

Social interactions, loneliness and health

Health Economics Webinar Series
Associazione Italiana di Economia Sanitaria (AIES)

Matija Kovacic
European Commission, Joint Research Centre
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Outline

- What is loneliness and why we should care about it?
- A brief insight into loneliness in Europe
- Loneliness and health: a complex relationship
- Quality of social interactions, loneliness and health: an alternative approach
- Results

Loneliness: definition

- The negative feeling arising when an individual's perception of social relationships is significantly deficient in either quantity or quality (Perlman and Peplau, 1984)
- It is not only a matter of being alone or (physically) isolated, rather it is a form of dissatisfaction with the existing social interactions and relationships
- It is, hence, a subjective phenomenon which may be influenced by several demographic, socio-economic but also cultural factors
- It is not only a “psychological” or “sociological” problem, rather it may have serious economic consequences (for individuals and society)

Why does loneliness matter?

- Loneliness is a **public health issue**:
 - ✓ Higher risk of depression, anxiety disorders, suicidal ideation, obesity, cardiovascular disease, cognitive and functional decline (Cacioppo and Cacioppo, 2018; Cacioppo and Hawkley, 2009; Cacioppo et al., 2014; Leigh-Hunt et al., 2017, among others)
- Also an **economic problem**:
 - ✓ Higher healthcare expenditure (Kung et al., 2021); increased absence, loss of productivity and increased voluntary turnover resulting from low job satisfaction (Michaelson et al., 2021); regions with a higher share of lonely people have a more limited capacity to generate additional wealth (Burlina and Rodríguez-Pose, 2021).

Why does loneliness matter?

- Loneliness does not affect only older people (as commonly believed) – **young(er) individuals** are significantly affected as well,
- The phenomenon is associated with other domains of social behaviors, such as **social media** (ab)use and **civic engagement**,
- Last but not least, some groups in the society are at a higher risk: **LGBTQIA+** and first-generation **immigrants**.

2022 EU Loneliness Survey (EU-LS)



First EU-wide survey measuring loneliness using established scales and a self reported measure



More than 25,000 respondents from all EU27 countries



Online survey conducted in November and December 2022

Respondents from large consumer panels
Quotas/weights to resemble country populations

EU-LS survey: 7 main modules

1. Loneliness and social isolation
2. Initiatives addressing loneliness and perceptions of loneliness
3. Intensity and purpose of social media use
4. Trust and civic engagement (including experiment on trust)
5. Health status, dietary habits and physical activity
6. Childhood experiences (ACE)
7. Socio-demographic characteristics (employment and income status)

Some descriptives

Loneliness: measurement

University of California Los Angeles (UCLA)

- How often do you feel that you lack companionship?
- How often do you feel left out?
- How often do you feel isolated from others?

De Jong - Gierveld (DJG)

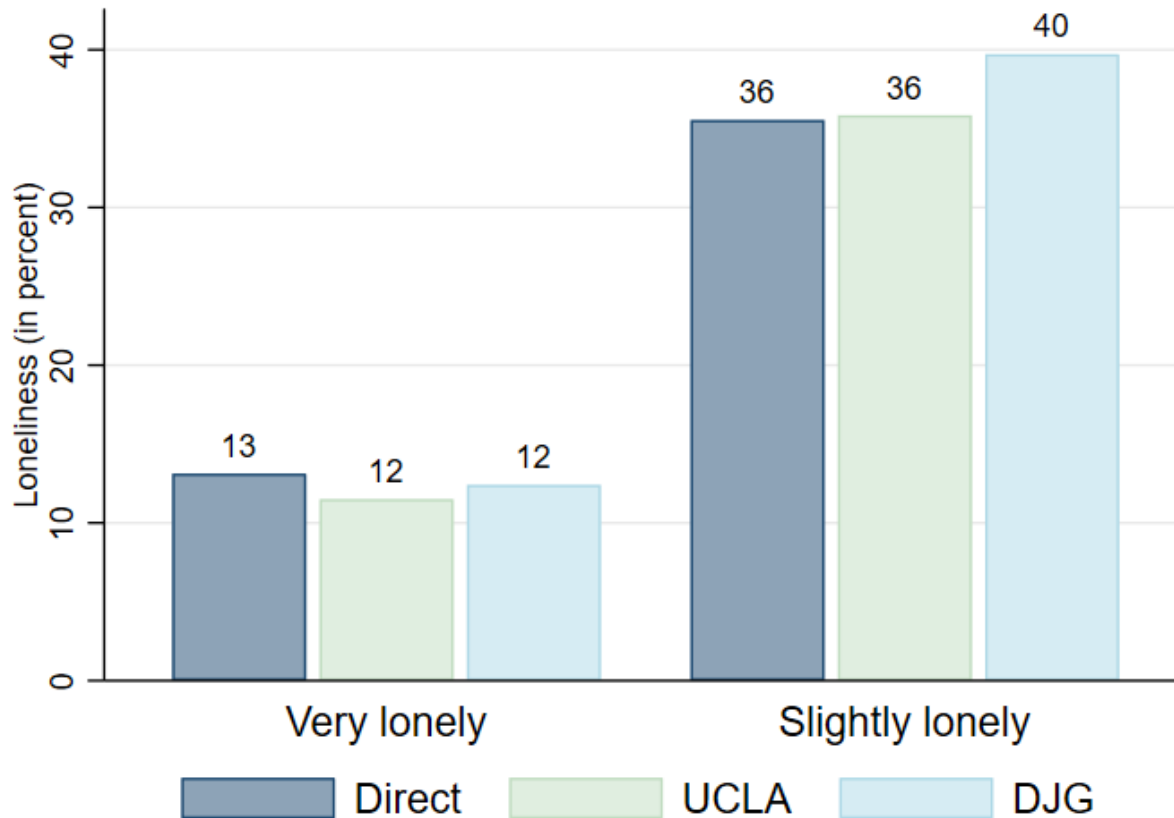
- I experience a general sense of emptiness.
- I miss having people around.
- I often feel rejected.
- There are plenty of people I can rely on when I have problems.
- There are many people I can trust completely.
- There are enough people I feel close to.

Direct question

How much of the time, during the past 4 weeks, have you been feeling lonely?

- ✓ All of the time
- ✓ Most of the time
- ✓ Some of the time
- ✓ A little of the time
- ✓ None of the time

EU-LS: Quantifying loneliness



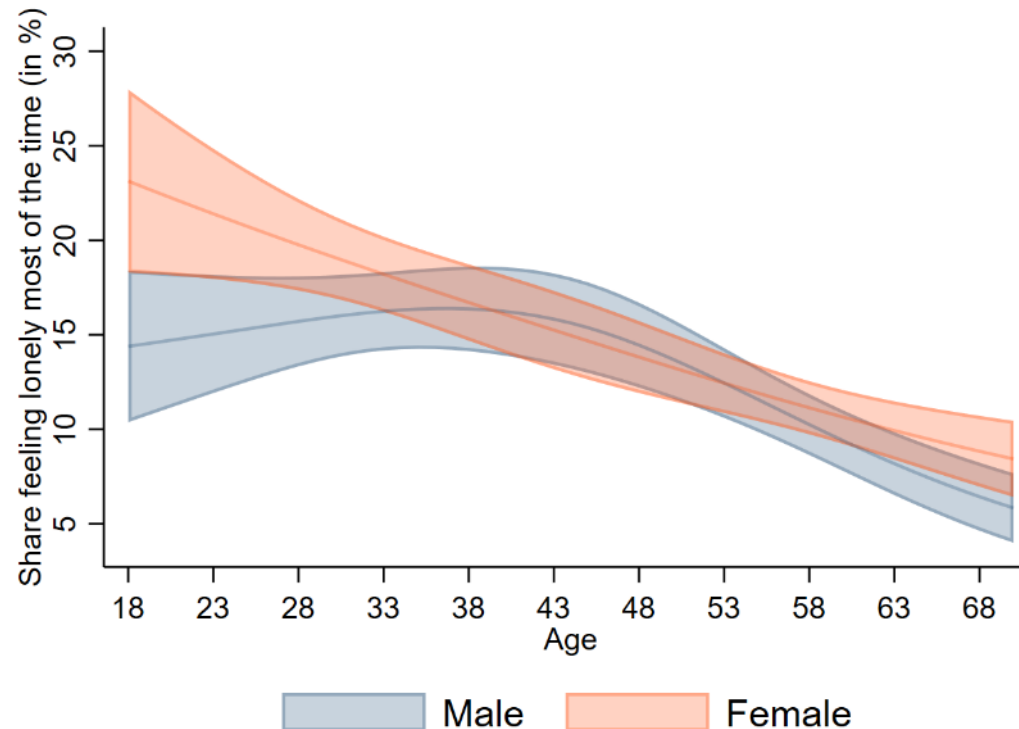
13% of respondents reported feeling lonely most or all of the time

