisfaction (panel A); restraint on restricted freedom and satisfaction (panel B); and collectivism on restricted freedom and satisfaction (panel C).



Note: The figure depicts marginal effects (expressed as a percentage point difference) of low freedom (perceived) on being unhappy, life-evaluation index (low evaluation/high dissatisfaction equals one whenever individuals report their current and future lives four or lower), and social-life index (low quality of social life). Degree of restraint has been standardized - the coefficients show the effect of a one standard deviation increase in restraint. In all model specifications we control for age, gender, marital and employment status, household size, income, education, religion, and country and continent fixed effects. Robust standard errors are clustered at the country level. Number of observations: 1,050,554.

6 Loneliness and health

The vast majority of the existing research on loneliness and health is based on multivariate regression models that link self-reported loneliness to a variety of health outcomes, ranging from emotional disorders to physical or cognitive decline. These studies generally reveal correlations and can say little about causation. Longitudinal studies (Mann et al., 2022, among others), on the other hand, alleviate the issue of endogeneity to some extent, but they do not completely solve the problem, since the coefficient on the lagged loneliness variable cannot be interpreted as a causal effect because it may be confounded by unobserved heterogeneity or omitted variables (Wooldridge, 2010).

In what follows, we contribute to this literature by using our previous results to isolate the causal impact of loneliness on a variety of health outcomes. Specifically, we estimate a two-stage model where self-reported loneliness is instrumented with the maternal country of origin's life-control component of restraint:

$$Health_{i,p,c} = \alpha + \beta L_i + \psi \mathbf{X_i} + \rho + F E_i + \eta_i, \tag{3}$$

where $Health_{i,p,c}$ is an indicator measuring mental or physical health of individual *i* with parental ancestry *p*, born and currently residing in country *c*, L_i denotes a measure of the individual *i*'s loneliness, X_i is a full set of individual level characteristics, and FE_i are the country of current residence and wave controls.

By plugging the first stage fitted values from Equation (2) in the second stage equation we obtain the reduced form model for health-related outcomes:

$$Health_{i,p,c} = \alpha + \beta \hat{L}_i + \psi \tag{4}$$

We consider six health indicators calculated from SHARE: EURO-D depression scale (Prince et al., 1999), which ranges from 1 (absence of depressive symptoms) to 12 (severe depressive symptoms);²⁴ number of mobility, arm function and fine motor limitations; number of limitations with

²⁴The EURO-D depression scale consists of 12 elements connected to psychological health: depression, pessimism, willingness to die, guilt complexes, sleeping difficulties, lack of interests, irritability, lack of appetite, fatigue, lack of

activities of daily living (ADL); body mass index (BMI); number of chronic diseases, and selfassessed health (ranging from 1 (excellent) to 5 (poor)).²⁵ As a sensitivity check, we generate an alternative EURO-D measure that excludes the item eliciting self-assessed depressive symptoms since it may conceptually overlap with loneliness and/or generate concerns regarding the exclusion restriction. Together with the overall prevalence (intensity of occurrence) of chronic diseases, we also estimate separately the effect of loneliness on five different physical health-related factors, namely diabetes, high blood pressure, stomach or duodenal ulcer, and peptic ulcer, high blood cholesterol and stroke. In addition, we consider a set of binary variables referring to the consumption of drugs (medicines) for six health problems: anxiety, sleeping problems, cholesterol, diabetes, pain and high blood pressure. The onset of these factors is captured by a set of binary variables.

Before discussing the main results, a word of caution regarding the validity of exclusion restriction is advisable. First, the identification of the causal effect of loneliness requires that culture does not affect health through any other variable other than loneliness (exclusion restriction). The index of restraint, apart from the perception of life-control as a core dimension, captures as well some minor traits such as the importance of leisure activities, spending, and other forms of indulgence. If leisure and indulgence affect health-related behaviours, which in turn shape individuals' health outcomes, the overall measure of restraint would not be a good instrument for loneliness. Norms and restrictions governing social relationships, on the other hand, are less likely to have a direct impact on unhealthy lifestyles or other unobservable health-related factors, such as genetic

concentration, inability to take pleasure from normal activities and a tendency to cry. Each item is of equal weighting and is reported with a 0 if the symptom is absent and a 1 when it is present.

²⁵As for the ADL measure, the respondents are given a list of fifteen everyday activities (such as dressing, bathing, shopping, etc.) and asked to declare whether they have any difficulty doing each of these activities excluding any difficulties that they expect to last less than three months. Mobility limitations, on the other hand, comprise activities such as climbing, lifting heavy weights, pulling large objects, etc. For chronic diseases, the respondents are given a list with 21 different items and asked how many of them they have been diagnosed or for how many they are currently being treated for or bothered by.

predispositions. We cannot, however, a priori rule out their potential effects on health, in particular on some aspects of emotional disorders such as depression or anxiety as they may partly overlap with loneliness from a conceptual point of view (Mann et al., 2022; Badcock et al., 2023), or on some other socio-economic factor such as labor market participation and/or educational attainment (especially for women). Although the exclusion restriction cannot be formally tested, we provide compelling evidence that suggests that it is unlikely to be violated.

Second, the exclusion restriction requires that the effect of culture does not pass through factors closely related to health, like risky health behaviors and/or other individual specific socio-economic characteristics. In Table B.8 (In Appendix B) we show that the predicted component of restraint has no effect on physical health outcomes and has only a marginally positive effect on EURO-D (panel A). This latter evidence is primarily driven by the association between culture and self-reported depressive symptoms, which may, to some extent, be attributed to the conceptual intersection of loneliness and depression. As a precaution, we develop an alternative EURO-D measure (EURO alt) that excludes this specific emotional disorder. The effect of predicted restraint vanishes. Interestingly, overall restraint, RIV (raw), significantly correlates with mental health indicators, ADL and BMI, as well as with being physically inactive (Panel B). This effect is driven by the residual component of restraint (Panel C). Finally, the instrument is not significantly associated with individuals' educational attainment, wealth, or being out of the labor market (Panel A). While the absence of a direct link between maternal restraint and health does not imply that the exclusion restriction has been fully met, these findings may be viewed as reassuring.

The residual component of restraint (capturing leisure and other indulgences), on the other hand, significantly correlates with most of the health outcomes and some behavioral risks. Finally, we run an over-identification test, which provides further proof that the exclusion restriction should not be violated.

6.1 Results

In Table B.9 (in Appendix B) we replicate a simple OLS model on a full-sample of individuals, regressing a set of physical and mental health outcomes on individuals' self-assessed loneliness as measured by the reduced UCLA scale. Loneliness appears to be correlated with most of the health outcomes considered: feeling lonely is significantly associated with an increased risk of mental disorders (as measured by the original EURO-D scale as well as by the modified one excluding depression), mobility limitations, and overall poorer health. However, drawing conclusions from these findings is difficult because the estimated effects do not account for the presence of reverse causality, resulting in a spurious and/or underestimated true effect of loneliness on health.²⁶

Table 3 reports our main results from a two-stage IV model.²⁷ According to the Stock and Yogo (2005) rule of thumb, the F-statistic confirms the strength of our instrument. Feeling lonely increases the likelihood of mental disorders, a high body mass index, and, albeit marginally, mobility limitations. More specifically, a gradual increase in loneliness causes a 0.95-point increase in the intensity of emotional distress (as measured by the EURO-alt scale) and a 3.14-point increase in the body mass index. The effect on mental disorders is primarily driven by an increased likelihood of suicidal thoughts and feelings of guilt (Table B.12, in Appendix B). This result is in line with Beutel et al., 2017 and Bennardi et al., 2019. Interestingly, loneliness has no impact on the incidence of

²⁶In addition, in Table B.10 (in Appendix B) we report the coefficients from a panel model using lagged loneliness as a predictor of the onset of mental and physical health outcomes. The results do not change significantly, although the estimated effects are somewhat reduced.

