



Research paper

Historical roots of loneliness and its impact on second-generation immigrants' health

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ABSTRACT

This paper examines the relationship between historical cultural norms and attitudes towards loneliness, specifically within the context of second-generation immigrants. We uncover an intergenerationally transmitted cultural element that emphasizes restraint and adherence to strict rules characterizing highly-intensive pre-industrial agricultural systems. This cultural dimension significantly impacts how individuals perceive their social relationships and influences their likelihood of experiencing loneliness. Additionally, we demonstrate that the identified cultural trait serves as a predictor of loneliness in a two-stage model for health. Our research shows that loneliness directly impacts body mass index and specific mental health issues, and these findings hold true across a battery of sensitivity checks. The results add to the existing body of research highlighting the importance of attitudes in predicting economic and health outcomes, shedding light on how deeply ingrained geographical, cultural, and individual characteristics can shape economic development processes in both home and host countries.

1. Introduction

Loneliness is a subjective negative feeling defined as an unmet need in terms of quantity or quality of social interaction, or both (Perلمان and Peplau, 1981; Peplau et al., 1982). Though it has been a recognized issue for a long time, loneliness is gaining increasing attention, particularly due to its far-reaching consequences in terms of health, loss of productivity, increased absence from work and lower job satisfaction (Cacioppo et al., 2014a; Cacioppo and Cacioppo, 2018; Cacioppo and Hawkey, 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, among others).

While there is a general consensus about the effects of loneliness, research examining its underlying causes remains inconclusive. Most studies concentrate on demographic and socioeconomic risk factors, such as gender, age, employment situation, or adverse life events, often providing mixed evidence regarding which category is more susceptible to loneliness (Barreto et al., 2021; Maes et al., 2019; Pinguart 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 due to a weak sense of belonging, discrimination and cultural differences (Delaruelle, 2023; Witte and Regenmortel, 2021; Madsen et al., 2016).

A growing body of psychological research investigates the link between culture, defined as the collection of inherited or acquired social values and norms shared by people in a particular place or time, and loneliness. This research is based on the premise that

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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* cultural backgrounds (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; Pinguart and Sörensen, 2003; Hawkey et al., 2008; Beller and Wagner, 2018). Recent research argues, for instance, that individuals living in societies with more restrictive norms about social connections have a greater tendency to evaluate actual social relationships negatively, which increases the likelihood of emotional and perceived isolation (Heu et al., 2021b).

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 behavioral standards and limit their freedom to choose optimal social relations. In order to identify the effect of culture on loneliness, we rely on the so-called “epidemiological approach” and thus, consider a sub-population of native individuals with one or both foreign-born parents (*i.e.*, second-generation immigrants) drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE). In this way, we are able to exploit the exogenous variation in parental cultural backgrounds while keeping the other country-specific factors invariant. Additionally, as SHARE surveys individuals aged 50+, we expect that our sample of second-generation immigrants has had enough time to assimilate the cultural and economic traits of their native country. In such a context, the documented persistent long-term effect of parental cultural backgrounds further reinforces the logic underlying the mechanism linking loneliness and culture. First-generation immigrants, although they share the same current environment but were born and raised in different cultural contexts, would not fit the objectives of our identification strategy since they confound social and cultural backgrounds with their minority status, which may itself affect loneliness. Our approach, therefore, allows us to merge two important aspects related to immigration, namely the individuals' foreign origins and their inherited cultural heterogeneity.

The main cultural indicator of interest is 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 behaviors. Following Minkov (2009) and Hofstede et al. (2010), we show that the core component of restraint captures the degree to which individuals feel that they have completely free choice over their lives (“life-control dimension”). This specific cultural dimension reflects the importance of social norms and restrictions at the societal level. 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. The link between historical agricultural intensity and norms, on the other hand, can be traced back to Minkov (2009) and Enke (2019). According to the authors, more intensive modes of production required higher degrees of cooperation, tighter kinship relations, disciplined behavior, stricter rules, and meticulous planning. These historical mechanisms are recorded in contemporary restraint, which is higher in societies with a strong legacy of highly intensive ancestral agriculture.

Regressing the index of restraint of contemporary cultures on ancestral agricultural potential and a set of potentially confounding geographic and climatic conditions that may have directly or indirectly affected the intensity of production and the emergence of informal institutions characterized by stricter social norms and discipline, we isolate the culturally embedded life-control component. Using an additional set of preferences, 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 towards rules and socially accepted behaviors, 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.

Once we established a robust association between the predicted life-control dimension and loneliness, we use former to instrument current experiences of loneliness in a two-stage model for health in our sample of second-generation immigrants from SHARE. Extensive, mostly psychological, literature documents consistent associations between loneliness and individuals' health, both physical and mental (Cacioppo et al., 2014a; Cacioppo and Cacioppo, 2018; Cacioppo and Hawkey, 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 specific 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 direct effect on health outcomes, as well as on factors closely related to health, like risky behaviors 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 health 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 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 urbanization rate and population density. The life-control component of the parental cultural backgrounds, in turn, 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 increases the likelihood of high blood sugar and diabetes, as well as cognitive impairment reflected by lower fluency scores. On the other hand, loneliness has no direct impact on the incidence of chronic conditions, limitations with activities of daily living, the perception of general health, or other physical health issues. 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 behaviors 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 behaviors 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. Section 6 concludes.

2. Cultural roots of loneliness

A growing body of psychological literature suggests that certain cultural dimensions may 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 favored behavioral 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 behaviors 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.² Interestingly, cultures that enforce a more severe compliance with rules and restrictions are those characterized 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 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 country-specific 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 confound social values with the individuals' minority status, which may itself affect loneliness. In addition, this strategy runs into selection problems since the factors influencing the probability of migrating may also affect the individual's general attitudes towards loneliness. Last, but not least, the issue might also be conceptual in nature

² Emotional 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).

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; Hawkey et al., 2008; Beller and Wagner, 2018; Taylor et al., 2018; Heu et al., 2021b).

In this paper, we address these challenges by both focusing on a sample of second-generation immigrants who share the same country-specific factors but are exposed to different cultural backgrounds and emphasizing the role of the perceived quality of social interactions in predicting loneliness. We suggest and show that individuals originating from cultures characterized by stricter social norms and prohibitions are 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.

3. Empirical strategy

3.1. Framework

Our primary goal is to link individual-specific attitudes towards loneliness, net of other factors, to individuals' cultural backgrounds reflecting the socially accepted conduct of behavior driven by social norms. To this end, we rely on Hofstede et al. (1991)'s categorization of cultures 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.

Minkov (2009) and Enke (2019) suggest that informal institutions characterized by stricter rules and norms are more pronounced in societies with a strong cultural legacy of highly intensive agriculture. These communities were historically characterized by more collective action, tighter kinship, and stronger authority and cooperation (Enke, 2019), which was necessary to sustain hard work and meticulous planning, as well as to face periodic conflicts for the territory, and exploitation. The exposure of ancestral populations to these factors in the pre-industrial era have fostered the emergence of informal institutions, such as family organization, 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). For instance, communitarian family types specific for intensive sedentary agriculture, as opposed to nuclear ones predominant in hunter gatherer societies with lower agricultural intensity, were characterized by strong ties among members of an extended organization or clan living together in a specific area, which facilitate the perpetuation of social norms and the imposition of sanctions on those who do not respect them (Todd, 1990).⁴ 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. 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., 2023) and focuses on 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.⁵ Considering second-generation immigrants, therefore, allows us to exploit the exogenous variation in parental cultural backgrounds while keeping the other country-specific factors invariant.

Once we have established the historical roots of loneliness and mechanisms linking rules and restrictions to relationship quality, we explore the effects of loneliness on different physical and mental health outcomes. This is an important issue since loneliness may significantly impact individuals' health and well-being, which comes with great social and economic costs, not only in terms of higher healthcare expenditure but also due to increased absence from work, loss of productivity and increased voluntary turnover resulting from low job satisfaction (Michaelson et al., 2021). The vast majority of the existing research on loneliness and health, however, 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, since the

³ Initially developed to analyze how the culturally embodied beliefs differ in terms of work objectives (Hofstede et al., 1991)'s model has been further expanded by Hofstede et al. (2010) using data from the Chinese Values Survey and from the World Values Survey 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). As our focus is on the cultural traits specifically related to the quality of social relationships, we limit our analysis to the distinction between indulgent and restraint societies. The other five cultural dimensions are described in Appendix A.

⁴ For a comprehensive review of the literature on the determinants of culturally embedded social norms, see Voigt (2024a,b).

⁵ The 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.

estimated effects do not account for the presence of reverse causality, resulting in a spurious and/or underestimated true effect of loneliness on health. 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). Differently from most of the existing literature, we rely on the epidemiological approach which allows us to isolate the causal impact of loneliness on a variety of physical and mental health outcomes.

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 characterize 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*.

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.

The third hypothesis predicts that loneliness has a negative impact on mental and physical health:

Hypothesis 3 (Loneliness and Health). Feeling lonely negatively affects emotional disorders and physical health related outcomes and functional decline, *ceteris paribus*.

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 increasing the odds of experiencing loneliness with a negative impact on health. 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:

$$Res_p = a_0 + b_0 Agr_p^{anc} + c_0 Geo_p + d_0 H_p + \epsilon_p, \tag{1}$$

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 continental fixed effects. H_p contains additional historical controls at the parental country of origin level, such as the degree of urbanization and population density. 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 towards rules and socially accepted behaviors.

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

$$L_i = \alpha + \pi_{i1} \hat{Res}_{i,p} + \pi_{i2} \mathbf{X}_i + \pi_{i3} FE_i + \zeta_i \tag{2}$$

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.