36% of respondents reported feeling lonely at least some of the time

Source: EU-LS

EU-LS: Loneliness by age and gender

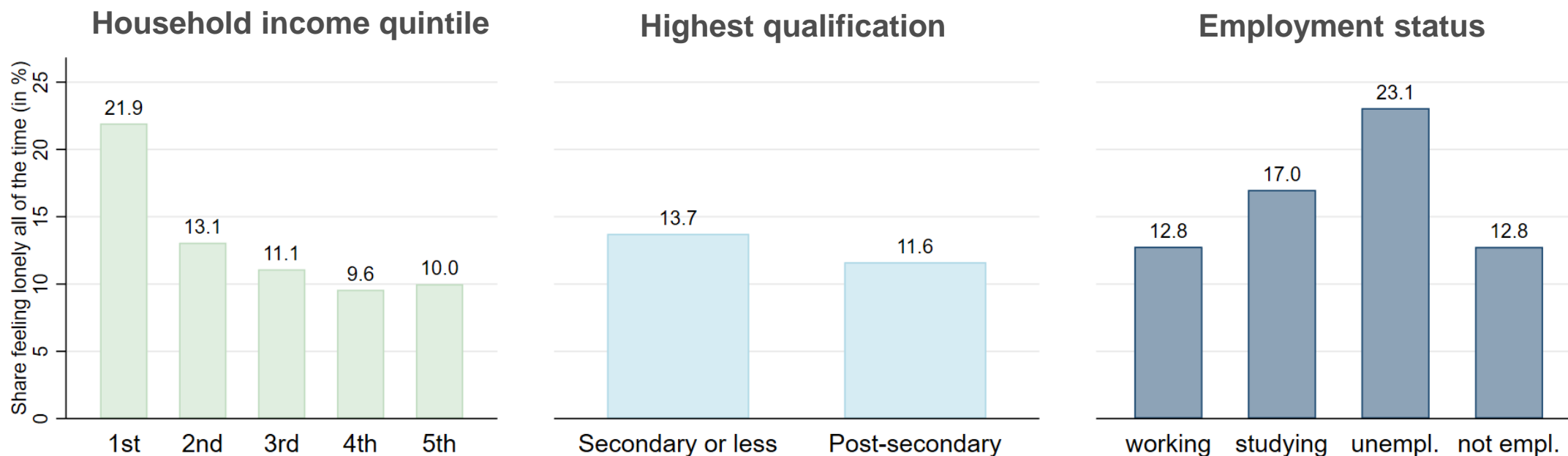
- The prevalence of loneliness decreases with rising age
- Young women are more likely to be lonely than young men



Source: EU-LS. Predicted values from a logistic regression with being lonely most of the time as the dependent variable. The lines show fitted values and 95% confidence intervals.

EU-LS: Loneliness by socio-demographic characteristics

- The prevalence of loneliness decreases with rising income and education.
- The unemployed and those studying are more likely to be lonely than those having a job.

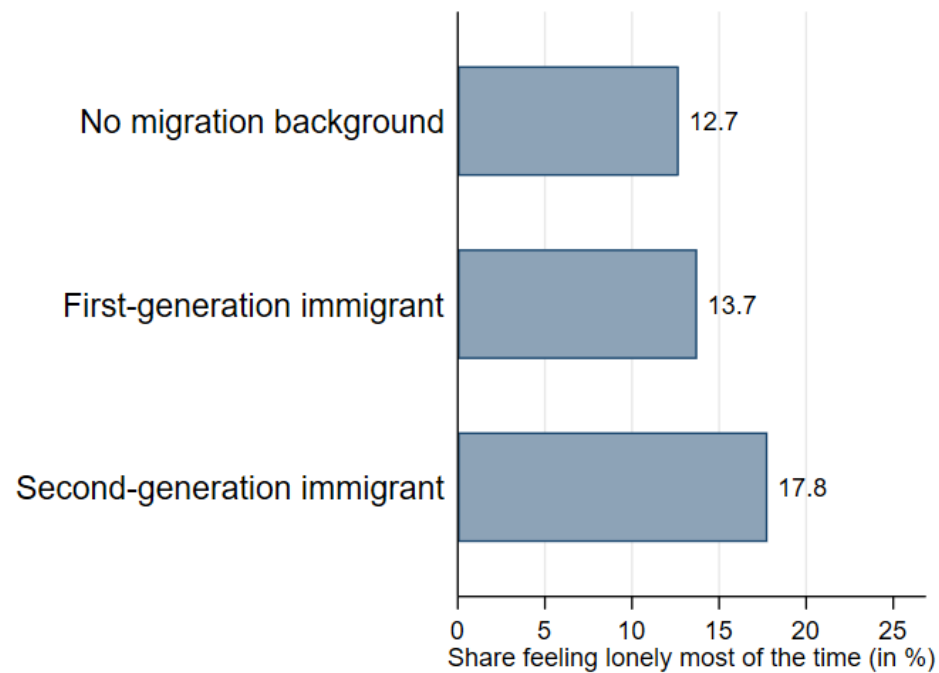


Source: EU-LS. Note: Income quintile refers to the country quintile of household disposable income and excludes non-responses. The employment status categorization excludes the retired.

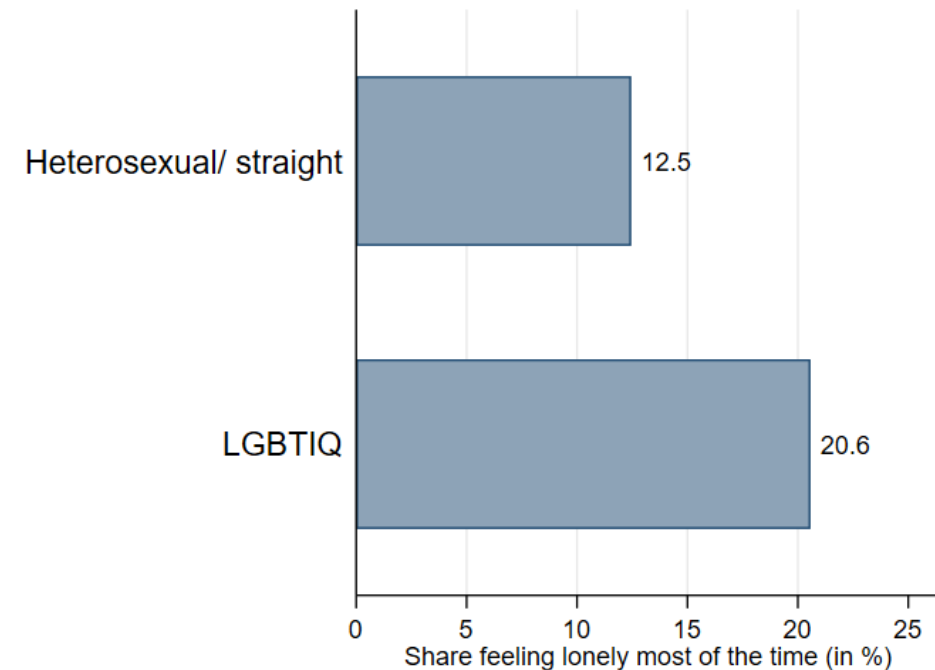
EU-LS: Loneliness is higher among some minority groups

- Those with parents born abroad and LGBTIQ are more at risk of feeling lonely.