²⁷Our baseline specification considers second-generation immigrants defined as native individuals with one or both foreign-born parents. The maternal predicted restraint for individuals with foreign-born fathers and native mothers is identical to their country of birth predicted restraint. The results, however, are robust to the exclusion of these individuals, *i.e.*, when we focus only on second-generation immigrants with foreign-born mothers (Table B.11). For the sake of space and clarity, we do not present the first-stage coefficients for the other explanatory and control variables since they have already been reported in Table 2 (column [1]).

chronic conditions, limitations with activities of daily living, or the perception of general health. This is consistent with Bekhet and Zauszniewski (2012) who find no association between loneliness and chronic conditions, but contradicts Richard et al. (2017) and Jessen et al. (2017) who report a significantly higher likelihood of self-reported chronic diseases and impaired health conditions in lonely individuals.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	
RIV (pred)	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	
(F)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	
1st Stage F	24.862	24.862	24.862	24.995	21.264	24.514	24.862	
2nd stage	EURO-D	EURO-alt	MOBILITY	ADL	BMI	CHRONIC	SAH	
Longlings (UCLA)	1 940***	0 059***	1 1 49*	0.368	2 1 2 8 **	0.043	0.319	
Lonenness (COLA)	(0.392)	(0.339)	(0.683)	(0.266)	(1.227)	(0.692)	(0.364)	
_								
Full set of								
regressors from Table 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
N. Observations	5823	5823	5821	5792	5820	5522	5823	

Notes: The table shows the direct effect of loneliness on second generation immigrants' health outcomes. Abbreviations: "ADL" - number of limitations with activities of daily living, "BMI" - body mass index, "SAH" - self-assessed health. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is ivreg2. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1, associated to maternal country of origin. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 3: The effect of loneliness on health among second-generation immigrants.

Furthermore, the lack of an effect of loneliness on limitations in daily activities is not aligned with previous research findings (Buchman et al., 2010; Perissinotto et al., 2012). It is worth noting that, when compared to OLS estimates in Table B.9, the effect of instrumented loneliness is 2.05 times larger in magnitude than the non-instrumented one for depressive symptoms and 4.6 for mobility. The body mass index, on the other hand, turns to be significant with an economically important effect.²⁸ Finally, the effects of loneliness are not altered by health-related risky behaviours, such as physical inactivity, few intense sports and smoking (Table B.14, in Appendix B).

When considering individuals' cognitive functioning, such as memory, literacy, and numeracy, as well as physical health-related factors separately (Table 4), loneliness does not seem to have any direct effect, which is not entirely consistent with Richard et al. (2017), among others. This result, however, should not be interpreted as the absence of any linkage between loneliness and physical health issues. Loneliness is likely to increase the likelihood of physical health problems indirectly through its economically significant impact on BMI. Indeed, being overweight or obese is significantly associated with the occurrence of chronic diseases, hypertension, diabetes, and high blood cholesterol (Table B.15, in Appendix B). The same indirect channel may hold true for functional and mobility limitations.

²⁸To further confirm the validity of predicted restraint as an instrument for loneliness, in Table B.13, we show that the overall index of restraint performs significantly worse. The effect of instrumented loneliness on BMI vanishes, while its effect on mental disorders remains significant and doubles in magnitude. The weakness of the aggregate measure is due to the fact that its leisure component does not correlate with loneliness and distorts the effect of the life-control dimension, which is in line with the evidence reported in Table B.6.

1st stage	(1) UCLA	(2) UCLA	(3) UCLA	(4) UCLA	(5) UCLA	(6) UCLA	(7) UCLA	(8) UCLA
RIV (pred)	0.010^{***} (0.003)	0.010^{***} (0.003)	0.010^{***} (0.003)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)
1st Stage F	10.599	10.599	10.599	24.312	24.312	24.312	24.312	24.312
2nd stage	MEMO	NUM	FLUE	PRESS	CHOL	DIAB	ULCER	STROKE
Loneliness (UCLA)	$\begin{array}{c} 0.344 \\ (0.369) \end{array}$	-0.052 (0.264)	-0.758 (2.144)	-0.145 (0.207)	-0.099 (0.115)	$0.055 \\ (0.051)$	$0.061 \\ (0.073)$	$0.034 \\ (0.065)$
Full set of regressors from Table 2 Country (of residence) Wave of interview	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes

Notes: The table shows the direct effect of loneliness on second generation immigrants' health outcomes. Abbreviations: "MEMO" - memory, "NUM" - numeracy, "FLUE" - fluency, "PRESS" - pressure, "CHOL" - cholesterol, "DIAB" - diabetes. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is ivreg2. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1, associated to maternal country of origin. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 4: The effect of loneliness on cognitive functioning and single health outcomes (physical) among second-generation immigrants.

In addition to mental health and BMI, loneliness significantly affects the prevalence of drug use for pain and inflammation (Table 5). Being lonely increases the probability of medication for stomach pain by 11%, and for inflammation by 6%. This result is consistent with the existing literature showing that some markers of systematic inflammation are higher among lonely individuals (Nersesian et al., 2018; Smith et al., 2020), which, in turn, may increase the risk of cardiovascular diseases and other physical health issues and functional decline.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1st stage	UCLA							
RIV (pred)	0.009^{***} (0.002)							
1st Stage F	24.166	24.166	24.166	24.166	24.166	24.166	24.166	24.166
2nd stage	CHOL	PRESS	CORON	PAIN	SLEEP	ANX	STOM	INFL
Loneliness (UCLA)	-0.089 (0.071)	-0.185 (0.202)	-0.112 (0.116)	$0.137 \\ (0.095)$	-0.060 (0.065)	-0.038 (0.071)	0.109^{*} (0.066)	0.058^{*} (0.033)
Full set of regressors from Table 2 Country (of residence) Wave of interview	Yes Yes Yes							
N. Observations	5820	5820	5820	5820	5820	5820	5820	5820

Notes: The table shows the direct effect of loneliness on second generation immigrants' drug consumption. Abbreviations: "CHOL" - drugs for high blood cholesterol, "PRESS" - drugs for hypertension, "CORON" - drugs for coronary diseases, "ANX" - drugs for anxiety, "STOM" - drugs for stomach burns, "INFL" - drugs for suppressing inflammation. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is ivreg2. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1, associated to maternal country of origin. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 5: The effect of loneliness on drug consumption among second-generation immigrants.

6.2 Sensitivity analysis

In this section, we test the robustness of the results from our baseline specification in Table 3, including: i) a direct question on loneliness; ii) controls for the frequency of contact with children (for a sub-set of individuals with offspring); iii) socially related activities in the last 12 months; iv) health status in the first 15 years of life and loneliness in childhood; and v) whether an individual provided or received informal care (help) from a family member from outside the household, a friend or neighbor.

Table B.16 (in Appendix B) reports the effects of loneliness when the individuals are directly asked whether and how often they feel lonely. Loneliness is significant only for mobility and body mass index, even though the predicted restraint results a weak instrument (F-test=6.029). This is not surprising given that direct mention of loneliness may be problematic when dealing with specific

population groups, such as the older people. This is because older individuals are often reluctant to admit to loneliness (Qualter et al., 2021). Furthermore, there is variation across cultures in how people understand the term "loneliness", which may bias the results.

The likelihood of loneliness may be influenced as well by the frequency of parent-offspring interactions (contacts). In Table B.17, Panel A (in Appendix B) we control for three different frequency levels (with contact on a daily basis as the reference category): frequent contact (several times a week), fair contact (once a week or every two weeks) and rare contact (once a month, less than once a month, never). The effects of loneliness are robust and similar to those shown in Table 3. Similarly, participating in voluntary or charity work, sporting activities, or socializing with others through games and other types of entertainment is negatively associated with loneliness (Panel B). The effects of the culturally embodied social norms and restrictions remain unaltered, strengthening the postulate according to which the feeling of loneliness is shaped by the perception of quality instead of the frequency of interaction. Accounting for these additional factors does not alter the impact of loneliness on health, which remains within the range reported in the baseline specification.