Finally, to empirically validate Hypothesis 3, we estimate a two-stage model where self-reported loneliness is instrumented with the maternal country of origin’s life-control component of restraint:

$$Health_{i,p,c} = \alpha + \beta L_i + \psi \mathbf{X}_i + \rho + FE_i + \eta_i, \tag{3}$$

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, \mathbf{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 Eq. (2) in Eq. (3) we obtain the reduced form model for health-related outcomes:

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

Since the component of restraint predicted by historical agro-climatic factors originates from a different distribution, in order to obtain correct estimates, in all model specifications we bootstrapped standard errors clustered at the country of residence and the parental country of origin level.

4. Data

Cultural indices and historical economic potential

The main cultural indicator of interest is taken from Hofstede et al. (2010).⁶ The index varies between 0 (full indulgence) and 100 (full restraint). Worth noting is that the index does not measure the absolute level of attribute of a country rather it expresses the position of societies relative to each other.⁷ Furthermore, Beugelsdijk and Welzel (2018) show that the values within each cultural dimension are transferred from parents to children, and rarely change in later life.⁸ 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 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, precipitation, and percentage of population living in tropical, sub-tropical and temperate zones.

Loneliness and health

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.

Table B.2 (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 measure 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.

What makes SHARE data particularly suited for the purposes of our analysis is the availability of a rich set of information on older individuals' physical and mental health conditions.¹⁰ We consider six health indicators: EURO-D depression scale (Prince et al., 1999), which ranges from 1 (absence of depressive symptoms) to 12 (severe depressive symptoms);¹¹ number of mobility, arm function and fine motor limitations; number of limitations with activities of daily living (ADL); body mass index (BMI); number

⁶ Hofstede'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.

⁷ Table B.1 (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.

⁸ By 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.

⁹ The 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, behavioral 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.).

¹⁰ In 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 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.

¹¹ The 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 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.

of chronic diseases, and self-assessed health (ranging from 1 - excellent - to 5 - poor).¹² 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.

Fig. B.1 depicts unconditional correlations between the percentage of individuals feeling lonely and their parental degree of restraint (first panel); the average score of EURO-D (second panel); the number of mobility limitations (third panel); body mass index - BMI (fourth panel); and the number of chronic conditions (fifth panel). As expected, the correlations are positive and near to 0.5 with the exception of the correlation between loneliness and the average number of chronic conditions.

Other controls

Among demographics, we include age, gender, marital status, number of children, and whether a respondent lives alone in the household.¹³ Socio-economic variables include the highest educational attainment, occupational status, and the type of residential area (rural versus urban). 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. 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.¹⁴ This set of variables includes the exposure to child neglect and childhood physical abuse, either from mother, father or third parties.¹⁵ 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 neighbor, and a set of behavioral risks including frequency of sports activity and smoking.

5. Results

5.1. Historical roots of restraint

In Table 1 we show the relationship between historical agricultural potential (and its change in the course of the Columbian Exchange) and contemporary restraint, controlling for confounding geographic and climatic conditions that may have directly or indirectly affected the intensity of agricultural production and the emergence of informal institutions characterized by stricter social norms and discipline. More precisely, geographic conditions were probably the single most important determinant for the predominant subsistence mode of historic societies, which, in turn, influenced the emergence of specific informal institutions (such as family organizations and their role in shaping societal norms and rules).¹⁶ The quality of the soil, in combination with the climate, has significantly influenced the agricultural potential and the related reward from agricultural investments. The sustainability of highly intensive agricultural systems required strict discipline, the respect of rules and norms, higher levels of cooperation, and tighter kinship systems. All these characteristics have contributed to the emergence of specific family types, namely communitarian families (as opposed to less connected and smaller nuclear families). These family structures are characterized by intense ties among extended family or clan members living together in a specific area, which facilitate the perpetuation of social norms and enforcement of sanctions for non-compliance. Family organization in this context, therefore, represents a mediating factor between geography and social norms. In addition, geographical and climatic attributes that had contributed to higher crop yield potential and a higher importance attached to rules and discipline in the past are likely to be conducive to higher crop yield potential and a more emphasized need for strictness in the present. Finally, along similar lines, we control for continental fixed effects in order to capture unobserved continent-specific geographical and historical characteristics that may have codetermined the global distribution of agricultural intensity, attitudes towards discipline, and stricter social norms.

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 transition to agriculture to capture the geographical

¹² As 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.

¹³ Marital 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.

¹⁴ Moreover, adverse childhood conditions have been shown to have a significant impact on health and unhealthy behaviors (Kovacic and Orso, 2022; Brugiavini et al., 2022).

¹⁵ We 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.

¹⁶ See, for instance, Voigt (2024a,b) for a comprehensive review of the literature.

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).

	mRIV1 not adj.	mRIV2 not adj.	mRIV3 not adj.	mRIV4 not adj.	mRIV5 adj.	mRIV6 adj.	mRIV7 adj.	mRIV8 adj.
Crop Yield (pre-1500)	7.878*** (2.795)	8.676*** (2.592)	9.262*** (2.786)	7.606** (3.819)				
Crop Growth Cycle (pre-1500)	-2.584 (2.680)	-4.442* (2.269)	-2.329 (2.255)	-3.865 (5.051)				
Crop Yield Change (post-1500)	4.715 (3.046)	3.524 (3.325)	3.115 (3.441)	7.842** (3.865)				
Crop Growth Cycle Change (post-1500)	3.432 (2.658)	2.386 (2.521)	3.448 (2.923)	-0.204 (2.994)				
Crop Yield (Anc., pre-1500)					5.742** (2.674)	7.099*** (2.416)	8.230*** (2.525)	6.916** (2.930)
Crop Yield Change (Anc., post-1500)					7.870** (3.395)	8.555** (3.615)	8.729** (3.719)	7.287* (3.952)
Crop Growth Cycle (Anc., pre-1500)					-3.342 (2.953)	-8.129** (3.753)	-5.037 (4.005)	-4.531 (4.212)
Crop Growth Cycle Change (Anc., post-1500)					3.157 (2.514)	2.401 (2.595)	3.097 (2.810)	0.662 (3.194)
Population density in 1500 CE			-6.184*** (1.720)				-5.879*** (1.730)	
Urbanization rate in 1700 CE				-4.816*** (1.702)				-4.744*** (1.515)
Absolute Latitude		-12.311** (6.154)	-9.444 (6.198)	-9.294 (6.960)		-13.920** (6.622)	-10.386 (6.668)	-11.494 (7.189)
Mean Elevation		2.295 (2.625)	0.850 (2.506)	0.156 (3.135)		0.683 (2.634)	-0.160 (2.480)	-0.836 (3.024)
Terrain Roughness		-4.180 (2.850)	-2.373 (2.550)	-2.264 (2.970)		-2.363 (2.682)	-1.187 (2.441)	-0.630 (2.816)
Precipitation		-5.065 (3.820)	-4.031 (3.671)	-7.950* (4.688)		-7.630* (4.222)	-6.658 (4.216)	-11.971** (4.641)
Pct. Land in Tropics		-5.179 (4.341)	-5.612 (4.459)	-2.709 (5.721)		-3.399 (4.215)	-3.545 (4.269)	-0.789 (5.728)
Continent controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	88	88	88	79	88	86	86	78
Adj. R squared	0.375	0.408	0.459	0.432	0.387	0.407	0.451	0.420

Notes: The table shows the association between historical agro-climatic conditions (pre-1500 potential crop yield and growth cycle, and their change in the post-1500 period) and restraint (measured on a scale of 0 to 100). The method of estimation is OLS. Models 6 - 8 control for the timing of the transition to the Neolithic Revolution. Robust standard errors clustered at the country level are reported in parenthesis. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

attributes that existed in the homelands of the ancestral populations of each contemporary country of origin (models “mRIV5” - “mRIV8”).¹⁷ This adjustment permits the analysis to capture the culturally embodied transmission rather than the direct effect of geography (Galor and Özak, 2016). As a robustness check, we also account for pre-industrial population density and urbanization, which may have been influenced positively by higher crop yield potential and, as a result, had a direct impact on the degree of restraint (models “mRIV7” and “mRIV8”).

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-standard-deviation 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 8.5 points (model “mRIV6”). A comparison between models “mRIV5” and “mRIV6” further confirms that the effect of crop intensity is embedded in the index of contemporary restraint. Indeed, once the confounding effects of additional geographical characteristics are taken into account, the coefficient of the ancestry-adjusted agricultural potential increases by 24%. Even after controlling for urbanization and population density, the effect of historical yield remains strong and statistically significant.¹⁸

¹⁷ In 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.

¹⁸ When 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 towards long-term oriented behaviors.

Table 2

The effect of historical agro-climatic conditions on the degree of co-residence of extended families in the pre-1500 period. Country-level analysis based on Galor and Özak (2016) and Schulz et al. (2019).