Migration background

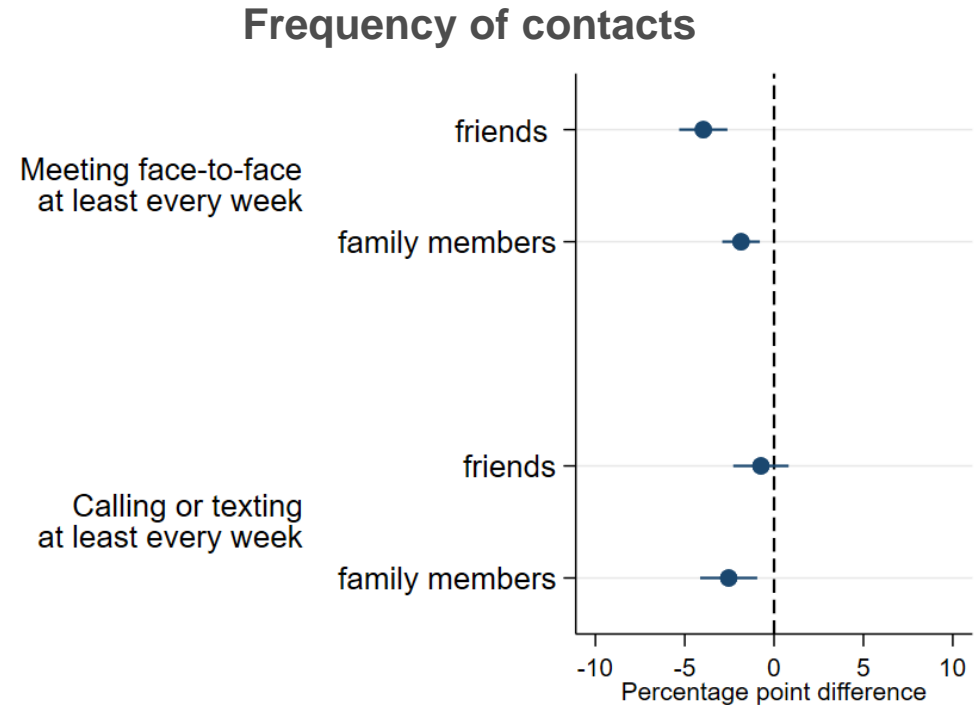
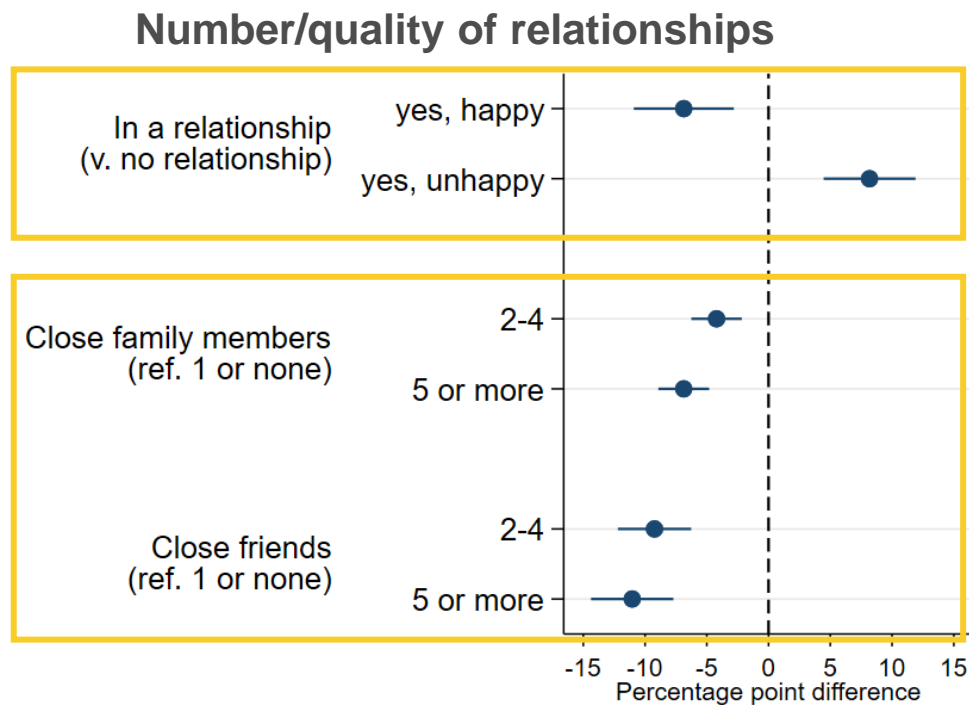


Sexual orientation



EU-LS: The importance of social relationships

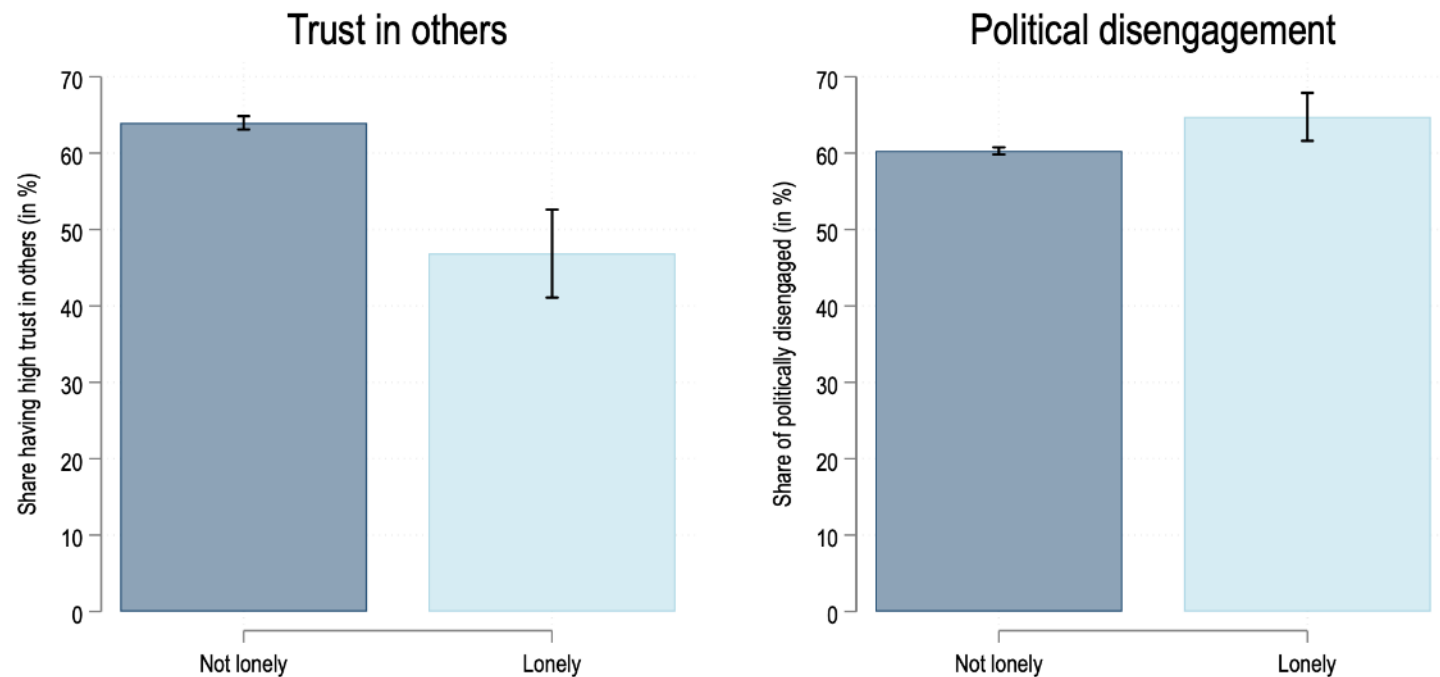
- Having several meaningful relationships is associated with lower loneliness
- Also the frequency of contacts matters for loneliness.



Source: EU-LS. Coefficients from a multivariate regression with being lonely most of the time as dependent variable. The lines show 95% confidence intervals.

EU-LS: Loneliness and the society

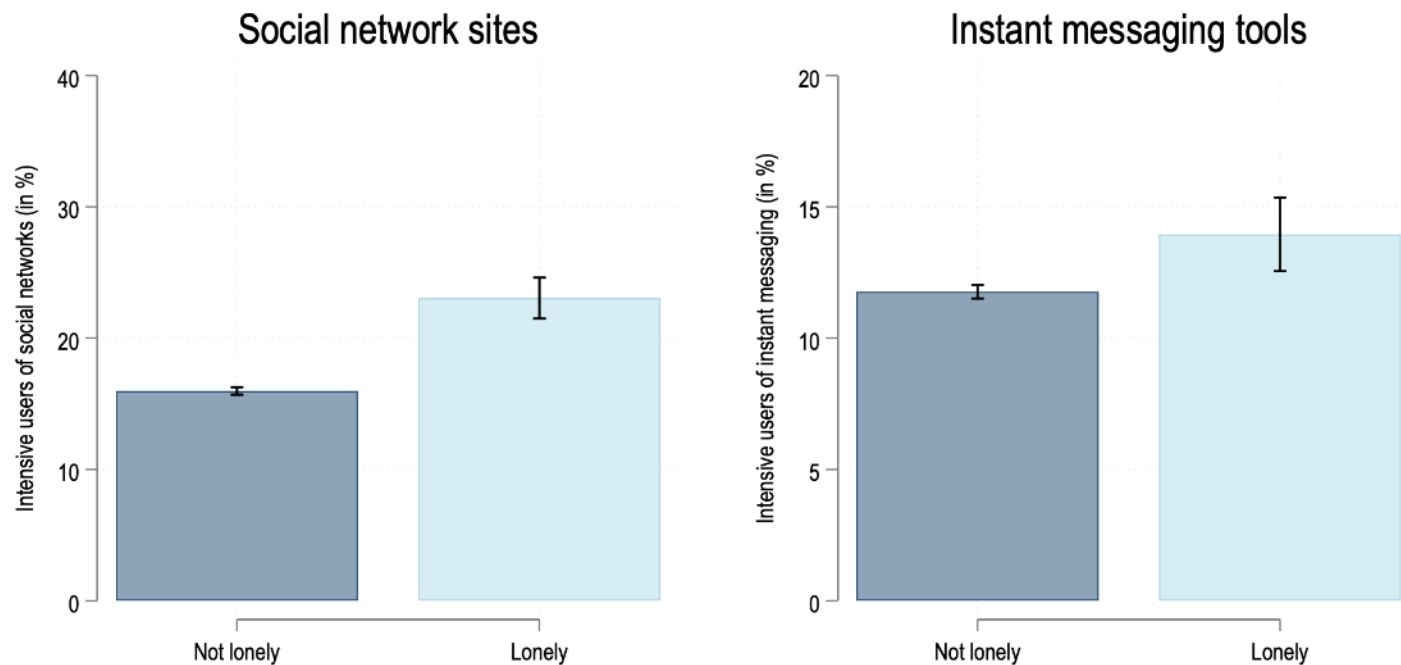
- Lonely respondents have lower trust in others and are more likely to be politically disengaged