In addition to the above set of socially-related activities, loneliness may be influenced as well by the presence of relatives, friends, or neighbours in times of need, or by giving help to the others. The results in Table B.18 (in Appendix B) show that individuals providing help to the other relatives, neighbours or friends are, on average, less lonely, while those receiving help from others are more likely to experience loneliness. Providing or receiving help, however, does not alter the effect of restraint, nor it resizes the impact of loneliness on health.

Individuals' current health and/or feelings of loneliness may be influenced in part by similar childhood experiences or inherited health problems. In order to account for these additional factors, in Table B.19 (in Appendix B) we control for loneliness episodes (Panel A) and health conditions in

childhood, *i.e.*, when individuals were aged 10 (Panel B). The statistical and economic significance of loneliness remains robust. Compared to the baseline specification in Table 3, the size of the effects of mental health and body mass index is larger, especially when health conditions in childhood are taken into account.

7 Conclusions

In this paper, we contribute to the research on the cultural determinants of loneliness. We focus on the historical and intergenerational aspects of culture, particularly how socially imposed rules and norms can restrict individuals' choices, thereby affecting their social interactions and sense of freedom.

To achieve this objective, we employ a set of ancestral factors associated with higher preindustrial agricultural returns. These factors triggered more intensive modes of production, demanding disciplined behaviour, stricter rules, and meticulous planning. Our research demonstrates that this cultural trait is closely linked to individuals' sense of having control over their lives, notably the "life-control dimension." Additionally, we provide evidence of the strong correlation between this cultural trait and individuals' perceptions of freedom in their lives, as well as their attitudes toward rules and socially accepted behaviours. Assuming that this cultural trait persists across generations, we explore how it influences loneliness among second-generation migrants, who differ only in terms of their parental cultural backgrounds. We emphasize that direct associations with agro-climatic factors alone cannot capture the effects of rules and restrictions, as historical agricultural potential also encompasses other important individual preferences, such as patience, which are not directly related to loneliness. Having established a robust association between the predicted life-control dimension and loneliness, we demonstrate its validity as an instrument in a two-stage model for health. In this framework, we find that loneliness directly impacts body mass index and specific mental health issues. Interestingly, our results show that these effects are more pronounced than those estimated through ordinary least squares (OLS).

Several implications emerge from our work. Cultural heritage, encompassing attitudes and behaviors related to social experiences, plays a prominent role in shaping individuals' experiences of loneliness. Consequently, when developing interventions to combat loneliness, policymakers must consider the diverse ways in which individuals experience loneliness across different societies and groups with distinct cultural backgrounds. Moreover, the connection between loneliness and health reveals a new channel through which deeply-rooted cultural and individual characteristics can influence economic development processes.

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A Appendix A

Hofstede et al. (1991) and Hofstede et al.'s (2010) dimensions of culture

In addition to the two cultural dimensions described in Section 2, (Hofstede et al., 1991) and Hofstede et al.'s (2010) six-dimensional model of national culture includes the following four cultural dimensions:

- 1. Uncertainty Avoidance. This dimension refers to a society's tolerance for ambiguity. It is conceptually different from risk avoidance. Cultures oriented to uncertainty avoidance are more prone to support stricter rules, laws, and norms aimed at reducing the ambiguity and offering "one-size-fits-all" solutions. On the other side, cultures accepting ambiguity prefer fewer rules and more freedom in expressing different opinions. According to Hofstede et al. (2010), this dimension is conceptually associated to indulgence.²⁹
- 2. Long Term versus Short Term Orientation. This dimension defines the extent to which a society looks toward the future rather than resorting to the past. Short-term oriented societies look to the past experiences to deal with the current challenges, and maintain a rather static and fixed mindset. Long-term oriented cultures, on the other side, are more flexible, susceptible to change, and ready to cope with uncertain future challenges. Moreover, long term oriented societies value relationships while short term oriented societies focus more on tradition.
- 3. **Power Distance**. Power distance measures how people in a society relate to each other on a hierarchical scale. High power distance cultures assign a higher weight to a person or authority, while low power distant societies emphasize the equal treatment of everyone.

²⁹However, the authors did not find objective ways of measuring and theorizing this association.

4. Masculinity versus Femininity. Masculinity is about the distinction of gender roles. In masculine societies gender roles are clearly distinct. Men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life. Femininity stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life.³⁰

 $^{^{30}}$ Hofstede et al. (2010), page 140.

B Appendix B

Variable	Mean	Std. Dev.	Min.	Max.	N
Loneliness (UCLA)	3.869	1.336	3	9	5823
Loneliness (direct)	2.703	0.570	1	3	5823
RIV (raw), M	63.115	16.987	22	96	5823
RIV (raw), F	62.819	17.725	22	96	5646
RIV (pred), M	60.552	6.665	32.591	76.673	5823
RIV (pred), F	60.888	6.709	20.66	89.384	5646
RIV (res), M	2.563	14.669	-32.346	27.456	5823
RIV (res), F	1.931	15.222	-32.346	27.456	5646
Individualism, M	57.132	15.618	25	91	5451
Individualism, F	57.481	15.719	20	91	5215
Stem, M	0.298	0.458	0	1	5023
Stem, F	0.304	0.46	0	1	4630
EURO - D	2.309	2.128	0	12	5823
EURO alt	1.914	1.852	0	11	5823
EURO-D: Depression	0.41	0.492	0	1	5816
EURO-D: Pessimism	0.142	0.349	0	1	5804
EURO-D: Suicide	0.066	0.248	0	1	5813
EURO-D: Guilt	0.093	0.29	0	1	5803
EURO-D: Sleep	0.361	0.48	0	1	5821
EURO-D: Interest	0.072	0.258	0	1	5819
EURO-D: Irritability	0.316	0.465	0	1	5814
EURO-D: Appetite	0.078	0.269	0	1	5822
EURO-D: Fatigue	0.343	0.475	0	1	5819
EURO-D: Concentration	0.124	0.329	0	1	5812
EURO-D: Enjoyment	0.082	0.274	0	1	5816
EURO-D: Tearfulness	0.241	0.427	0	1	5812
Mobility limitations	1.405	2.151	0	10	5823
ADL	0.164	0.618	0	6	5821
BMI	27.319	5.053	13.62	73.462	5792
Chronic diseases	1.746	1.586	0	11	5820
SAH	3.101	1.059	1	5	5823
No physical activity	0.08	0.271	0	1	5823
Int. sport	2.422	1.323	1	4	5819
Smoking	0.482	0.5	0	1	5823
Memory	2.901	0.942	1	5	4202
Numeracy	3.651	0.989	1	5	4420
Fluency	22.98	7.072	0	93	4202
Hypertension	0.4	0.49	0	1	5818
Cholesterol	0.239	0.426	0	1	5818