	(1)	(2)	(3)	(4)
	Strong ties	Strong ties	Strong ties	Strong ties
Crop Yield (Anc., pre-1500)	0.125*** (0.046)	0.136*** (0.044)	0.138*** (0.046)	0.179*** (0.059)
Crop Yield Change (Anc., post-1500)	0.153*** (0.052)	0.165*** (0.053)	0.165*** (0.053)	0.081* (0.045)
Crop Growth Cycle (Anc., pre-1500)	-0.045 (0.041)	-0.156*** (0.052)	-0.151*** (0.055)	-0.159** (0.065)
Crop Growth Cycle Change (Anc., post-1500)	-0.030 (0.028)	-0.056* (0.032)	-0.055* (0.031)	-0.052 (0.041)
Population density in 1500 CE			-0.009 (0.033)	
Urbanization rate in 1700 CE				-0.024 (0.038)
Absolute Latitude		-0.102 (0.084)	-0.097 (0.085)	-0.165* (0.090)
Mean Elevation		-0.009 (0.043)	-0.010 (0.043)	0.007 (0.043)
Terrain Roughness		0.047 (0.041)	0.048 (0.041)	0.011 (0.040)
Precipitation		0.023 (0.053)	0.024 (0.053)	0.052 (0.054)
Pct. Land in Tropics		-0.055 (0.068)	-0.055 (0.069)	-0.193*** (0.073)
Continent controls	Yes	Yes	Yes	Yes
N. Observations	85	83	83	75
Adj. R squared	0.370	0.359	0.350	0.398

Notes: The table shows the association between the degree of co-residence of extended families in the 1500-period (measured on a scale of 0 - Independent nuclear families, to 1 - large extended families). The method of estimation is OLS. All models control for the timing of the transition to the Neolithic Revolution. Robust standard errors clustered at the country level are reported in parenthesis. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The negative and economically significant effects of urbanization and population density may be attributed to the fact that highly intensive agricultural societies were characterized by extended (communitarian) families and village communities, characterized by strong family ties, rules and social norms. In more urbanized 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). To complement this evidence, in Table 2 we assess the direct association between agricultural intensity and predominant family type in historical societies. As a dependent variable, we consider the ancestral co-residence of extended families in the pre-1500 period from (Schulz et al., 2019), which captures the degree to which several generations of a family (each with their own spouses and children) co-resided. Anthropological research suggests that such residential norms created stronger ties and economic interdependence among co-residents, entailing a wide set of rules and norms governing social behavior that were not present in smaller and independent nuclear families, where only the conjugal couple and their children lived together. As expected, higher crop yield potential and its change in the post-1500 period are positively linked with the strength of family ties in historical societies, even after controlling for geographic and climatic conditions, and degrees of urbanization and population density.

The empirical evidence presented so far suggests that historical agricultural intensity significantly contributed to the evolution of cultural traits that embed a stronger attachment to rules and norms. These ancestral features have also contributed to the emergence of specific family organizations that supported and enforced the respect of norms, including sanctioning mechanisms (such as disapproval from others) for the free-riders. Given the documented persistence of these traits, part of restraint predicted by ancestral factors may represent a good proxy for rules and norms in contemporary societies.

5.2. Life control and loneliness

Under the assumption that historically determined attitudes towards rules and norms are persistent, the culturally embedded life-control dimension of restraint is likely to correlate with the individuals' contemporary preferences regarding discipline and compliance with rules, whereas the residual component is likely to capture the value placed on leisure and other indulgences. In order to give further support to this intuition, in Table B.4 (in Appendix B) we first regress a range of individual opinions regarding compliance with rules, norms, traditions, and socially acceptable behavior, as well as preferences for leisure and having fun, on the predicted restraint and residuals from model "mRIV6" (Table 1) related to respondents parents' country of origin, together with the full set of individual-specific demographic and socio-economic characteristics. Since these alternative preferences are not available

in our main data set (SHARE), in this exercise we rely on the European Social Survey (ESS henceforth).¹⁹ Models L1 - L2 refer to preferences for leisure and indulgence, while models R3 - R5 consider attitudes towards rules and socially accepted behaviors. The results suggest that parental cultural backgrounds characterized by more stringent social norms and restrictions do not have any significant effect on leisure but rather translate into a higher importance attached to socially acceptable behaviors, respect of traditions and customs, and lower tolerance towards members of the LGBTQIA+ community. Conversely, the residual component of restraint related to leisure significantly impacts preferences for seeking fun and things that give pleasure in life and does not correlate with the compliance of rules.²⁰

Turning to the effects of the predicted restraint on loneliness, Table 3 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, we also consider 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 mother, and second-generation immigrants with both foreign-born parents (Table B.5 in Appendix B).²¹

The results support Hypothesis 2. Parental cultural backgrounds with a stronger tendency to frame individual behavior according to social norms and restrictions positively affect the risk of loneliness. 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 socialization and perception of the quality of their social relationships.²² This is in line with the existing empirical evidence on inter-generational transmission of attitudes and behavior (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 effect of culture becomes even stronger when we take into consideration the distance between the individual country of residence's predicted restraint and the one inherited from parents (Table B.7, in Appendix B). The effect of predicted restraint increases by 44%. Moreover, individuals living in countries with a predicted restraint higher than the parental one are marginally more likely to experience loneliness. Culturally embedded rules and restrictions in the country of birth, therefore, weakly reinforce the effect of similar traits inherited from parents.

The results also suggest that loneliness is particularly pronounced for individuals living alone and among those with disabilities.²³ Similarly, adverse early life conditions such as the absence of a parent or a low-quality parent-child relationship correlate positively with loneliness.²⁴ 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.8 (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. Indeed, the coefficient of the residual component of restraint is not statistically different from zero (Column [2] and [3]). 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 Columns [4] and [5] 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.²⁵ Moreover, the life-control component of restraint does not capture other cultural characteristics from Hofstede et al. (2010), such as masculinity (intensity of competition) and uncertainty avoidance (aversion to ambiguity).

¹⁹ ESS is a cross-sectional survey covering a large set of European countries 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.

²⁰ Since agro-cultural factors have been shown to be good predictors of contemporary time preferences (Galor and Özak, 2016; Galor et al., 2020), we also controlled for the Hofstede et al. (2010)'s index of long-term orientation to rule out the possibility 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. These additional results are not shown for the sake of space.

²¹ Even 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 ($p = 0.315$).

²² The results remain robust even when we control for individuals' income. We do not consider this additional control in the main specification because the income variable has many missing values (around 30%). Instead, we consider the respondents' highest educational attainment, the number of books when individuals were 15 years old, as well as the financial situation during the respondents' childhood, which are good proxies for the individuals' current level of income or wealth. See Table B.6 in Appendix B.

²³ 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).

²⁴ The 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.

²⁵ The predicted component of long-term orientation is obtained from a model equivalent to "mRIV6" (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).

Table 3
Direct association between predicted restraint and loneliness among second-generation immigrants. SHARE data.

	(1)	(2)	(3)	(4)	(5)	(6)
	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred), M	0.009*** (0.003)	0.008*** (0.003)			0.008*** (0.003)	0.007** (0.003)
Individualism, M		-0.001 (0.002)				-0.000 (0.003)
RIV (pred), F			0.006** (0.003)	0.006** (0.003)	0.004 (0.003)	0.005* (0.003)
Individualism, F				-0.001 (0.003)		-0.000 (0.002)
Age	0.002 (0.003)	0.001 (0.004)	0.002 (0.003)	0.001 (0.003)	0.002 (0.003)	0.000 (0.004)
Female	0.013 (0.053)	0.018 (0.056)	0.006 (0.055)	-0.004 (0.058)	0.006 (0.055)	-0.006 (0.059)
Low Education	0.148** (0.059)	0.118* (0.061)	0.153*** (0.058)	0.135** (0.057)	0.153*** (0.059)	0.115** (0.058)
High Education	-0.095* (0.056)	-0.080 (0.057)	-0.093 (0.058)	-0.076 (0.057)	-0.093 (0.058)	-0.080 (0.059)
Retired	-0.143 (0.090)	-0.117 (0.094)	-0.147 (0.091)	-0.120 (0.094)	-0.144 (0.092)	-0.133 (0.096)
Unemployed	0.003 (0.168)	-0.005 (0.167)	0.057 (0.171)	0.094 (0.177)	0.044 (0.173)	0.052 (0.183)
Disabled	0.542*** (0.139)	0.609*** (0.145)	0.492*** (0.141)	0.545*** (0.147)	0.497*** (0.142)	0.551*** (0.149)
Employed	-0.330*** (0.093)	-0.314*** (0.099)	-0.324*** (0.093)	-0.324*** (0.098)	-0.328*** (0.093)	-0.344*** (0.098)
Married	-0.239** (0.103)	-0.259** (0.108)	-0.240** (0.106)	-0.225** (0.112)	-0.245** (0.105)	-0.243** (0.114)
Divorced	-0.154 (0.098)	-0.174* (0.101)	-0.130 (0.100)	-0.102 (0.104)	-0.136 (0.100)	-0.115 (0.106)
Widowed	-0.182 (0.120)	-0.159 (0.124)	-0.180 (0.123)	-0.122 (0.128)	-0.184 (0.123)	-0.127 (0.130)
Number of children	-0.018 (0.020)	-0.026 (0.020)	-0.023 (0.019)	-0.033* (0.020)	-0.022 (0.019)	-0.031 (0.020)
Lives alone	0.483*** (0.061)	0.451*** (0.063)	0.467*** (0.064)	0.473*** (0.068)	0.467*** (0.064)	0.453*** (0.069)
rural	-0.010 (0.040)	-0.022 (0.041)	-0.019 (0.043)	-0.034 (0.043)	-0.014 (0.043)	-0.032 (0.044)
Poor HH (when 10)	0.105 (0.066)	0.119* (0.069)	0.104 (0.069)	0.096 (0.073)	0.105 (0.069)	0.107 (0.073)
No. books (when 10)	-0.021 (0.017)	-0.024 (0.018)	-0.017 (0.018)	-0.015 (0.019)	-0.015 (0.018)	-0.016 (0.019)
Harm (parents or third)	0.245*** (0.047)	0.235*** (0.048)	0.240*** (0.047)	0.234*** (0.050)	0.241*** (0.047)	0.224*** (0.050)
Relationship (adverse)	0.054 (0.042)	0.049 (0.045)	0.061 (0.042)	0.073 (0.045)	0.060 (0.042)	0.067 (0.046)
Absent parent	0.043 (0.070)	0.040 (0.071)	0.024 (0.067)	0.008 (0.064)	0.025 (0.067)	-0.001 (0.065)
Country & wave	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	5471	5123	5304	4887	5304	4775

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. Loneliness is measured by the UCLA loneliness scale (with a range between 3 and 9). The method of estimation is OLS. RIV (pred) stands for predicted values of restraint from model “mRIV6”, Table 1. Robust standard errors bootstrapped and clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Finally, the empirical exercise in Appendix C shows that the mechanism linking life-control dimension to loneliness passes through individuals’ degree of satisfaction with social life. The underlying logic is that in the presence of stricter norms, individuals face less freedom in choosing their optimal behaviors, which may result in lower satisfaction, *ceteris paribus*. This is particularly relevant for the perceived quality of social connections, which represent the main conceptual element of loneliness.