Source: EU-LS Note: Trust in others measures the degree of trust in most people. Political disengagement is measured through agreement with the statement: 'People like me don't have any say about what the government does'

EU-LS: Loneliness and social media use

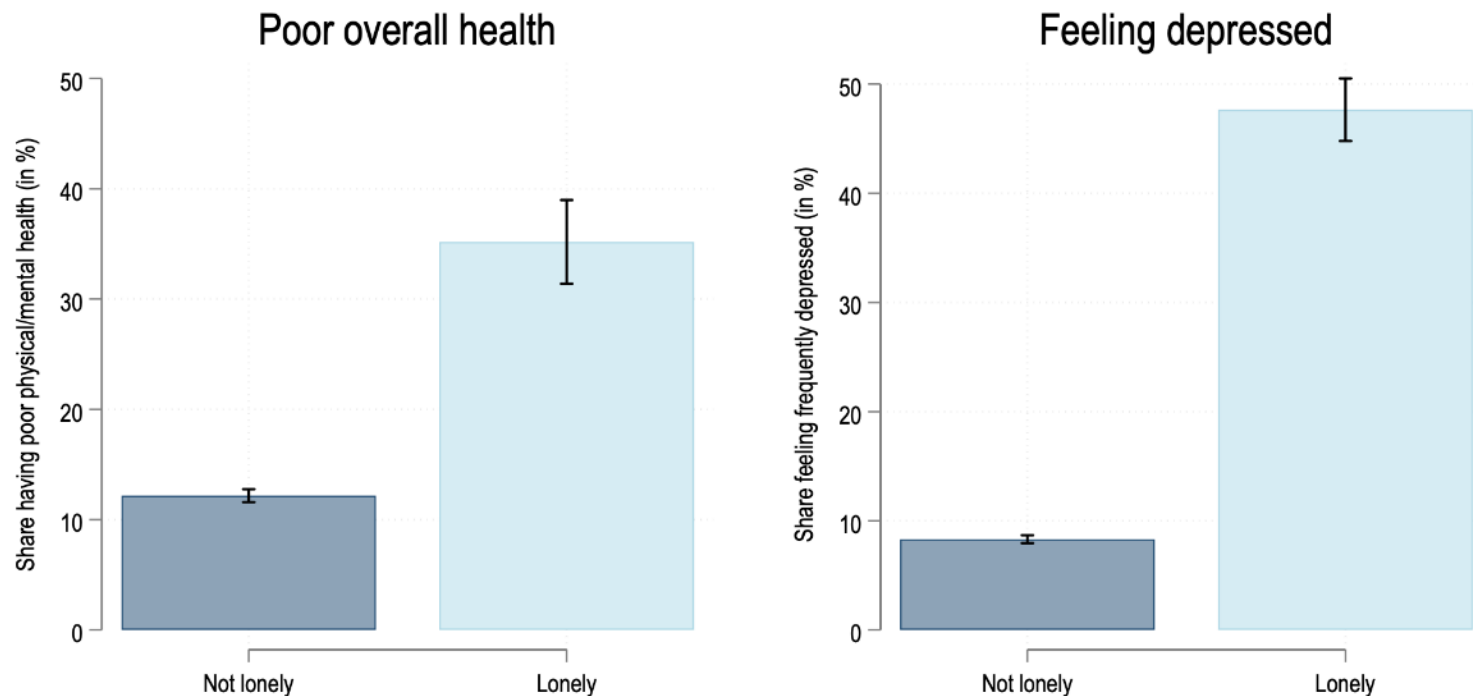
- Lonely respondents spend more time on social networks and instant messaging



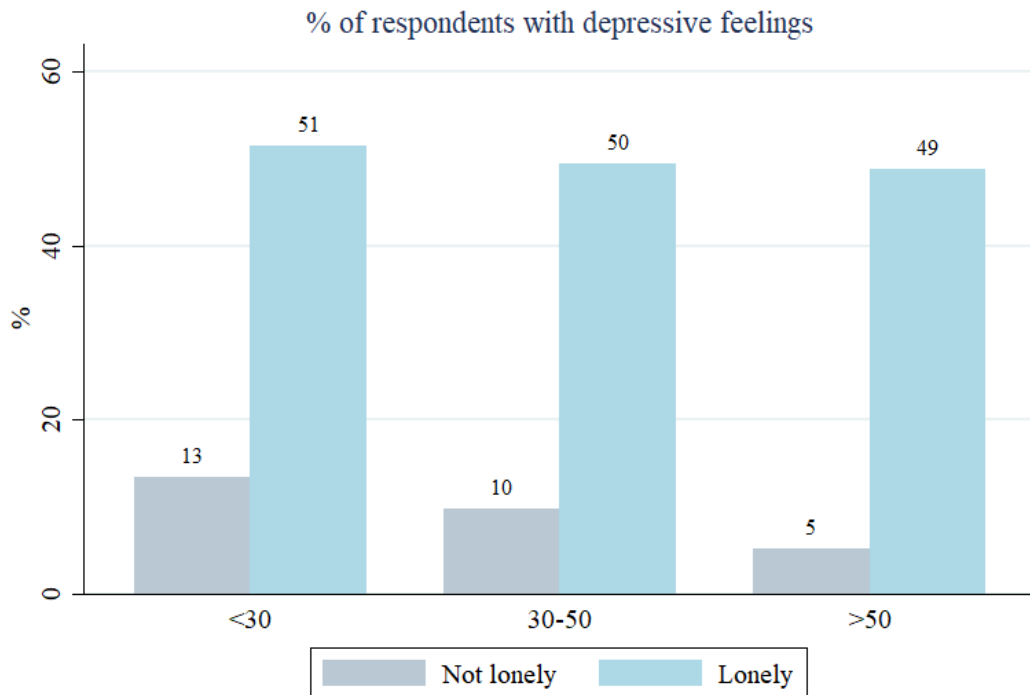
Source: EU-LS. Note: intensive use of social media refers to individuals reporting to spend more than 2 hours per day on a given type of social media.

EU-LS: Loneliness and health

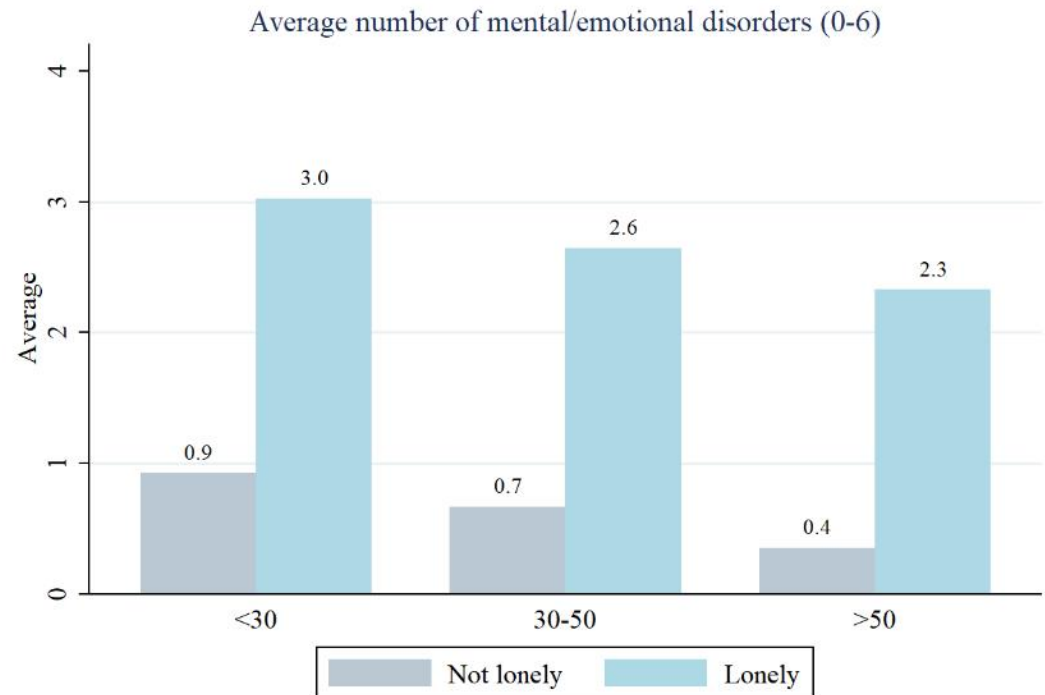
- Lonely respondents have lower health and are more likely to be depressed