 Table B.1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	Ν
Diabetes	0.135	0.341	0	1	5818
Ulcer	0.042	0.2	0	1	5818
Stroke	0.033	0.178	0	1	5818
Drugs for: pressure	0.42	0.494	0	1	5820
Drugs for: coronary	0.088	0.284	0	1	5820
Drugs for: pain	0.139	0.346	0	1	5820
Drugs for: sleep	0.075	0.264	0	1	5820
Drugs for: anxiety	0.076	0.266	0	1	5820
Drugs for: stomach	0.09	0.286	0	1	5820
Drugs for: inflammation	0.025	0.156	0	1	5820
Lonely (when 10)	0.691	0.968	0	3	5810
Poor health (when 10)	0.135	0.341	0	1	4942
Activities: voluntary	0.188	0.391	0	1	5807
Activities: training	0.167	0.373	0	1	5807
Activities: sport club	0.321	0.467	0	1	5807
Activities: comm. org.	0.076	0.264	0	1	5807
Activities: reading	0.818	0.386	0	1	5807
Activities: games	0.51	0.5	0	1	5807
Contact: daily	0.257	0.437	0	1	4192
Contact: frequent	0.271	0.444	0	1	4192
Contact: fair	0.298	0.457	0	1	4192
Contact: rare	0.175	0.38	0	1	4192
Informal care (received)	0.197	0.398	0	1	5286
Informal care (given)	0.308	0.462	0	1	5286
Age	65.452	8.651	50	96	5823
Female	0.588	0.492	0	1	5823
Low Education	0.236	0.425	0	1	5823
High Education	0.297	0.457	0	1	5823
Retired	0.545	0.498	0	1	5823
Unemployed	0.023	0.149	0	1	5823
Disabled	0.042	0.2	0	1	5823
Employed	0.328	0.47	0	1	5823
Married	0.67	0.47	0	1	5823
Divorced	0.133	0.34	0	1	5823
Widowed	0.121	0.326	0	1	5823
Number of children	2.206	1.345	0	14	5823
Lives alone	0.226	0.419	0	1	5823
N. books (when 10)	2.595	1.269	1	5	5823
Poor HH (when 10)	0.218	0.413	0	1	5823
Absent parent	0.149	0.356	0	1	5823
Harm (parents or third)	0.304	0.46	0	1	5823
Relationship (adverse)	0.553	0.497	Ō	1	5823

Country	Individ.	RIV	Country	Individ.	RIV
Albania		85	Italy	76	70
Algeria		68	Jamaica	39	
Andorra		35	Japan	46	58
$\operatorname{Argentina}$	46	38	Jordan		57
Australia	90	29	Korea	18	71
Austria	55	37	Kosovo		85
Azerbaijan		78	Kyrgyzstan		61
Bangladesh	20	80	Latvia	70	87
Belarus		85	Lithuania	60	84
Belgium	75	43	Luxembourg	60	44
Benin	78		North Macedonia		65
Bosnia and Herzegovina		56	Malaysia	26	43
Brazil	38	41	Mali		57
Bulgaria	30	84	Malta	59	34
Burkina Faso		82	Mexico	30	3
Canada	80	32	Moldova		81
Central African Republic	73		Morocco	46	75
Chile	23	32	Netherlands	80	32
China	20	76	New Zealand	79	25
Colombia	13	17	Nigeria		16
Costa Rica	15		Norway	69	45
Croatia	33	67	Pakistan	14	100
Cyprus		30	Panama	11	
Czech Republic	58	71	Peru	16	54
Denmark	74	30	Philippines	32	58
Dominican Republic		46	Poland	60	71
Ecuador	8		Portugal	27	67
Egypt		96	Puerto Rico	i	10
El Salvador	19	11	Romania	30	80
Estonia	60	84	Russian Federation	39	80
Finland	63	43	Rwanda		63
France	71	52	Saudi Arabia		48
Georgia		68	Serbia	25	72
Germany	67	60	Singapore	20	54
Ghana		28	Slovakia	52	72
Greece	35	50	Slovenia	27	52
Guatemala	6		South Africa	65	37
Hong Kong	25	83	Spain	51	56
Hungary	80	69	$\mathbf{S}_{\mathbf{uriname}}^{-}$	47	
Iceland		33	\mathbf{Sweden}	71	22
India	48	74	$\mathbf{Switzerland}$	68	34
Indonesia	14	62	Taiwan	17	51

Table B.2: List of countries included in (Hofstede et al., 2010) and the corresponding index of individualism and restraint.

Country	Individ.	RIV	Country	Individ.	RIV
Iran	41	60	Tanzania		62
Iraq		83	Thailand	20	55
Ireland	70	35	Trinidad and Tobago	16	20
Israel	54		Turkey	37	51
Uganda		48	Venezuela	12	0
Ukraine		86	Viet Nam	20	65
United Kingdom	89	31	Zambia		58
United States of America	91	32	Zimbabwe		72
Uruguay	36	47			

Source: (Hofstede et al., 2010).

 Table B.3: List of countries included in the analysis.

SG immigrants	Country of interview (27)
	Austria, Germany, Sweden, Netherlands, Spain, Italy, France,
	Denmark, Greece, Switzerland, Belgium, Israel, Czech Republic,
	Poland, Luxembourg, Portugal, Slovenia, Estonia,
	Croatia, Lithuania, Bulgaria, Cyprus, Finland,
	Latvia, Malta, Romania, Slovakia.

SG immigrants	Country of origin Mother (62)					
	Albania, Algeria, Argentina, Australia, Austria, Azerbaijan,					
	Belarus, Belgium, Bosnia and Herzegovina, Brazil, Bulgaria,					
	Canada, Chile, China, Colombia, Croatia, Cyprus, Czech Republic,					
	Denmark, Dominican Republic, Egypt, Estonia, Finland, France,					
Georgia, Germany, Greece, Hungary, India, Indonesia,						
	Iran, Iraq, Ireland, Italy, Kosovo, Latvia, Lithuania,					
	Luxembourg, Macedonia, Malta, Moldova, Republic of Morocco,					
	Netherlands, Norway, Poland, Portugal, Romania,					
	Russian Federation, Serbia, Slovakia, Slovenia, South Africa, Spain,					
	Sweden, Switzerland, Turkey, Ukraine, United Kingdom,					
	United States of America, Uruguay, Venezuela, Viet Nam.					

	L1 How happy	L2 New adventures	L3 Have good time	L4 Have fun & pleasure	R1 Behave properly	R2 Traditions & customs	R3 Sexual minorities	R4 Safe environm.
FB Mother								
panel A								
RIV (pred)	$0.001 \\ (0.002)$	$0.001 \\ (0.001)$	$0.001 \\ (0.001)$	$^{-0.002}_{(0.001)}$	0.006^{***} (0.001)	0.004^{**} (0.002)	$^{-0.004^{stst}}_{(0.002)}$	0.004^{***} (0.001)
panel B								
RIV (pred)	$0.001 \\ (0.002)$	$0.001 \\ (0.001)$	$0.001 \\ (0.001)$	$-0.002 \\ (0.001)$	0.006^{***} (0.001)	0.004^{***} (0.001)	-0.004^{***} (0.001)	0.004^{***} (0.001)
LTO, M	0.002^{**} (0.001)	$0.000 \\ (0.001)$	-0.001 (0.001)	$0.000 \\ (0.001)$	-0.001^{*} (0.001)	-0.003^{***} (0.001)	0.003^{***} (0.001)	-0.002^{***} (0.001)
panel C								
RIV (res)	-0.001 (0.001)	-0.002 (0.001)	0.000 (0.001)	0.003^{***} (0.001)	$0.001 \\ (0.002)$	-0.001 (0.001)	0.000 (0.001)	0.000 (0.001)
N. Observations	16690	16484	16490	16478	16480	16503	16282	16450
FB Father								
panel A								
RIV (pred)	$0.001 \\ (0.002)$	$\begin{array}{c} 0.001 \\ (0.001) \end{array}$	$0.000 \\ (0.001)$	$\begin{array}{c} -0.001 \\ (0.001) \end{array}$	0.003^{st} (0.002)	0.004^{**} (0.002)	-0.005^{***} (0.002)	0.003^{stst} (0.001)
panel B								
RIV (pred)	$\begin{array}{c} 0.001 \\ (0.002) \end{array}$	$0.001 \\ (0.001)$	$0.000 \\ (0.001)$	$-0.001 \\ (0.001)$	0.003^{st} (0.002)	$0.003^{stst} (0.001)$	-0.005^{***} (0.001)	$0.003^{stst} (0.001)$
LTO, F	0.002^{*} (0.001)	$^{-0.001}_{(0.001)}$	$^{-0.001*}(0.001)$	$\begin{array}{c} 0.001 \\ (0.001) \end{array}$	$^{-0.002^{***}}_{(0.001)}$	$^{-0.003^{stst}}_{(0.001)}$	0.003^{**} (0.001)	$^{-0.001}_{(0.001)}$
panel C								
RIV (res)	-0.002	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.001	0.000 (0.001)	0.001 (0.001)	0.002^{**} (0.001)
N. Observations	15666	15479	15486	15477	15477	15502	15279	15446
Full set of individual char. Country Wave	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes

Table B.4: Direct association between predicted and residual restraint and second-generation immigrants' attitudes. European Social Survey (ESS), rounds 2-9.