5.3. Loneliness and health

Before discussing the main results on loneliness and health, 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. While leisure and indulgence may affect health-related behaviors, and in turn individuals’ health

outcomes, the core component of restraint capturing norms and restrictions is less likely to have a direct impact on unhealthy lifestyles or other unobservable health-related factors, such as genetic 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.9 (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). 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. While the absence of a direct link between the predicted restraint and health does not imply that the exclusion restriction has been fully met, these findings may be viewed as reassuring.

In Table B.10 (in Appendix B) we first estimate a simple OLS model on a sample of second-generation immigrants, 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.²⁶ As already mentioned in the introductory section, 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.²⁷

Table 4 reports our main results from a two-stage IV model.²⁸ 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 1.03-point increase in the intensity of emotional distress (as measured by the EURO-alt scale) and a 3.41-point increase in the body mass index. These effects are economically significant given the overall prevalence of emotional disorders and average body mass index in the population (1.91 and 27.35 respectively). The effect on mental disorders is primarily driven by an increased likelihood of suicidal thoughts (10 percentage points) and sleeping problems (20 percentage points). Moreover, the probability of experiencing depressive symptoms is 25 percentage points higher for lonely individuals (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 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. 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). This latter divergence may be attributed to our ability to account for reverse causality between loneliness and health, with the effects running only in one direction, namely from adverse general health to loneliness and vice versa.

It is worth noting that, when compared to OLS estimates in Table B.10, the effect of instrumented loneliness is 2.2 times larger in magnitude than the non-instrumented one for depressive symptoms and 5.1 for mobility. The body mass index, on the other hand, turns to be significant with an economically important effect.²⁹ Finally, the effects of loneliness are not altered by health-related risky behaviors, 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 5), loneliness seems to increase the likelihood of scoring low in fluency tests, as well as of having diabetes. The direct and independent contribution of loneliness to high blood sugar or diabetes is 1%. This result is consistent with (Richard et al., 2017), among others, and fits well with the considerable impact of loneliness on body mass index documented in Table 4.

²⁶ Similar results are obtained when we consider the entire population of native individuals (*i.e.*, even those with parents born in the country of interview).

²⁷ In addition, in Table B.11 (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.

²⁸ Our baseline specification considers second-generation immigrants defined as native individuals with one or both foreign-born parents. The maternal (paternal) predicted restraint for individuals with foreign-born fathers (mothers) and native mothers (fathers) 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 or fathers, as well as on those with both foreign-born parents (Table B.5 in Appendix B). 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 3 (Column [1]).

²⁹ To 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.

Table 4
The effect of loneliness on health among second-generation immigrants. SHARE data.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)
1st Stage F	26.229	26.229	26.229	26.349	22.066	25.860	26.229
2nd stage	EURO-D	EURO-alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Lonely	1.290*** (0.467)	1.026*** (0.400)	1.216* (0.884)	0.086 (0.521)	3.412*** (1.514)	0.089 (1.254)	0.415 (0.614)
Full set of regressors from Table 3	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	5471	5471	5471	5469	5441	5468	5471

Notes: The table shows the direct effect of loneliness on second generation immigrants' health outcomes. Loneliness is measured by the UCLA loneliness scale (with a range between 3 and 9). Abbreviations: "EURO-D" - 12 item European Depression Scale, "EURO-alt" - European Depression Scale excluding depression, "MOBILITY" - number of mobility limitations, "ADL" - number of limitations with activities of daily living, "BMI" - body mass index, "CHRONIC" - number of chronic health conditions, "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, living in rural area, financial hardship during childhood, adverse childhood conditions, and absence of one or both parents during childhood. The method of estimation is ivreg2. RIV (pred) stays for predicted values of restraint from model "mRIV6", Table 1, associated to maternal country of origin. Robust standard errors bootstrapped and 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 single health outcomes and cognitive abilities among second-generation immigrants. SHARE data.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1st stage (UCLA, bin)	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
1st Stage F	15.469	15.469	15.469	15.469	15.469	12.168	12.168	16.182
2nd stage	CHOL.	DIAB.	PRESS.	ULCER	STROKE	MEMO.	FLUEN.	NUMER.
Lonely	0.013 (0.010)	0.010*** (0.003)	-0.019 (0.027)	0.000 (0.008)	0.001 (0.005)	0.023 (0.031)	0.015*** (0.002)	0.013 (0.030)
Full set of regressors from Table 3	Yes	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	Yes	Yes
N. Observations	5466	5466	5466	5466	5466	3935	3935	4146

Notes: The table shows the direct effect of loneliness on second generation immigrants' health outcomes. Loneliness is measured by dichotomized UCLA loneliness scale (1 = UCLA \geq 6). Abbreviations: "MEMO" - fair or poor memory, "NUME" - fair or poor numeracy, "FLUE" - fluency \leq 15 (on a scale of 0 to 100), "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, living in rural area, financial hardship during childhood, adverse childhood conditions, and absence of one or both parents during childhood. The method of estimation is bivariate probit model. RIV (pred) stays for predicted values of restraint from model "mRIV6", Table 1, associated to maternal country of origin. Robust standard errors bootstrapped and clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The direct effect of loneliness on high blood cholesterol and pressure, on the other hand, is not significant, which, at first glance, may seem counter-intuitive given the economically relevant influence of loneliness on BMI. The reasons behind this lack of significance may be twofold. First, unhealthy lifestyles and/or obesity are not necessarily related to these specific health problems.³⁰ Second, the link between loneliness and physical health issues, as well as functional and mobility limitations may be indirect, passing through body mass index or other individual specific behavioral factors.

Finally, we test the robustness of the results from our baseline specification in Table 4, 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.15 (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

³⁰ Indeed, the unconditional correlation between BMI and cholesterol, ulcer and stroke is, respectively, 0.1, 0.03, and 0.09, while for diabetes, it is 0.31.

instrument (F-test = 5.781 and 5.937, respectively). 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.16, 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 4. 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 neighbors in times of need, or by giving help to the others. The results in Table B.17 (in Appendix B) show that individuals providing help to the other relatives, neighbors 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.18 (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 4, the size of the effects of mental health and body mass index is larger, especially when health conditions in childhood are taken into account. It is worth noting that the significance of loneliness is somewhat reduced when childhood health conditions are taken into account. This is not surprising evidence since self-reported health at early life stages may suffer from a recall bias, *i.e.*, individuals with worse health outcomes are more likely to recall their past conditions with a more negative connotation.

6. Conclusions

In this paper, we investigate the cultural determinants of loneliness and the health impact of loneliness using a sample of second-generation immigrants from the Survey on Health, Ageing and Retirement in Europe (SHARE). Previous literature documents significant associations between loneliness and health. However, most studies reveal correlations and say little about causation. Focusing on second-generation immigrants allows us to identify the effect of loneliness on individuals’ health by exploiting the exogenous variation in parental cultural background while keeping the other country-specific factors invariant.

We consider an historical and intergenerational aspect of culture related to socially imposed rules and norms that affect and restrict individuals’ choices, thereby affecting their social interactions and sense of freedom. More specifically, we employ a set of ancestral factors associated with higher pre-industrial agricultural returns. These factors triggered more intensive modes of production, demanding disciplined behavior, 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. 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.

Additionally, we provide evidence of the strong correlation between the predicted life-control dimension and individuals’ perceptions of freedom in their lives, as well as their attitudes towards rules and socially accepted behaviors. Assuming that this cultural trait persists across generations, we find that it strongly predicts loneliness among our sample of second-generation migrants, who differ only in terms of their parental cultural backgrounds.

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 (BMI) and specific mental health issues and that these findings hold across a battery of sensitivity checks. Interestingly, our results show that these effects are more pronounced than those estimated through ordinary least squares (OLS).

Several policy 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. Furthermore, our analysis reveals heterogeneities within the immigrant population. This aspect is not limited only to second-generation immigrants; it can be extended to a general population of first-generation immigrants and refugees, which, as suggested by the literature, are more likely to experience loneliness compared to native populations. This is because they have limited opportunities to establish social connections beyond their own ethnic groups’ networks, face language barriers, and are often subject to discrimination and exclusion. In addition to these contextual factors, younger immigrants may be particularly at risk of loneliness given their higher expectations for social relationships. Moreover, policymakers should pay particular attention to refugees, which represent the most vulnerable category of migrants since they have lower degrees of freedom in choosing their destinations based on social network considerations.