EU-LS: Loneliness and mental well-being



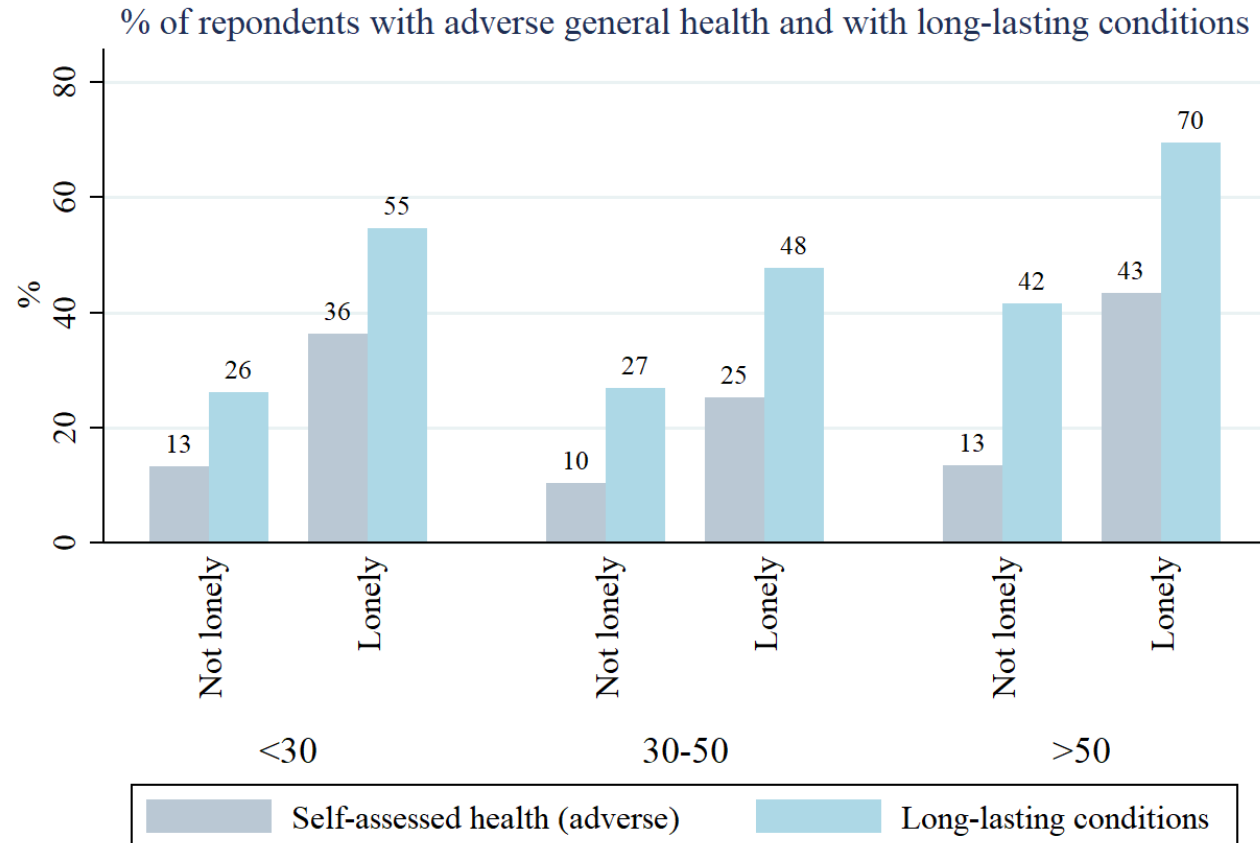
Source: EU-LS, 2022



Source: EU-LS, 2022

- Individuals feeling lonely most of the time (13% in total) are more affected by mental health issues,
- The prevalence of mental disorders is considerable among younger individuals,
- The average number of mental/emotional disorders decreases with increasing age.

EU-LS: Loneliness and physical health

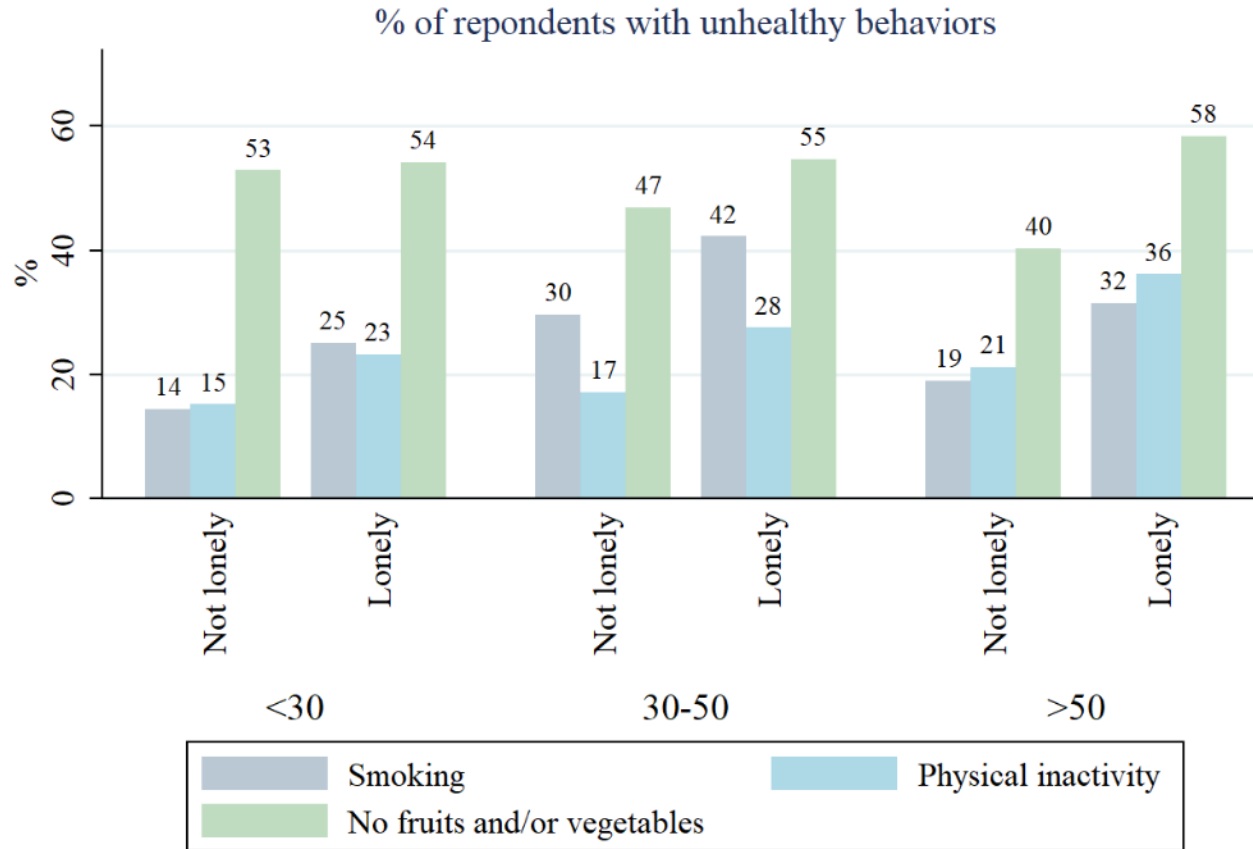


Source: EU-LS, 2022

- Self-assessed health: fairly poor or very poor (13.82% of the sample)
- Long-lasting mental or physical health problem: Yes (35.93% of the sample)

- Less pronounced but still considerably higher incidence of worse general health conditions among lonely individuals, highest among older individuals (50+).

EU-LS: Loneliness and unhealthy behavior



Source: EU-LS, 2022

- Smoking: 10 or more cigarettes per day (20.99% of the sample)
- Physical inactivity: No physical activity during past week (17.31% of the sample)
- No fruits and/or vegetables (48.75% of the sample)

- Considerably higher incidence of unhealthy (risky) behaviors among lonely individuals (approx. 10 pp); slight increase with age.

Relevant insights for policy makers and researchers

- Considerable incidence of loneliness and emotional disorders among younger populations,
- This is an important piece of evidence that calls for the attention of policymakers,
- However, there is a need for a better understanding of the drivers of loneliness beyond the common demographics and socio-economic characteristics:

What influences what? Causal effects of loneliness on health.

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

Co-authored with Elizabeth Casabianca (JRC)

Key starting point

- Loneliness is a subjective phenomenon: plenty of factors influencing individual attitudes/perceptions:
 - ✓ Demographic and socio-economic factors - living alone, absence partner/parent, employment status, adverse childhood conditions, lonely in childhood, etc.
 - ✓ Cultural-psychological factors (norms) - “*the collective programming of the mind that distinguishes the members of one group or category of people from other*” (Hofstede et al., 2010).

Not new: Figlio et al., 2019, Galor and Özak (2016), Kovacic and Orso (2023)

Some commonly shared traits may influence perceptions of social relationships and, hence, affect the likelihood of experiencing loneliness (net of the other factors).