Notes: The set of dependent variables includes: How happy are you (L1); Important to seek adventures and have an exciting life (L2); Important to have a good time (L3); Important to seek fun and things that give pleasure (L4); Important to behave properly (R1); Important to follow traditions and customs (R2); Gays and lesbians free to live life as they wish (R3), and Important that government is strong and ensures safety (R4). The full set of individual characteristics includes: age, female, low education, high education, white collar, marital status, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, have worked abroad, atheist, parent white collar. The method of estimation is OLS. RIV (pred) and RIV (res) stay respectively for predicted and residual values of restraint from model "mRIV7", Table 1. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

FB Mother	(1) UCLA	(2) UCLA	(3) UCLA	(4) UCLA	(5) UCLA	(6) UCLA
RIV (pred), M	0.011***	0.011***			0.011***	0.011***
RIV (pred), F	(0.002)	(0.003)	0.007	0.007	$(0.003) \\ -0.000$	$egin{array}{c} (0.003) \ 0.001 \end{array}$
Individualism, M		-0.000	(0.005)	(0.005)	(0.006)	$(0.006) \\ 0.000$
Individualism, F		(0.002)		$0.000 \\ (0.002)$		$egin{array}{c} (0.003) \ 0.001 \ (0.004) \end{array}$
N. Observations	4135	3761	4029	3724	4029	3597
FB Father						
RIV (pred), M	0.012^{***}	0.011^{***}			0.011^{**}	0.010^{***}
RIV (pred), F	(0.004)	(0.004)	0.005	0.005	(0.004) 0.002 (0.004)	(0.003) 0.001
Individualism, M		-0.000	(0.004)	(0.004)	(0.004)	(0.004) -0.001
Individualism, F		(0.002)		$^{-0.001}_{(0.001)}$		(0.002) -0.001 (0.002)
N. Observations	3901	3616	3803	3358	3803	3319
Both FB parents						
RIV (pred), M	0.013**	0.011*			0.019**	0.007
RIV (pred), F	(0.006)	(0.006)	0.006	0.007	(0.008) -0.008	(0.010) 0.002
Individualism, M		-0.001	(0.007)	(0.007)	(0.010)	(0.011) -0.005
Individualism, F		(0.003)		$0.001 \\ (0.002)$		$egin{array}{c} (0.005) \ 0.005 \ (0.005) \end{array}$
N. Observations	2140	1855	2114	1809	2114	1770
Full set of						
regressors from Table 2	Yes	Yes	Yes	Yes	Yes	Yes
Country (of residence) Wave of interview	Yes Voc	Yes Voc	Yes Voc	Yes Voc	Yes Voc	Yes Voc

Table B.5: Direct association between predicted restraint and loneliness (UCLA loneliness scale) among second-generation immigrants (alternative definitions).

Notes: The table shows the association between the predicted restraint (measured on a scale of 0 to 100) in parental countries of origin and loneliness (measured on a scale of 3 to 9) for alternative definitions of second-generation immigrants. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is OLS. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

	(1) UCLA	(2) UCLA	(3) UCLA	$^{(4)}_{\rm UCLA}$
RIV (raw)	0.004^{***}			
RIV (res)	()	0.002 (0.002)		
Crop Yield (Anc., pre-1500)		()	0.148^{**}	0.093
Crop Yield Change (Anc., post-1500)			(0.074) 0.098 (0.126)	0.035
Crop Growth Cycle (Anc., pre-1500)			-0.114	-0.054
Crop Growth Cycle Change (Anc., post-1500)			(0.117) -0.098	(0.123) -0.113
RIV (pred)			(0.088)	(0.093) 0.007^{**} (0.004)
Full set of				
regressors from Table 2	Yes	Yes	Yes	Yes
Full set of geo factors and neolithic				
transition timing from Table 1	No	No	Yes	Yes
Country (of residence)	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes
N. Observations	5823	5823	5823	5823

Table B.6: Direct association between restraint (raw), agro-climatic proxies and loneliness (UCLA loneliness scale) among second-generation immigrants.

Notes: The table shows the association between the index of restraint restraint (measured on a scale of 0 to 100) in parental countries of origin and loneliness (measured on a scale of 3 to 9) among second-generation immigrants. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is OLS. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table B.7: Direct association between predicted restraint, alternative cultural characteristics and loneliness (UCLA loneliness scale) among second-generation immigrants.

	(1) UCLA	(2) UCLA	$^{(3)}_{ m UCLA}$	$^{(4)}_{\rm UCLA}$	(5) UCLA	(6) UCLA	(7) UCLA
RIV (pred)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.008^{***} (0.001)	0.008^{***} (0.002)	0.008^{***} (0.001)	0.009^{***} (0.002)
LTO	()	(0.002) (0.001)	()	()	()	()	()
LTO (pred)		· · · ·	0.000 (0.002)				
Uncertainty Avoidance			× ,	$0.002 \\ (0.002)$			
Power Distance				× ,	0.001 (0.001)		
Masculinity					× ,	$0.000 \\ (0.001)$	
Family: Stem						× ,	$\begin{array}{c} 0.020 \\ (0.032) \end{array}$
Full set of							
regressors from Table 2	Yes						
Country (of residence)	Yes						
Wave of interview	Yes						
N. Observations	5823	5823	5823	5451	5451	5451	5023