Finally, 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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Code availability

Available upon reasonable request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Hofstede et al. (1991) and Hofstede et al.’s (2010) dimensions of culture

In addition to the cultural dimensions of restraint described in Section 3.1, Hofstede et al. (1991) and Hofstede et al.’s (2010) six-dimensional model of national culture includes the following five cultural dimensions:

- 1 **Individualism** This dimension refers to the degree to which people in a society are integrated into groups. Individualistic societies have loose ties that often only relate an individual to his/her immediate family. They emphasize the “I” versus the “we”. Its counterpart, collectivism, describes a society in which tightly integrated relationships tie extended families and others into groups. These groups are laced with loyalty and support each other when a conflict arises with another group.
- 2 **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, although the authors did not find objective ways of measuring and theorizing this association.
- 3 **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.
- 4 **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.
- 5 **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 ((Hofstede et al., 2010), page 140)

Appendix B. Tables and figures

See Tables B.1–B.18 and Fig. B.1.

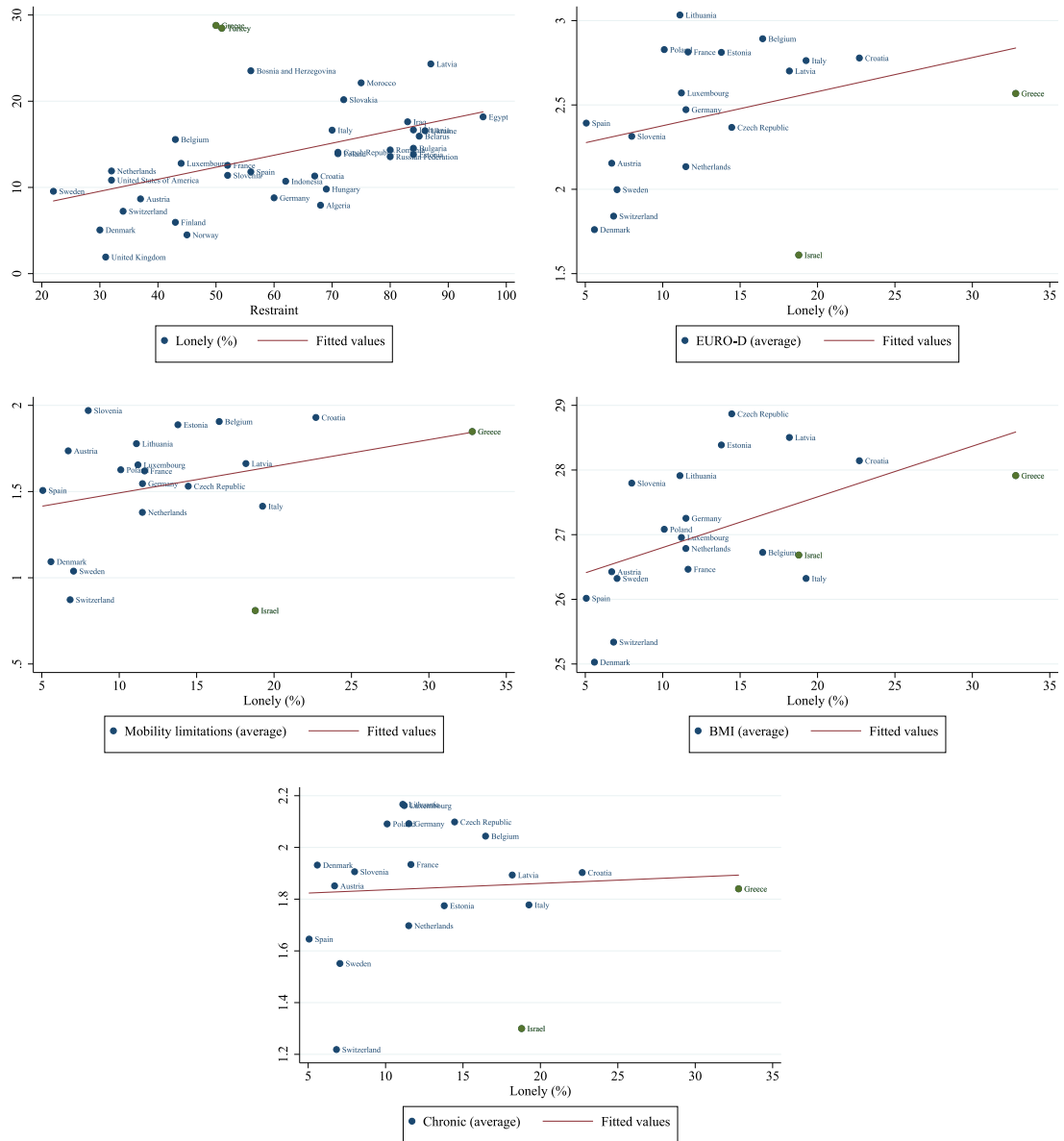


Fig. B.1. Unconditional correlations between the degree of restraint, selected mental and physical health outcomes and loneliness, by country. **Note:** The figure depicts unconditional correlations between the percentage of individuals feeling lonely and their parental degree of restraint (first panel); the average score of EURO-D (second panel); the number of mobility limitations (third panel); body mass index - BMI (fourth panel); and the number of chronic conditions (fifth panel). The correlation coefficients with and without two outlying countries (Greece and Turkey in panel a, and Israel and Greece in panels b-e) are, respectively, 0.45 (0.65), 0.33 (0.65), 0.30 (0.46), 0.51 (0.58), and 0.06 (0.29).

Table B.1

List of countries included in Hofstede et al. (2010) and the corresponding index of individualism and restraint.
Source: Hofstede et al. (2010).

Country	Individ.	RIV	Country	Individ.	RIV
Albania	.	85	Italy	76	70
Algeria	.	68	Jamaica	39	.
Andorra	.	35	Japan	46	58
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	.	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	Suriname	47	.
Iceland	.	33	Sweden	71	22
India	48	74	Switzerland	68	34
Indonesia	14	62	Taiwan	17	51
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			

Table B.2

Summary statistics.

Variable	Mean	Std. Dev.	Min.	Max.	N
Loneliness (UCLA)	3.857	1.331	3	9	5471
Lonely (direct)	0.233	0.423	0	1	5471
RIV (predicted), M	60.517	6.699	32.591	76.673	5471
RIV (predicted), F	60.882	6.757	20.66	89.384	5304
RIV (residuals), M	2.283	14.637	-32.346	27.456	5471
RIV (residuals), F	1.669	15.205	-32.346	27.456	5304
Individualism, M	57.373	15.633	25	91	5123
Individualism, F	57.742	15.744	20	91	4897
RIV (raw), M	62.801	16.956	22	96	5471

(continued on next page)

Table B.2 (continued).

Variable	Mean	Std. Dev.	Min.	Max.	N
RIV (raw), F	62.551	17.708	22	96	5304
EURO depression scale (EURO-D)	2.307	2.115	0	12	5471
EURO-D alt (alternative)	1.912	1.84	0	11	5471
Mobility limitations	1.43	2.164	0	10	5471
Limitations with daily (ADL)	0.165	0.617	0	6	5469
Body mass index (BMI)	27.351	5.091	13.62	73.462	5441
Number of chronic diseases	1.76	1.578	0	11	5468
Self-assessed health (SAH)	3.112	1.058	1	5	5471
EURO-D: Depression	0.41	0.492	0	1	5464
EURO-D: Pessimism	0.14	0.347	0	1	5453
EURO-D: Suicide	0.067	0.25	0	1	5462
EURO-D: Guilt	0.093	0.291	0	1	5453
EURO-D: Sleep	0.362	0.481	0	1	5469
EURO-D: Interest	0.07	0.256	0	1	5468
EURO-D: Irritability	0.315	0.465	0	1	5462
EURO-D: Appetite	0.077	0.266	0	1	5470
EURO-D: Fatigue	0.346	0.476	0	1	5467
EURO-D: Concentration	0.123	0.329	0	1	5460
EURO-D: Enjoyment	0.083	0.275	0	1	5464
EURO-D: Tearfulness	0.238	0.426	0	1	5461
No physical activity	0.081	0.273	0	1	5471
Few sports	0.365	0.482	0	1	5467
Ever smoked daily	0.488	0.5	0	1	5471
Low memory score	0.251	0.434	0	1	3935
Low numeracy score	0.594	0.491	0	1	4146
Low fluency score	0.138	0.345	0	1	3935
High blood cholesterol	0.241	0.428	0	1	5466
Diabetes or high blood sugar	0.136	0.342	0	1	5466
High blood pressure or hypertension	0.404	0.491	0	1	5466
Stomach or duodenal ulcer	0.041	0.198	0	1	5466
Stroke	0.033	0.178	0	1	5466
Often lonely in childhood	0.219	0.414	0	1	5459
Fair or poor health in childhood	0.131	0.337	0	1	4626
Informal care (given)	0.31	0.462	0	1	4962
Informal care (received)	0.198	0.398	0	1	4962
Every day contact	0.252	0.434	0	1	3943
Frequent contact	0.271	0.445	0	1	3943
Fair contact	0.3	0.458	0	1	3943
Rare contact	0.176	0.381	0	1	3943
Voluntary or charity work	0.19	0.392	0	1	5461
Educational or training course	0.163	0.37	0	1	5461
Sport, social or other kind of club	0.32	0.466	0	1	5461
Political or community-related org.	0.075	0.264	0	1	5461
Books, magazines or newspapers	0.821	0.383	0	1	5461
Games (crossword, puzzles, etc.)	0.508	0.5	0	1	5461
Cards or games such as chess	0.306	0.461	0	1	5461
Age	65.547	8.681	50	96	5471
Female	0.587	0.492	0	1	5471
Low Education	0.239	0.427	0	1	5471
High Education	0.299	0.458	0	1	5471
Retired	0.553	0.497	0	1	5471
Unemployed	0.023	0.15	0	1	5471
Disabled	0.042	0.202	0	1	5471
Employed	0.318	0.466	0	1	5471
Married	0.680	0.467	0	1	5471
Divorced	0.13	0.336	0	1	5471
Widowed	0.117	0.321	0	1	5471
Number of children	2.212	1.342	0	14	5471
Lives alone	0.217	0.412	0	1	5471
Rural area	0.285	0.452	0	1	5471
Poor Household (HH) (when 10)	0.22	0.414	0	1	5471
No. books (when 10)	2.573	1.268	1	5	5471
Harm (parents or third)	0.303	0.46	0	1	5471
Relationship (adverse)	0.557	0.497	0	1	5471
Absent parent	0.15	0.358	0	1	5471

Note: Summary statistics based on the sample of second-generation immigrants from SHARE.