Our research

- We estimate the **direct effect of loneliness on a set of health-related indicators** (mental and physical)
- **Empirical issues** hindering the correct identification of direct effects:
 - ✓ Endogeneity: reverse causality: **need for exogenous proxy (instrument)**; exclusion restriction
- Our empirical strategy consists of **three primary elements**:
 - ✓ Explore the **historical roots of attitudes toward loneliness** which pass through a **specific cultural trait** related to norms and restriction governing individual behavior
 - ✓ Separate the effect of culture from the other country-specific factors: **epidemiological approach (second-generation immigrants)**
 - ✓ Cultural trait as an **instrument** for individual self-declared loneliness

Cultural roots of loneliness: Question 1

- Which aspect of social life matters for loneliness? **Quantity** (variety) of social relationships **or perceived quality** of relationships, **or both**?
- **Quality** is more important than quantity in predicting loneliness (Pinquart and Sörensen, 2003; Beller and Wagner, 2018): individuals facing the same number of social relations may have different evaluations of such relationships (i.e., perceived quality)
- **Culturally-embedded social norms and restrictions** force individuals to fit into pre-defined behavioral standards increasing the likelihood of dissatisfaction and, hence, loneliness (“*culture-loneliness framework*”, Heu et al, 2021) = **LIFE-CONTROL** component of culture

Cultural roots of loneliness: Question 2

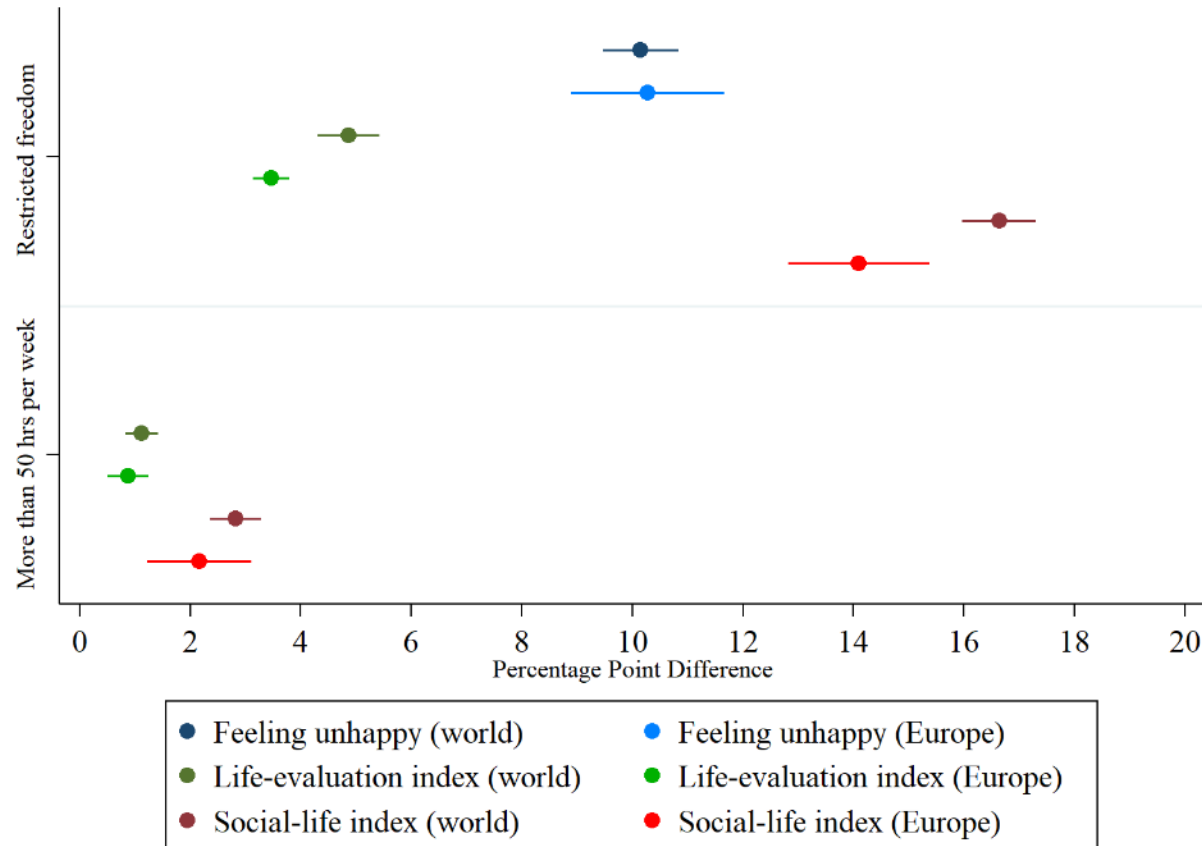
- Which cultural dimension as proxy for relationships quality?
 - **Hofstede (1991, 2010)** Six Dimensional Model of Culture: widely used in economics (Figlio et al., 2019; Galor and Özak, 2016; Kovacic and Orso, 2023; Proto and Oswald, 2017, among others)
 - **Individualism** versus **Collectivism** (cultural proxy for quantity/variety)
 - **Restraint** versus **Indulgence** (cultural proxy for norms and restrictions – shape the quality) – core component of restraint is “**Life-control**”
- **** residual component is leisure

Story linking culture to loneliness

Higher restraint → stronger norms and restrictions → restricted freedom
(Hofstede, 1991, 2010; Minkov, 2009)

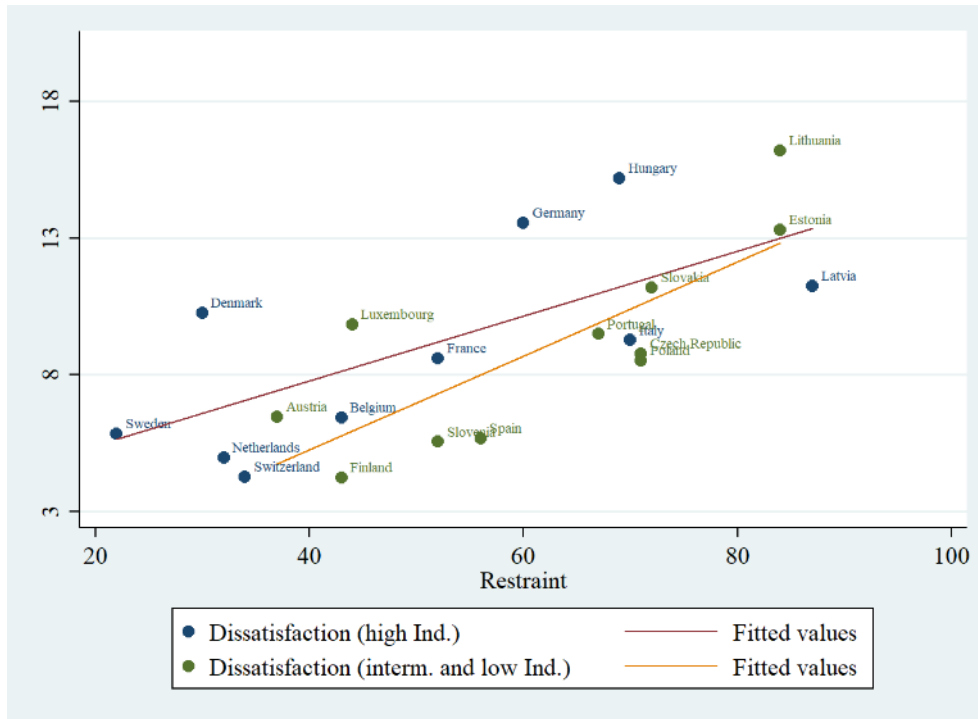
- Restricted freedom → lower satisfaction
- Lower satisfaction (higher restraint) → higher probability of loneliness

Restricted freedom → more dissatisfaction

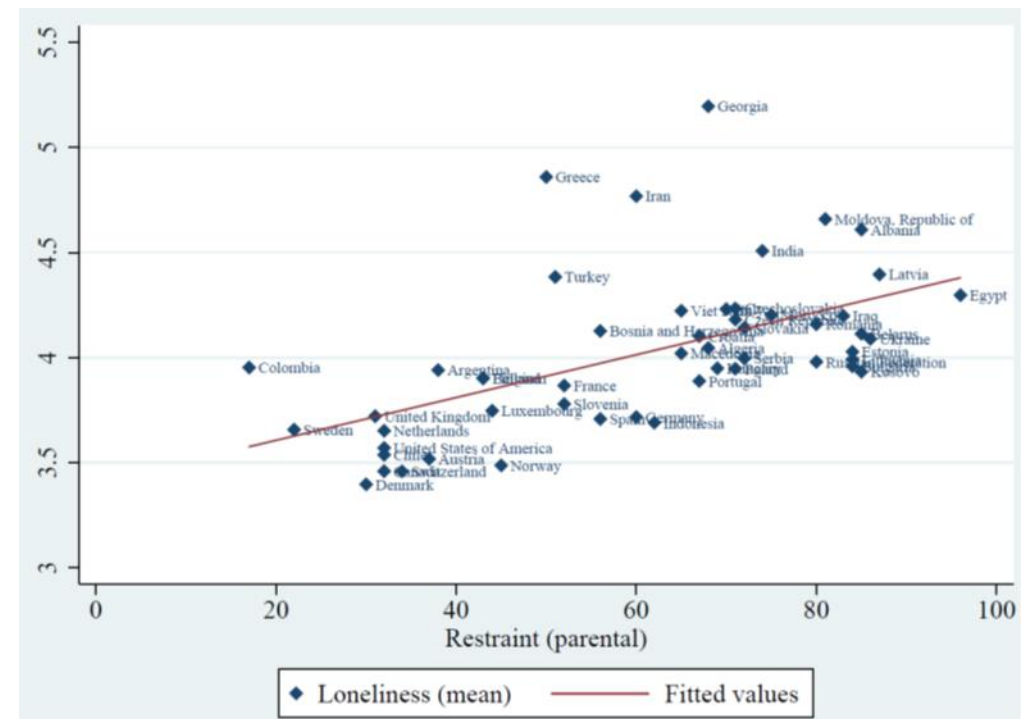


- Marginal effects (percentage point difference) of low freedom to live the life as wanted
- Controls for leisure time
- Gallup World Poll individual-level data; Number of observations: 1,050,554