Notes: The table shows the association between the index of restraint restraint (measured on a scale of 0 to 100) in parental countries of origin and loneliness (measured on a scale of 3 to 9) among second-generation immigrants. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is OLS. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. Classification of the predominant family types is taken from Todd (1990). Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Panel A	EURO-D	MOBILITY	ADL	BMI	CHRONIC	SAH		
RIV (pred)	0.011* (0.006)	0.010^{*} (0.006)	$\begin{array}{c} 0.003 \ (0.002) \end{array}$	$0.027 \\ (0.017)$	$0.000 \\ (0.005)$	$\begin{array}{c} 0.003 \\ (0.003) \end{array}$		
	Depress.	Pessimism	Suicide	Guilt	Sleep	$\operatorname{Interest}$	Irritab.	Appetite
RIV (pred)	0.003^{*} (0.001)	$0.001 \\ (0.001)$	$0.001 \\ (0.001)$	$0.001 \\ (0.001)$	$0.001 \\ (0.001)$	$\begin{array}{c} 0.000 \\ (0.001) \end{array}$	$\begin{array}{c} 0.001 \\ (0.001) \end{array}$	$0.000 \\ (0.001)$
	Fatigue	Concentr.	${ m Enj}$ oy ment	Tearful.	EURO alt	Ph.Inact.	Sport	Smoking
RIV (pred)	$0.001 \\ (0.001)$	$0.000 \\ (0.001)$	$0.000 \\ (0.001)$	$0.002 \\ (0.001)$	$0.008 \\ (0.005)$	$\begin{array}{c} 0.001 \ (0.001) \end{array}$	$\begin{array}{c} 0.004 \\ (0.003) \end{array}$	-0.002 (0.001)
	Tertiary	Wealth	Homemaker					
RIV (pred)	-0.000 (0.002)	-0.001 (0.007)	$0.000 \\ (0.001)$					
Panel B	EURO-D	MOBILITY	ADL	BMI	CHRONIC	SAH		
RIV (raw)	0.007^{**} (0.003)	$0.004 \\ (0.003)$	0.002^{**} (0.001)	0.026^{**} (0.010)	$0.001 \\ (0.002)$	$\begin{array}{c} 0.001 \\ (0.001) \end{array}$		
	Depress.	Pessimism	Suicide	Guilt	Sleep	Interest	Irritab.	Appetite
RIV (raw)	0.001^{*} (0.001)	$0.000 \\ (0.000)$	0.001^{**} (0.000)	0.001^{*} (0.000)	0.001^{*} (0.001)	-0.000 (0.000)	$0.000 \\ (0.001)$	$0.000 \\ (0.000)$
	Fatigue	Concentr.	${ m Enj}$ oyment	Tearful.	EURO alt	Ph.Inact.	Sport	Smoking
RIV (raw)	$\begin{array}{c} 0.000 \\ (0.001) \end{array}$	0.001^{**} (0.000)	$\begin{array}{c} 0.000\\(0.000)\end{array}$	0.002^{***} (0.001)	0.006^{**} (0.003)	0.001^{*} (0.000)	$0.003 \\ (0.002)$	-0.001 (0.001)
Panel C	EURO-D	MOBILITY	ADL	BMI	CHRONIC	SAH		
RIV (res)	0.006* (0.003)	$0.002 \\ (0.003)$	0.002^{**} (0.001)	$0.027^{st st} (0.011)$	$0.001 \\ (0.003)$	$\begin{array}{c} 0.001 \ (0.002) \end{array}$		
	Depress.	Pessimism	Suicide	Guilt	Sleep	Interest	Irritab.	Appetite
RIV (res)	$0.001 \\ (0.001)$	$0.000 \\ (0.001)$	0.001^{*} (0.000)	0.001^{*} (0.000)	0.001^{st} (0.001)	-0.000 (0.000)	$0.000 \\ (0.001)$	$0.000 \\ (0.000)$
	Fatigue	Concentr.	Enjoyment	Tearful.	EURO alt	Ph.Inact.	Sport	Smoking
RIV (res)	$\begin{array}{c} 0.000 \\ (0.001) \end{array}$	0.001^{**} (0.000)	$0.000 \\ (0.000)$	0.002^{**} (0.001)	0.006^{**} (0.003)	$0.001 \\ (0.000)$	$0.002 \\ (0.002)$	-0.000 (0.001)

Table B.8: Direct effect of restraint on health and socio-economic characteristics.

Notes: The table shows the direct effect of predicted regraint on second generation immigrants' health outcomes and selected socio-economic characteristics. All model specifications control for country of residence and wave of interview, as well as for the full set of individual characteristics from Table 3. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is OLS. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	0 541***	0 464***	0 246***	0 061***	0.023	0 099***	0 115***
	(0.032)	(0.028)	(0.030)	(0.011)	(0.069)	(0.022)	(0.013)
Аде	0.010**	0.0028)	0.041***	0.007***	-0.069***	0.038***	0.018***
1160	(0.010)	(0,000)	(0.006)	(0,002)	(0.014)	(0.004)	(0.010)
Female	0.678***	0.525***	0 499***	0.009	-0.406	0.063	-0.009
1 ciliare	(0.066)	(0.055)	(0.078)	(0, 020)	(0.263)	(0.055)	(0.033)
Low Education	0 176**	0 192**	0 421***	0.095***	0 794***	0.245***	0 165***
How Education	(0.081)	(0.080)	(0.096)	(0.028)	(0.238)	(0.066)	(0.039)
High Education	-0.099	-0.109	-0.161*	-0.030	-0.358	-0.138**	-0.195***
High Education	(0.077)	(0.066)	(0.084)	(0.018)	(0.218)	(0.058)	(0.037)
Retired	-0.001	-0.021	-0.177	-0.036	0.852**	0.005	-0.023
10001104	(0.110)	(0.095)	(0.163)	(0.051)	(0.371)	(0.112)	(0.058)
Unemployed	0.527^{**}	0.414**	-0.426*	-0.085	-0.813	-0.177	0.047
	(0.221)	(0.189)	(0.240)	(0.051)	(0.515)	(0.132)	(0.108)
Disabled	1.350***	1.183***	1.993***	0.455***	0.468	1.284***	0.946***
	(0.194)	(0.167)	(0.214)	(0.087)	(0.528)	(0.178)	(0.098)
Employed	-0.038	-0.070	-0.412***	-0.045	-0.302	-0.269***	-0.181***
1 0	(0.115)	(0.102)	(0.154)	(0.039)	(0.398)	(0.095)	(0.056)
Married	-0.016	-0.001	-0.361**	-0.073	-0.768	-0.201*	-0.157**
	(0.129)	(0.115)	(0.176)	(0.049)	(0.472)	(0.113)	(0.062)
Divorced	0.250*	0.227*	-0.098	-0.015	-0.502	0.015	-0.009
	(0.140)	(0.128)	(0.166)	(0.052)	(0.449)	(0.113)	(0.067)
Widowed	0.144	0.137	0.245	0.026	-0.174	0.059	0.017
	(0.168)	(0.153)	(0.182)	(0.051)	(0.607)	(0.121)	(0.068)
Number of children	0.031	0.022	$0.059*^{*}$	0.008	0.105	-0.009	-0.011
	(0.021)	(0.019)	(0.026)	(0.008)	(0.067)	(0.019)	(0.012)
Lives alone	-0.152	-0.163	-0.361 ***	-0.051	-0.548	-0.212*	-0.135**
	(0.117)	(0.107)	(0.137)	(0.050)	(0.376)	(0.115)	(0.066)
Poor HH (when 10)	0.154**	0.130 * *	0.143	-0.019	0.615*	0.043	0.086**
	(0.071)	(0.059)	(0.108)	(0.019)	(0.353)	(0.059)	(0.043)
N. books (when 10)	-0.081^{***}	-0.080***	-0.052	0.002	-0.203^{**}	-0.034	-0.047^{***}
	(0.029)	(0.023)	(0.041)	(0.012)	(0.081)	(0.023)	(0.013)
Harm (parents or third)	0.190**	0.174^{**}	0.204*	0.040	-0.052	0.229^{***}	0.000
	(0.086)	(0.079)	(0.116)	(0.027)	(0.244)	(0.057)	(0.030)
Relationship (adverse)	0.103^{*}	0.053	-0.044	-0.030*	-0.221	-0.147^{***}	-0.005
	(0.058)	(0.048)	(0.067)	(0.017)	(0.177)	(0.049)	(0.033)
Absent parent	0.050	0.036	0.219*	0.013	0.595^{*}	0.099	0.036
	(0.080)	(0.072)	(0.114)	(0.031)	(0.321)	(0.074)	(0.042)
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	5823	5823	5823	5821	5792	5820	5823
$R \ Squared$	0.248	0.240	0.213	0.086	0.079	0.172	0.286

Table B.9: Direct association between loneliness and health among second-generation immigrants.OLS model.

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. The method of estimation is OLS. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table B.10: Direct association between loneliness and health among second-generation immigrants. Random effects model with lagged loneliness as a predictor.

	EURO-D	EURO-D alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (lag)	0.268^{***} (0.029)	0.218^{***} (0.029)	0.108^{***} (0.030)	0.028^{**} (0.011)	-0.013 (0.055)	$0.057^{***} \\ (0.020)$	0.068^{***} (0.014)
Full set of	Vos	Vos	Vos	Vor	Vos	Vos	
Country (of residence)	Ves	Ves	Ves	Ves	Ves	Ves	Ves
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	3157	3157	3157	3157	3132	3156	3157

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is random effect model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table B.11: The effect of loneliness on health among second-generation immigrants with foreignborn mothers.