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

SG immigrants	Country of interview (19)
	Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Greece, Israel, Italy, Latvia, Lithuania, Luxembourg, Poland, Slovenia, Spain, Sweden, Switzerland.
SG immigrants	Country of origin Mother (40)
	Algeria, Argentina, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hungary, Iran, Iraq, Italy, Latvia, Lithuania, Luxembourg, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States of America.

Notes: Countries of interview (countries of origin) with less than 20 (10) observations with valid information on all the explanatory and control variables are excluded from the analysis.

Table B.4
Direct association between predicted and residual restraint and second-generation immigrants' attitudes toward leisure and rules and restrictions. European Social Survey (ESS) data.

	L1 Have good time	L2 Have fun pleasure	R3 Behave properly	R4 Traditions & customs	R5 Sexual minorities
Either or both					
RIV (pred)	0.002 (0.002)	-0.002 (0.002)	0.009*** (0.002)	0.005** (0.002)	-0.011*** (0.003)
RIV (res)	0.001 (0.002)	0.003*** (0.001)	0.001 (0.002)	-0.001 (0.002)	-0.003 (0.002)
<i>N. Observations</i>	16 528	16 516	16 518	16 541	16 319
FB Mother					
RIV (pred)	0.001 (0.002)	-0.001 (0.002)	0.010*** (0.002)	0.004* (0.002)	-0.011*** (0.003)
RIV (res)	0.001 (0.002)	0.006*** (0.002)	0.000 (0.003)	-0.002 (0.002)	0.002 (0.003)
<i>N. Observations</i>	10 872	10 860	10 868	10 882	10 763
<i>Full set of individual char.</i>	Yes	Yes	Yes	Yes	Yes
<i>Country & wave</i>	Yes	Yes	Yes	Yes	Yes

Notes: The set of dependent variables includes: Important to have a good time (L1); Important to seek fun and things that give pleasure (L2); Important to behave properly (R3); Important to follow traditions and customs (R4); and Gays and lesbians free to live life as they wish (R5). 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 ordered logit. RIV (pred) and RIV (res) stay respectively for predicted and residual values of restraint from model "mRIV6", Table 1. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

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

	(1) Lonely	(2) Lonely	(3) Lonely	(4) Lonely	(5) Lonely	(6) Lonely
FB Mother						
RIV (pred), M	0.010*** (0.003)	0.010*** (0.003)			0.010*** (0.003)	0.009** (0.004)
RIV (pred), F			0.007* (0.005)	0.007* (0.005)	0.000 (0.005)	0.002 (0.004)
Individualism, M		-0.001 (0.003)				-0.000 (0.004)
Individualism, F				0.000 (0.003)		0.001 (0.002)
<i>N. Observations</i>	3820	3472	3719	3431	3719	3319
FB Father						
RIV (pred), M	0.013**	0.013**			0.011*	0.011*

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Table B.5 (continued).

	(0.006)	(0.007)			(0.008)	(0.009)
RIV (pred), F			0.006** (0.003)	0.006* (0.003)	0.003 (0.004)	0.002 (0.004)
Individualism, M		−0.001 (0.003)				−0.001 (0.004)
Individualism, F				−0.001 (0.002)		−0.001 (0.002)
<i>N. Observations</i>	3610	3339	3521	3104	3521	3068
Both FB parents						
RIV (pred), M	0.015** (0.006)	0.014** (0.005)			0.020** (0.009)	0.011 (0.007)
RIV (pred), F			0.008* (0.005)	0.009* (0.006)	−0.007 (0.009)	0.001 (0.005)
Individualism, M		−0.002 (0.003)				−0.005 (0.007)
Individualism, F				0.000 (0.003)		0.005 (0.004)
<i>N. Observations</i>	1959	1688	1936	1648	1936	1612
<i>Full set of regressors from Table 3</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Country (of residence)</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Wave of interview</i>	Yes	Yes	Yes	Yes	Yes	Yes

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 parents during childhood. The method of estimation is OLS. RIV (pred) stands for predicted values of restraint from model “mRIV6”, 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.6

Direct association between predicted restraint and loneliness among second-generation immigrants. Additional controls for individual income. SHARE data.

	(1) Lonely	(2) Lonely	(3) Lonely	(4) Lonely	(5) Lonely	(6) Lonely
RIV (pred), M	0.009*** (0.004)	0.008** (0.004)			0.009*** (0.004)	0.008** (0.004)
Individualism, M		−0.003 (0.002)				−0.002 (0.002)
RIV (pred), F			0.003 (0.003)	0.003 (0.003)	0.001 (0.003)	0.002 (0.003)
Individualism, F				0.000 (0.002)		0.001 (0.002)
<i>Full set of regressors from Table 3</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Income (deciles)</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>Country & wave</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>N. Observations</i>	3935	3698	3815	3530	3815	3460

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. Loneliness is measured by the UCLA loneliness scale (with a range between 3 and 9). The method of estimation is OLS. RIV (pred) stands for predicted values of restraint from model “mRIV6”, Table 1. Robust standard errors bootstrapped and 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 and loneliness among second-generation immigrants, controlling for the difference between the predicted restraint in the country of residence and the parental one. SHARE data.

	(1) Lonely	(2) Lonely	(3) Lonely	(4) Lonely	(5) Lonely	(6) Lonely
RIV (pred), M	0.013*** (0.003)	0.013*** (0.005)			0.011*** (0.004)	0.011** (0.005)
RIV (pred), CR > RIV (pred), M	0.084* (0.046)	0.088 (0.068)			0.067 (0.058)	0.067 (0.070)

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Table B.7 (continued).

Individualism, M	0.001 (0.002)				0.002 (0.002)	
RIV (pred), F			0.007* (0.004)	0.006* (0.004)	0.006* (0.004)	0.006 (0.004)
RIV (pred), CR > RIV (pred), F			-0.026 (0.069)	-0.039 (0.066)	-0.016 (0.065)	-0.033 (0.067)
Individualism, F					-0.001 (0.002)	-0.000 (0.002)
Country & wave	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	4731	4519	4584	4312	4584	4209

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. Loneliness is measured by the UCLA loneliness scale (with a range between 3 and 9). The method of estimation is OLS. RIV (pred) stands for predicted values of restraint from model “mRIV6”, Table 1, and $RIV(pred)$, CR indicates the predicted restraint associated to individuals’ country of residence. Different number of observations (4731 versus 5471) compared to Table 3 is due to the fact that the index of restraint is not available for Israel. Robust standard errors bootstrapped and 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.8

Direct association between predicted restraint, alternative cultural characteristics and loneliness (UCLA loneliness scale) among second-generation immigrants. SHARE data.

	(1) Lonely	(2) Lonely	(3) Lonely	(4) Lonely	(5) Lonely	(6) Lonely	(7) Lonely
RIV (raw)	0.004** (0.002)						
RIV (res)		0.002 (0.002)	0.002 (0.002)				
RIV (pred)			0.009*** (0.003)	0.009*** (0.003)	0.009*** (0.003)	0.008** (0.003)	0.008*** (0.003)
LTO				0.001 (0.002)			
LTO (pred)					-0.000 (0.002)		
Uncertainty Avoidance						0.002* (0.002)	
Masculinity							-0.000 (0.001)
Full set of Regressors from Table 3	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	5471	5471	5471	5471	5471	5123	5123

Notes: The table shows the association between the index of 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 parents during childhood. The method of estimation is OLS. RIV (pred) and RIV (res) stand for predicted and residual values of restraint from model “mRIV6”, Table 1. Robust standard errors bootstrapped and clustered at the country of origin and country of residence level are reported in parenthesis. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.9

Direct effect of restraint on health and socio-economic characteristics. SHARE data.

Panel A	EURO-D	MOBILITY	ADL	BMI	CHRONIC	SAH		
RIV (pred)	0.011* (0.006)	0.010* (0.006)	0.003 (0.002)	0.027 (0.017)	0.000 (0.005)	0.003 (0.003)		
	Depress.	Pessimism	Suicide	Guilt	Sleep	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)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)
	Fatigue	Concentr.	Enjoyment	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)	0.001 (0.001)	0.004 (0.003)	-0.002 (0.001)

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Table B.9 (continued).

	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)	0.001 (0.001)		
	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.	Enjoyment	Tearful.	EURO alt	Ph.Inact.	Sport	Smoking
RIV (raw)	0.000 (0.001)	0.001** (0.000)	0.000 (0.000)	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** (0.011)	0.001 (0.003)	0.001 (0.002)		
	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* (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)	0.000 (0.001)	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)

Notes: The table shows the direct effect of predicted restraint 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 4. 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.10

Direct association between loneliness and health among second-generation immigrants. OLS model. SHARE data.