Higher restraint → dissatisfaction → loneliness

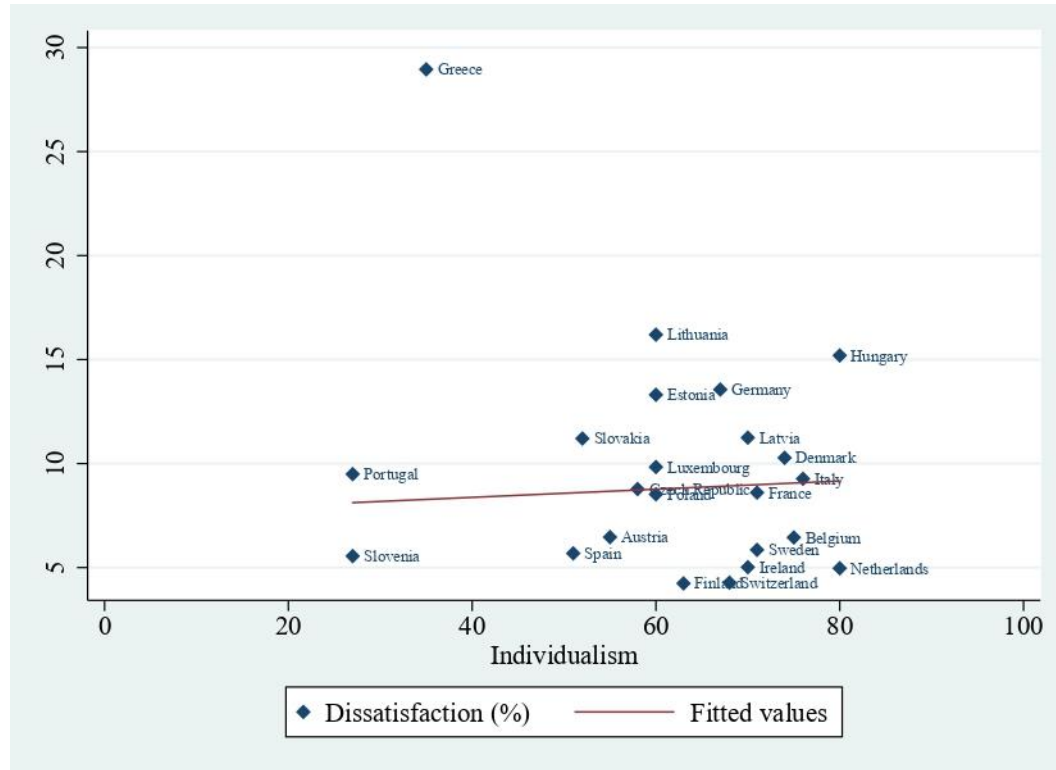


a) restraint versus dissatisfied (%)

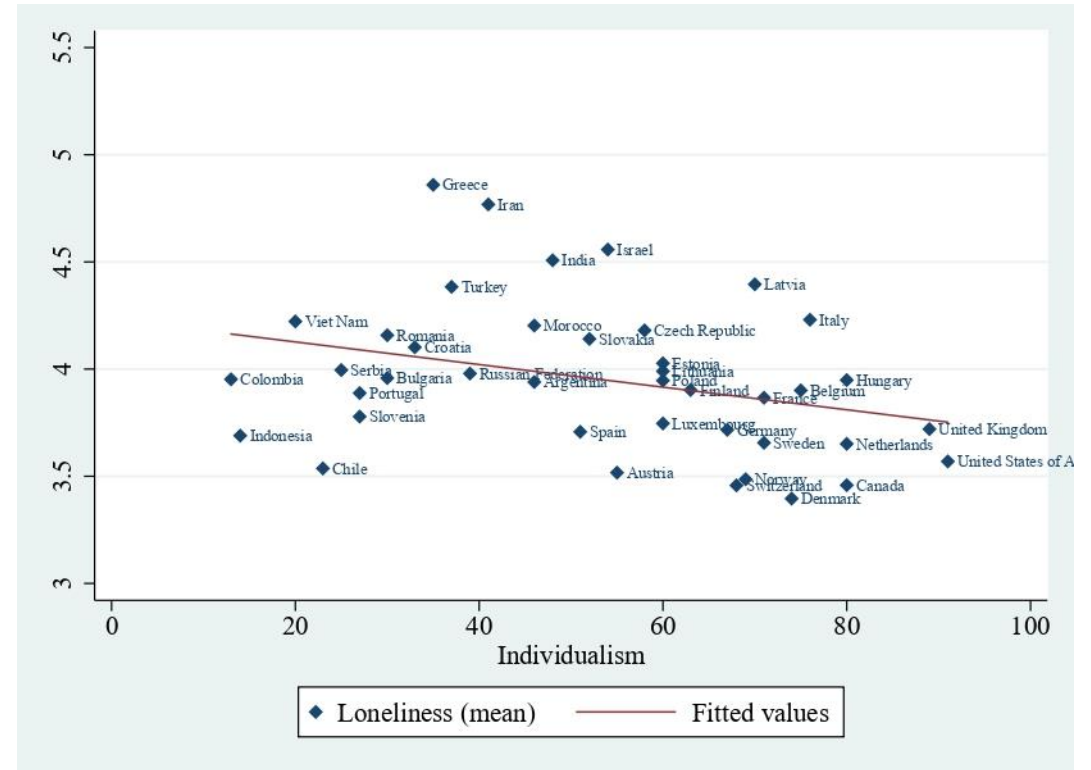


b) restraint versus lonely (%)

Individualism: no relationship



a) individualism versus dissatisfied (%)



b) individualism versus lonely (%)

How to capture the life-control component?

- Cultural characteristics (and their transmission across generations) are influenced by **historical (ancestral) mechanisms**
- In particular, observed differences in the restrictiveness of norms and prohibitions across cultures may be rooted in the **pre-industrial intensity of agricultural production** (Minkov, 2009):
 - ✓ Highly intensive agricultural systems were characterized by hard work, strict rules and discipline, and adequate planning
 - ✓ Higher exposure of these factors in the pre-industrial era may have contributed to the emergence and persistence of traits related to stricter social norms in the population = **“recorded”** in contemporary cultures.

Life-control component: historical proxies

- **Galor and Özak (2016):**
 - ✓ Pre-1500 crop yield potential (measured in millions of kilo calories per hectare per year) in individual ancestors' country of origin,
 - ✓ Crop growth cycle (measured in days) for the crop that maximizes potential yield before the Columbian Exchange (Putterman and Weil, 2010),
 - ✓ Post-1500 changes in the yield and growth cycles of the dominant crop due to the Columbian Exchange.
- Geographical factors: absolute latitude, mean elevation above sea level, terrain roughness, neolithic transition timing, precipitation, percentage of population living in tropical, sub-tropical and temperate zones, distance to coast or navigable rivers, as well as landlocked region dummies + pre-industrial population density and urbanization.

Individual-level data

- Survey of Health, Ageing and Retirement in Europe (**SHARE**); 50+ individuals; European Social Survey (**ESS**)

Loneliness: short 3-items UCLA scale (Hughes et al., 2004; Russell et al., 1978)

- ✓ *How often do you feel that you lack companionship?*
- ✓ *How often do you feel left out?*
- ✓ *How often do you feel isolated from others?*

Often (score = 3), Some of the time (score = 2), Hardly ever or never (score = 1)

- Aggregate score: from 3 (not lonely) to 9 (very lonely)

Individual-level data

Explanatory and controls:

demographic (age, gender) and SE (education, employment status, marital status, family size), living alone, parental info (financial situation, harm, neglect, absence, N. books), loneliness and health in childhood, frequency of contact with kids, informal care (received and given), social engagement, unhealthy behaviours

Cultural index:

Restraint - Indulgence, 0 – 100 scale from Hofstede et al. (2010)

Health outcomes: →

Health outcomes

- **Mental health:** EURO-D scale (12 items - 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);
- **Physical health:** number of mobility, arm function and fine motor limitations; number of chronic diseases; BMI, self-assessed health (SAH);
- **Single health outcomes:** diabetes, high blood pressure, ulcer, high blood cholesterol and stroke;
- **Drug consumption:** anxiety, sleeping problems, cholesterol, diabetes, pain, high blood pressure, inflammation.

Identification strategy

- Traditional estimation approaches fail to separate the effect of culture from the other country-specific factors such as economic and institutional arrangements (potential “empirical” source of ambiguity)
- **Epidemiological approach** (Giuliano, 2007, Fernández, 2011, Galor and Özak, 2016, Galor et al., 2020):
 - ✓ **SG immigrants**: Individuals born and raised in the same country (or region) → identical economic and institutional arrangements **but** with different cultural backgrounds
 - ✓ Cultural values and beliefs are vertically transmitted from parents to children (at least to some extent)

Hypotheses

Hypothesis I.