1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred)	$\begin{array}{c} 0.010^{***} \ (0.002) \end{array}$	0.010^{***} (0.002)	0.010^{***} (0.002)	0.010^{***} (0.002)	0.010^{***} (0.002)	0.010^{***} (0.002)	0.010^{***} (0.002)
1st Stage F	27.909	27.909	27.909	27.909	25.424	27.312	27.909
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	0.817^{**} (0.330)	0.629^{**} (0.315)	$0.737 \\ (0.572)$	$0.223 \\ (0.248)$	2.822^{**} (1.438)	-0.234 (0.645)	$\begin{array}{c} 0.041 \\ (0.309) \end{array}$
Full set of regressors from Table 2 Country (of residence) Wave of interview	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	Yes Yes
N. Observations	4083	4083	4083	4083	4058	4081	4083

Notes: The table shows the direct effect of loneliness on second generation immigrants' with foreign born mothers physical and mental health outcomes. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

1st stage UCLA UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred) 0.009^{***} 0.009^{***} (0.002) (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)
1st Stage F 23.775 27.375	24.112	24.319	24.796	24.610
2nd stage depression pessimism	suicide	guilt	sleep	interest
Loneliness (UCLA) 0.284^{***} 0.091 (0.091) (0.064)	0.110^{***} (0.041)	0.090^{**} (0.041)	$0.130 \\ (0.105)$	$\begin{array}{c} 0.014 \\ (0.048) \end{array}$
N. Observations 5816 5804	5813	5803	5821	5819
1st stage UCLA UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred) 0.009^{***} 0.009^{***} (0.002) (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)
1st Stage F 27.705 24.810	24.676	26.037	25.138	25.126
2nd stage irritability appetite	fatigue	concentr.	enjoy	tears
Loneliness (UCLA) $0.091 0.055 (0.094) (0.105)$	$\begin{array}{c} 0.132 \\ (0.170) \end{array}$	$0.043 \\ (0.104)$	$0.019 \\ (0.044)$	$egin{array}{c} 0.176 \ (0.129) \end{array}$
N. Observations 5814 5822	5819	5812	5816	5812
Full set of regressors from Table 2 Yes Yes	Yes	Yes	Yes	Yes
Country (of residence) Yes Yes	Yes	Yes	Yes	Yes

Table B.12: The effect of loneliness on single components of the EURO-D scale among second-
generation immigrants.

Notes: The table shows the direct effect of loneliness on single components of the EURO-D depression scale. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

1st stage	UCLA						
RIV (raw)	0.004^{***} (0.001)	0.004^{***} (0.001)	0.004^{***} (0.001)	0.004^{***} (0.001)	0.004^{**} (0.001)	0.004^{**} (0.001)	0.004^{***} (0.001)
1st Stage F	6.706	6.706	6.706	6.650	6.345	6.350	6.706
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	2.006^{***} (0.750)	1.771^{**} (0.696)	$1.142 \\ (0.937)$	0.577^{st} (0.334)	$7.189 \\ (4.954)$	$0.141 \\ (0.816)$	$\begin{array}{c} 0.372 \\ (0.691) \end{array}$
Full set of regressors from Table 2 Country (of residence) Wave of interview N. Observations	Yes Yes Yes 5823	Yes Yes Yes 5823	Yes Yes Yes 5823	Yes Yes Yes 5821	Yes Yes Yes 5792	Yes Yes Yes 5820	Yes Yes Yes 5823

Table B.13: The effect of loneliness on health among second-generation immigrants. RIV not predicted ("raw").

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (raw) stays for the index of restraint from Hofstede et al. (2010). The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Physically inactive							
1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred)	0.008^{***} (0.002)	$0.008^{stst} \\ (0.002)$	0.008^{***} (0.002)	0.008^{***} (0.002)	0.008^{***} (0.002)	0.008^{***} (0.002)	0.008^{***} (0.002)
1st Stage F	19.922	19.922	19.922	19.988	16.753	19.461	19.922
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.183^{***}	0.888^{**}	0.941	0.325	3.127^{**}	-0.030	0.254
No physical activity	(0.482) (0.420)	(0.344) (0.345)	(0.000) 1.712^{***} (0.417)	(0.1200) 0.370* (0.197)	(1.001) 0.093 (1.216)	(0.605) (0.426)	(0.492^{**}) (0.230)
N. Observations	5823	5823	5823	5821	5792	5820	5823
Few intense sports							
1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)
1st Stage F	23.080	23.080	23.080	23.183	19.804	22.671	23.080
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	$_{\rm SAH}$
Loneliness (UCLA)	1.186^{***} (0.428)	0.905^{**} (0.370)	0.982 (0.692)	0.350 (0.267)	2.940^{**} (1.178)	-0.050 (0.671)	0.253 (0.337)
Few int. sports	0.121^{**} (0.051)	0.121^{***} (0.042)	0.326^{***} (0.067)	$0.038 \overset{\circ}{*} (0.022)$	0.208^{**} (0.092)	0.177^{***} (0.052)	0.134^{***} (0.029)
N. Observations	5819	5819	5819	5817	5788	5816	5819
Smoking daily							
1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)
1st Stage F	24.651	24.651	24.651	24.782	21.130	24.314	24.651
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.279***	0.989***	1.178*	0.374	3.168**	0.057	0.318
Ever smoked daily	$(0.431) \\ 0.214^{***} \\ (0.075)$	$(0.374) \\ 0.201^{***} \\ (0.064)$	$egin{array}{c} (0.709) \ 0.192^{**} \ (0.076) \end{array}$	$(0.272) \\ 0.036 \\ (0.023)$	$(1.242) \\ 0.167 \\ (0.162)$	$(0.701) \\ 0.074 \\ (0.064)$	$egin{array}{c} (0.365) \ 0.034 \ (0.038) \end{array}$
N. Observations	5823	5823	5823	5821	5792	5820	5823
Full set of							
regressors from Table 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country (of residence) Wave of interview	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes

Table B.14: The effect of loneliness on health among second-generation immigrants. Additionalcontrols for behavioral risks.

Notes: The table shows the direct effect of loneliness on sec 6π generation immigrants' physical and mental health outcomes. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Panel A	CHRONIC	SAH	PRESS	CHOL	DIAB	ULCER	STROKE
BMI (continuous)	$0.063^{stst} \\ (0.005)$	0.028^{***} (0.004)	0.025^{***} (0.002)	$0.007^{stst} \\ (0.001)$	0.015^{***} (0.002)	-0.000 (0.001)	$0.001^{stst} (0.001)$
Panel B	CHRONIC	SAH	PRESS	CHOL	DIAB	ULCER	STROKE
BMI: Overweight	0.282***	0.099**	0.150***	0.068***	0.050***		0.001
BMI: Obese	(0.057) 0.743^{***} (0.067)	(0.039) 0.361^{***} (0.044)	(0.015) 0.321^{***} (0.019)	(0.015) 0.085^{***} (0.020)	(0.011) 0.169^{***} (0.021)	(0.006) -0.000 (0.007)	(0.006) 0.011 (0.008)
	(0.001)	(01011)	(01010)	(01020)	(0.021)	(0.001)	(01000)
Full set of							
regressors from Table 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	5789	5792	5787	5787	5787	5787	5787

Table B.15: The effect of BMI on physical health outcomes among second-generation immigrants.