	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	0.539*** (0.031)	0.462*** (0.027)	0.238*** (0.031)	0.057*** (0.011)	0.027 (0.071)	0.089*** (0.021)	0.115*** (0.014)
Age	0.010** (0.005)	0.009* (0.005)	0.041*** (0.006)	0.006*** (0.002)	−0.074*** (0.014)	0.038*** (0.004)	0.019*** (0.002)
Female	0.698*** (0.071)	0.541*** (0.060)	0.486*** (0.084)	0.003 (0.020)	−0.342 (0.274)	0.065 (0.055)	−0.011 (0.035)
Low Education	0.176** (0.085)	0.194** (0.084)	0.404*** (0.103)	0.090*** (0.030)	0.834*** (0.249)	0.235*** (0.071)	0.157*** (0.041)
High Education	−0.105 (0.087)	−0.112 (0.075)	−0.172** (0.086)	−0.035* (0.018)	−0.352 (0.214)	−0.153*** (0.057)	−0.188*** (0.037)
Retired	0.038 (0.116)	0.011 (0.101)	−0.175 (0.166)	−0.045 (0.052)	0.789** (0.363)	0.008 (0.115)	−0.024 (0.059)
Unemployed	0.584*** (0.221)	0.476** (0.188)	−0.367 (0.244)	−0.087 (0.053)	−0.884* (0.517)	−0.155 (0.141)	0.078 (0.111)
Disabled	1.355*** (0.198)	1.168*** (0.166)	2.009*** (0.222)	0.433*** (0.082)	0.313 (0.590)	1.260*** (0.154)	0.951*** (0.093)
Employed	0.011 (0.121)	−0.026 (0.107)	−0.415*** (0.153)	−0.062 (0.040)	−0.366 (0.396)	−0.254** (0.098)	−0.174*** (0.058)
Married	0.019 (0.127)	0.016 (0.115)	−0.384** (0.182)	−0.069 (0.052)	−0.804 (0.476)	−0.226** (0.114)	−0.175*** (0.064)
Divorced	0.292** (0.141)	0.243* (0.127)	−0.083 (0.171)	−0.002 (0.058)	−0.527 (0.448)	0.026 (0.115)	−0.016 (0.073)
Widowed	0.167 (0.170)	0.154 (0.153)	0.300 (0.177)	0.059 (0.052)	−0.195 (0.631)	0.057 (0.126)	0.010 (0.070)
Number of children	0.036 (0.022)	0.026 (0.020)	0.058** (0.027)	0.008 (0.008)	0.104 (0.069)	−0.004 (0.020)	−0.009 (0.012)
Lives alone	−0.201 (0.126)	−0.213* (0.117)	−0.365*** (0.139)	−0.053 (0.053)	−0.481 (0.408)	−0.215* (0.119)	−0.144** (0.067)
Rural	−0.017 (0.066)	−0.016 (0.055)	0.152* (0.082)	0.011 (0.024)	0.005 (0.290)	−0.029 (0.056)	0.051 (0.033)

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Table B.10 (continued).

	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Poor HH (when 10)	0.151** (0.071)	0.130** (0.060)	0.144 (0.111)	-0.014 (0.020)	0.643* (0.340)	0.059 (0.061)	0.097** (0.045)
N. books (when 10)	-0.075** (0.032)	-0.072** (0.026)	-0.049 (0.043)	0.000 (0.012)	-0.213** (0.084)	-0.032 (0.024)	-0.044** (0.014)
Harm (parents or third)	0.200** (0.084)	0.184** (0.075)	0.236* (0.122)	0.042 (0.029)	-0.057 (0.254)	0.258*** (0.057)	0.023 (0.031)
Relationship (adverse)	0.094 (0.060)	0.046 (0.051)	-0.050 (0.068)	-0.029 (0.018)	-0.225 (0.187)	-0.129** (0.050)	-0.012 (0.034)
Absent parent(s)	0.035 (0.081)	0.020 (0.072)	0.230** (0.115)	0.015 (0.031)	0.581* (0.323)	0.109 (0.076)	0.023 (0.042)
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	5471	5471	5471	5469	5441	5468	5471
Adj. R Squared	0.236	0.229	0.207	0.078	0.074	0.165	0.277

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.11

Direct association between loneliness and health among second-generation immigrants. Random effects model with lagged loneliness as a predictor. SHARE data.

	EURO-D	EURO-D alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (lag)	0.273*** (0.030)	0.224*** (0.030)	0.091*** (0.030)	0.022** (0.011)	-0.025 (0.055)	0.038* (0.021)	0.066*** (0.014)
Full set of regressors from Table 3	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	2960	2960	2960	2960	2935	2959	2960

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 parents during childhood. The method of estimation is random effects. 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.12

The effect of loneliness on single components of the EURO-D scale among second-generation immigrants. SHARE data.

1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
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)
1st Stage F	24.972	27.903	25.521	26.462	26.125	26.876
2nd stage	depression	pessimism	suicide	guilt	sleep	interest
Loneliness (UCLA)	0.249** (0.098)	0.055 (0.063)	0.097** (0.039)	0.078 (0.058)	0.196* (0.138)	0.028 (0.053)
N. Observations	5464	5453	5462	5453	5469	5468
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
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)
1st Stage F	31.325	26.124	25.773	27.271	26.555	27.229
2nd stage	irritability	appetite	fatigue	concentr.	enjoy	tears
Loneliness (UCLA)	0.083 (0.119)	0.080 (0.109)	0.173 (0.297)	0.040 (0.118)	0.018 (0.051)	0.175 (0.207)
N. Observations	5462	5470	5467	5460	5464	5461
Full set of regressors from Table 3	Yes	Yes	Yes	Yes	Yes	Yes
Country (of residence)	Yes	Yes	Yes	Yes	Yes	Yes
Wave of interview	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the direct effect of loneliness on single components of the EURO-D depression scale. RIV (pred) stands for predicted values of restraint from model "mRIV6", 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.13

The effect of loneliness on health among second-generation immigrants. RIV not predicted (“raw”). SHARE data.

1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (raw)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.004** (0.002)
1st Stage F	4.987	4.987	4.987	4.954	4.775	4.792	4.987
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.984** (0.834)	1.823** (0.792)	1.318 (0.983)	0.620* (0.349)	6.978 (4.614)	0.273 (0.840)	0.491 (0.680)
Full set of regressors from Table 3	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	5471	5471	5471	5469	5441	5468	5471

Notes: The table shows the direct effect of loneliness on second generation immigrants’ physical and mental health outcomes. RIV (raw) stands 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 parents during childhood. The method of estimation is IV linear regression model. Robust standard errors bootstrapped and 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.14

The effect of loneliness on health among second-generation immigrants. Additional controls for behavioral risks. SHARE data.

Physically inactive							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.008*** (0.002)	0.008*** (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	18.216	18.216	18.216	18.247	15.210	17.723	18.216
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.218*** (0.463)	0.945** (0.406)	0.962 (0.730)	0.318 (0.294)	3.443** (1.427)	0.003 (0.760)	0.350 (0.393)
No physical activity	0.483 (0.429)	0.542 (0.362)	1.688*** (0.458)	0.372* (0.212)	-0.204 (1.284)	0.564 (0.469)	0.438* (0.261)
N. Observations	5471	5471	5471	5469	5441	5468	5471
Few intense sports							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.009*** (0.002)
1st Stage F	22.650	22.650	22.650	22.714	19.221	22.213	22.650
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.230*** (0.451)	0.974** (0.400)	1.033 (0.719)	0.353 (0.267)	3.199** (1.264)	-0.015 (0.677)	0.349 (0.361)
Few sport	0.119** (0.056)	0.117** (0.046)	0.331*** (0.074)	0.038* (0.022)	0.186** (0.093)	0.172*** (0.057)	0.132*** (0.032)
N. Observations	5467	5467	5467	5465	5437	5464	5467
Full set of regressors from Table 3	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
Smoking daily							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
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	26.482	26.482	26.482	26.618	22.355	26.160	26.482
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.335*** (0.434)	1.069*** (0.385)	1.259* (0.735)	0.382 (0.272)	3.427*** (1.294)	0.108 (0.702)	0.420 (0.383)
Ever smoked daily	0.202*** (0.068)	0.192*** (0.059)	0.194*** (0.073)	0.039* (0.023)	0.068 (0.186)	0.082 (0.069)	0.022 (0.039)
N. Observations	5471	5471	5471	5469	5441	5468	5471

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Table B.14 (continued).

Full set of regressors from Table 3	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

Notes: The table shows the direct effect of loneliness on second generation immigrants’ physical and mental health outcomes. RIV (pred) stands for predicted values of restraint from model “mRIV6”, 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.15

The effect of loneliness on health among second-generation immigrants. Direct question for loneliness. SHARE data.

1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
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	5.781	5.781	5.781	5.721	5.937	5.613	5.781
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (direct)	4.655 (3.023)	3.703 (2.364)	4.385* (2.592)	1.349 (0.841)	12.724*** (4.932)	0.322 (2.477)	1.498 (0.955)
Full set of regressors from Table 3	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	5471	5471	5471	5469	5441	5468	5471

Notes: The table shows the direct effect of loneliness on second generation immigrants’ physical and mental health outcomes. RIV (pred) stands for predicted values of restraint from model “mRIV6”, 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.16

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. SHARE data.

Panel A: contact kids							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)
Frequent contact	0.014 (0.041)	0.014 (0.041)	0.014 (0.041)	0.012 (0.041)	0.016 (0.043)	0.014 (0.041)	0.014 (0.041)
Fare contact	0.132*** (0.039)	0.132*** (0.039)	0.132*** (0.039)	0.133*** (0.039)	0.134*** (0.039)	0.128*** (0.039)	0.132*** (0.039)
Rare contact	0.363*** (0.041)	0.363*** (0.041)	0.363*** (0.041)	0.363*** (0.041)	0.360*** (0.041)	0.362*** (0.041)	0.363*** (0.041)
1st Stage F	16.331	16.331	16.331	16.460	15.090	16.537	16.331
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.529*** (0.291)	1.271*** (0.261)	1.036* (0.606)	0.301 (0.324)	4.110*** (1.051)	0.271 (0.566)	0.350 (0.320)
N. Observations	3943	3943	3943	3942	3921	3940	3943
Panel B: activities							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)
Voluntary	-0.130*** (0.049)	-0.130*** (0.049)	-0.130*** (0.049)	-0.131*** (0.049)	-0.126*** (0.049)	-0.130*** (0.049)	-0.130*** (0.049)
Training course	0.001 (0.043)	0.001 (0.043)	0.001 (0.043)	0.002 (0.043)	-0.003 (0.044)	0.002 (0.043)	0.001 (0.043)
Sport, social club	-0.111*** (0.032)	-0.111*** (0.032)	-0.111*** (0.032)	-0.111*** (0.032)	-0.112*** (0.032)	-0.111*** (0.032)	-0.111*** (0.032)
Political or comm. org.	0.013 (0.065)	0.013 (0.065)	0.013 (0.065)	0.013 (0.065)	0.015 (0.066)	0.013 (0.065)	0.013 (0.065)

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Table B.16 (continued).

Books	−0.317*** (0.071)	−0.317*** (0.071)	−0.317*** (0.071)	−0.318*** (0.071)	−0.319*** (0.073)	−0.317*** (0.072)	−0.317*** (0.071)
Games	−0.083** (0.033)	−0.083** (0.033)	−0.083** (0.033)	−0.085** (0.033)	−0.082** (0.033)	−0.084** (0.033)	−0.083** (0.033)
1st Stage F	12.292	12.292	12.292	12.306	10.157	12.071	12.292
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.411*** (0.475)	1.066** (0.446)	1.258 (0.867)	0.425 (0.337)	3.969** (1.873)	0.095 (0.824)	0.361 (0.436)
N. Observations	5461	5461	5461	5459	5431	5458	5461
Full set of regressors from Table 3	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

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (pred) stands for predicted values of restraint from model "mRIV6", 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.17

The effect of loneliness on health among second-generation immigrants. Additional controls for informal care (provided and received). SHARE data.

Panel A: care provided							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)
Informal care (given)	−0.072 (0.044)	−0.072 (0.044)	−0.072 (0.044)	−0.075* (0.044)	−0.070 (0.044)	−0.072 (0.044)	−0.072 (0.044)
1st Stage F	63.046	63.046	63.046	64.295	51.084	64.585	63.046
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.355*** (0.445)	1.129*** (0.374)	1.016** (0.472)	0.314 (0.207)	3.293*** (0.733)	0.192 (0.589)	0.370 (0.311)
N. Observations	4962	4962	4962	4960	4932	4959	4962
Panel B: care received							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)	0.011*** (0.001)
Informal care (received)	0.141*** (0.045)	0.141*** (0.045)	0.141*** (0.045)	0.141*** (0.045)	0.144*** (0.045)	0.143*** (0.045)	0.141*** (0.045)
1st Stage F	69.946	69.946	69.946	71.323	56.475	71.559	69.946
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.354*** (0.458)	1.132*** (0.380)	1.088** (0.470)	0.329* (0.199)	3.333*** (0.734)	0.218 (0.569)	0.388 (0.311)
N. Observations	4962	4962	4962	4960	4932	4959	4962
Full set of regressors from Table 3	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

Notes: The table shows the direct effect of loneliness on second generation immigrants' physical and mental health outcomes. RIV (pred) stands for predicted values of restraint from model "mRIV6", 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table B.18
The effect of loneliness on health among second-generation immigrants. Additional controls for loneliness and health in childhood. SHARE data.

Panel A: loneliness							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)
Lonely in childhood	0.522*** (0.094)	0.522*** (0.094)	0.522*** (0.094)	0.523*** (0.094)	0.516*** (0.094)	0.520*** (0.094)	0.522*** (0.094)
1st Stage F	15.231	15.231	15.231	15.281	12.713	14.669	15.231
Panel B: health							
1st stage	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely	Lonely
RIV (pred)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)
Poor health (when 10 yrs)	0.212** (0.105)	0.212** (0.105)	0.212** (0.105)	0.212** (0.105)	0.215** (0.106)	0.212** (0.105)	0.212** (0.105)
1st Stage F	9.134	9.134	9.134	9.134	7.921	9.071	9.134
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.526*** (0.497)	1.195*** (0.458)	1.468 (0.956)	0.446 (0.372)	4.592*** (1.768)	0.159 (0.939)	0.504 (0.519)
N. Observations	5459	5459	5459	5457	5430	5456	5459
2nd stage	EURO-D	EURO alt	MOBILITY	ADL	BMI	CHRONIC	SAH
Loneliness (UCLA)	1.620* (0.892)	1.290* (0.756)	0.848 (1.234)	0.309 (0.386)	6.108* (3.234)	-0.177 (0.982)	0.423 (0.570)
Full set of regressors from Table 3	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	4626	4626	4626	4626	4602	4625	4626

Notes: The table shows the direct effect of loneliness on second generation immigrants’ physical and mental health outcomes. RIV (pred) stands for predicted values of restraint from model “mRIV6”, 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 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: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Appendix C. Life-control and freedom

The mechanism linking rules and restrictions to loneliness passes through individuals’ degree of satisfaction with social life. The assumption is that in the presence of stricter norms, individuals face less freedom in choosing their optimal behaviors, which may result in lower satisfaction, *ceteris paribus*. This is particularly relevant for the perceived quality of social connections, which represent the main conceptual element of loneliness. In order to show this, we perform an additional exercise and rely on the Gallup World Poll Survey and consider native individuals living in more than 145 countries worldwide. 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. We 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. We 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). Fig. C.1 (first panel) 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 behaviors 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 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

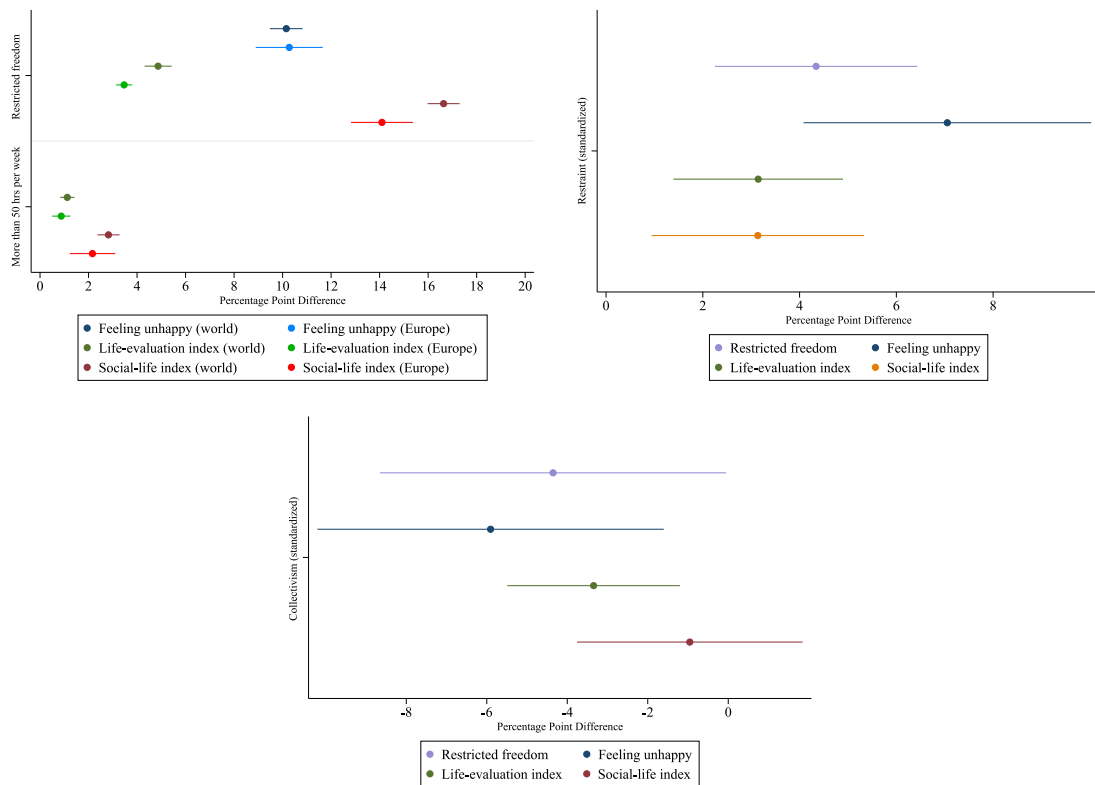


Fig. C.1. Marginal effects: restricted freedom and low leisure on satisfaction (first panel); restraint on restricted freedom and satisfaction (second panel); and collectivism on restricted freedom and satisfaction (third panel).

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.

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. Fig. C.1 (second panel) 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.

Finally, in order to show that freedom does not relate significantly with group cohesion, in Fig. C.1 (third panel) 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.

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