Notes: The table shows the direct association between BMI and second generation immigrants' physical health outcomes. "Overweight" indicates BMI between 25 and 30, "Obese" indicates BMI above 30. Reference category: normal weight and underweight. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.002)	0.009^{***} (0.001)	0.009^{***} (0.002)
_1st Stage F	6.029	6.029	6.029	5.972	6.174	5.876	6.029
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (direct)	$4.183 \\ (2.663)$	$3.211 \\ (2.005)$	3.853^{*} (2.276)	$1.241 \\ (0.802)$	10.880^{***} (4.193)	$0.144 \\ (2.315)$	$1.051 \\ (0.914)$
Full set of							
regressors from Table 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	5823	5823	5823	5821	5792	5820	5823

 Table B.16: The effect of loneliness on health among second-generation immigrants. Direct question for loneliness.

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.
Panel A: contact kids							
1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
RIV (pred)	0.012***	0.012***	0.012***	0.012***	0.012***	0.011***	0.012***
·- /	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Frequent contact	0.016	0.016	0.016	0.013	0.018	0.015	0.016
Fair contact	(0.036)	(0.036)	(0.036)	(0.035)	(0.038)	(0.036)	(0.036)
	0.110***	0.110***	0.110***	0.111***	0.113***	0.106***	0.110***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.033)	(0.032)
rare contact	(0.028)	(0.028)	(0.028)	(0.028)	(0.038)	(0.028)	(0.028)
	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.038)
1st Stage F	14.690	14.690	14.690	14.765	13.838	14.730	14.690
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1 507***	1 254***	1 046**	0.299	3 677***	0.263	0.306
	(0.244)	(0.194)	(0.442)	(0.274)	(0.883)	(0.485)	(0.268)
	()	()	()	()	()	()	()
N. Observations	4192	4192	4192	4191	4169	4189	4192
Panel B: activities							
1st stage	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA	UCLA
DIV (prod)	0 007***	0 007***	0 007***	0 007***	0 007***	0 007***	0 007***
itiv (pica)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Voluntary	-0.117**	-0.117**	-0.117**	-0.117**	-0.112*	-0.116*	-0.117**
-	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)	(0.059)
Training course	-0.022	-0.022	-0.022	-0.021	-0.026	-0.022	-0.022
	(0.044)	(0.044)	(0.044)	(0.044)	(0.046)	(0.044)	(0.044)
Sport, social club	-0.128***	-0.128***	-0.128***	-0.127^{***}	-0.128***	-0.127***	-0.128***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.033)	(0.034)	(0.034)
Political or comm. org. Books	0.014	0.014	0.014	0.015	0.016	0.014	0.014
	(0.058)	(0.058)	(0.058)	(0.058)	(0.059)	(0.058)	(0.058)
	(0.072)	(0.072)	(0.072)	(0.312)	(0.074)	(0.072)	(0.072)
Games	-0.080**	-0.080**	-0.080**	-0.082**	-0.079**	-0.082**	-0.080**
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
1st Stage F	10.929	10.929	10.929	10.949	9.452	10.741	10.929
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
T 11 (77 (77 4))	بر بار بار بار بار بار بار بار بار بار ب	1 0 0 0 4 4 4	1 0 5 - 44	0.450	0.01-****	0.001	0.000
Loneliness (UCLA)	1.435^{***}	1.060^{***}	1.357^{**}	0.459	3.911***	0.094	0.286
	(0.432)	(0.390)	(0.632)	(0.296)	(1.517)	(0.786)	(0.381)
N. Observations	5807	5807	5807	5805	5776	5804	5807
Full set of							
regressors from Table 2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table B.17: The effect of loneliness on health among second-generation immigrants. Additional controls for the frequency of contact with kids and participation in socially related activities.

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV Thear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table B.18: The effect of loneliness on health among second-generation immigrants. Additional controls for informal care (provided and received).

Panel A: care provided							
1st stage	UCLA						
RIV (pred)	0.011***	0.011***	0.011***	0.011***	0.011***	0.010***	0.011***
Informal care (given)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
fillofillal cafe (given)	(0.043)	(0.039)	(0.043)	(0.092)	(0.038)	(0.043)	(0.039)
lat Staga F	28 201	29.201	29.201	28 7 4 4	22.002	28.440	28 201
	36.301	30.301	38,301	30.744	33.992	36,449	38.301
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.394***	1.137***	1.036***	0.332^{*}	3.190***	0.186	0.328
· · ·	(0.431)	(0.354)	(0.313)	(0.184)	(0.549)	(0.558)	(0.277)
N. Observations	5286	5286	5286	5284	5255	5283	5286
Panel B: care received							
1st stage	UCLA						
RIV (pred)	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***	0.011***
(1)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Informal care (received)	0.131^{***}	0.131^{***}	0.131^{***}	0.131^{***}	0.134^{***}	0.133^{***}	0.131^{***}
	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)	(0.044)
1st Stage F	41.027	41.027	41.027	41.497	36.470	41.075	41.027
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.366***	1.118***	1.080***	0.340^{*}	3.210***	0.197	0.339
	(0.449)	(0.363)	(0.314)	(0.176)	(0.554)	(0.538)	(0.278)
N. Observations	5286	5286	5286	5284	5255	5283	5286
regressors from Table 2	Yes						
Country (of residence)	Yes						
Wave of interview	Yes						

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Panel A: loneliness 1st stage UCLA UCLA UCLA UCLA UCLA UCLA UCLA 0.007*** 0.007*** 0.007*** 0.007*** 0.007*** 0.007*** 0.007*** RIV (pred) (0.002)(0.002)(0.002)(0.002)(0.002)(0.002)(0.002)0.233*** 0.233*** 0.233*** 0.234*** 0.231*** 0.233*** 0.233*** Lonely (when 10) (0.035)(0.035)(0.035)(0.035)(0.035)(0.035)(0.035)1st Stage F 11.31511.31511.31511.32710.00510.93111.3152nd stage EURO-D EURO alt MOBILITY ADL BMICHRONIC SAH1.472*** 1.145*** 1.486** 4.314*** Loneliness (UCLA) 0.4620.0950.405(0.462)(0.399)(0.642)(0.315)(1.520)(0.859)(0.430)N. Observations 5810581058105808 57805807 5810Panel B: health 1st stage UCLA UCLA UCLA UCLA UCLA UCLA UCLA RIV (pred) 0.007*** 0.007*** 0.007*** 0.007*** 0.007*** 0.007*** 0.007*** (0.002)(0.002)(0.002)(0.002)(0.002)(0.002)(0.002)0.252*** 0.252*** 0.252*** 0.252*** 0.252*** 0.252*** 0.255*** Health (when 10 yrs.) (0.083)(0.083)(0.083)(0.083)(0.083)(0.083)(0.083)9.997 9.9979.997 9.9978.959 9.9199.9971st Stage F EURO-D EURO alt MOBILITY CHRONIC 2nd stage ADLBMISAH 1.667^{**} 5.763** Loneliness (UCLA) 1.317*0.9360.349-0.1810.342(0.843)(0.721)(0.957)(0.304)(2.708)(0.927)(0.477)Health (when 10 yrs.) 0.2570.2830.488*0.025-1.5090.607** 0.202(0.305)(0.266)(0.253)(0.089)(0.990)(0.258)(0.162) $Full\ set\ of$ regressors from Table 2 Yes Yes Yes Yes Yes Yes Yes Country (of residence) Yes Yes Yes Yes Yes Yes Yes Yes Wave of interview Yes Yes Yes Yes Yes Yes N. Observations 494249424942 49424918 49414942

Table B.19: The effect of loneliness on health among second-generation immigrants. Additional controls for loneliness and health in childhood.

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (pred) stays for predicted values of restraint from model "mRIV7", Table 1. The full set of individual characteristics includes age, female, low education, high education, white collar, marital status, number of children, occupational status, living alone dummy, financial hardship during childhood, adverse childhood conditions, and absence of one or both both parents during childhood. The method of estimation is IV linear regression model. Robust standard errors clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.