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

Hypothesis II.

Individuals with cultural backgrounds characterized by stricter social norms and prohibitions (“life-control”) are, on average, more likely to feel lonely.

Hypothesis III.

Feeling lonely negatively affects emotional disorders and physical health-related outcomes and functional decline.

Empirical strategy

Hypothesis I: Country-level analysis (OLS)

$$Res_p = a_0 + b_0 \mathbf{Agr}_p^{anc} + c_0 \mathbf{Geo}_p + d_0 \mathbf{H}_p + \varepsilon_p$$

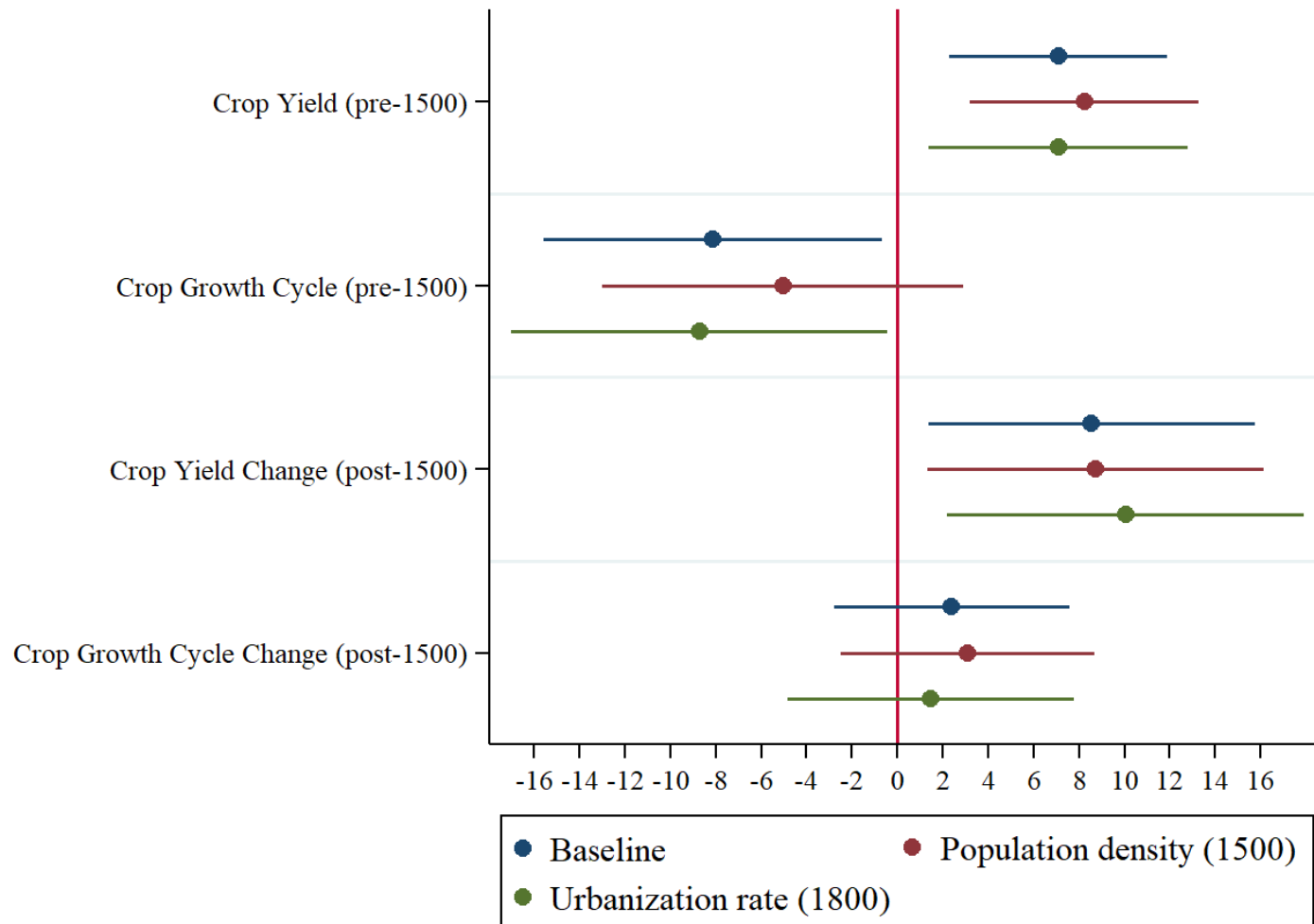
Hypothesis II: First-stage IV (IVREG)

$$L_i = \alpha + \pi_{i1} \widehat{Res}_{i,p} + \pi_{i2} \mathbf{X}_i + \pi_{i3} FE_i + \vartheta_i$$

Hypothesis III: Second-stage IV (IVREG)

$$Health_{i,p,c} = \alpha + \beta \widehat{L}_i + \varphi \mathbf{X}_i + \gamma FE_i + error_i$$

Results: Hypothesis I



- Dependent variable: restraint (0-100), 86 countries
- Key variables: crop yield and crop yield change
- Full set of geographic and climatic controls
- Effects: 1SD increase
- ✓ Crop yield: **+7.099**
- ✓ Crop yield change: **+8.555**

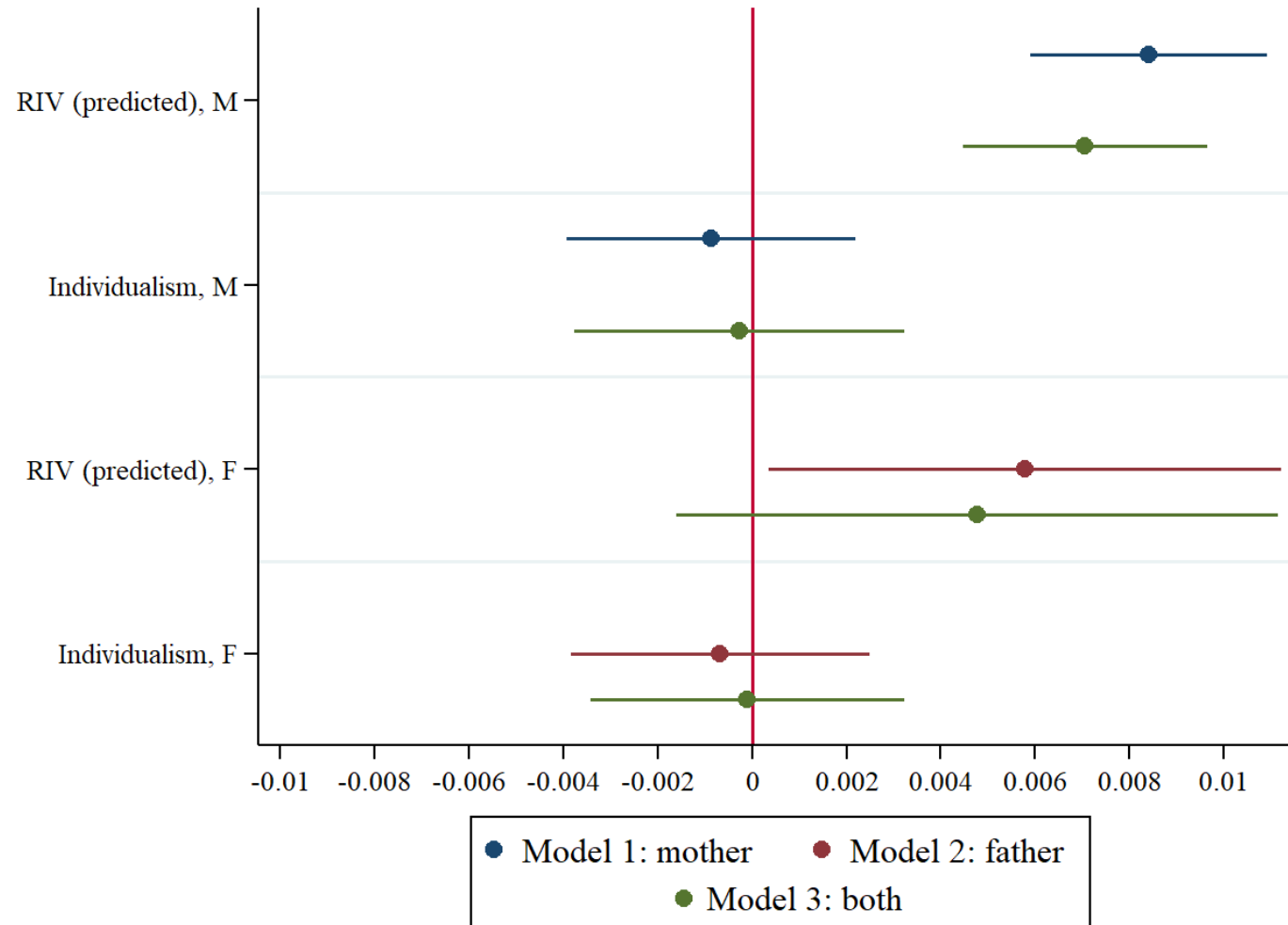
Results: Hypothesis I

	Leisure		Rules and restrictions			
	Good time	Fun	Behave	Traditions	Sex. Min.	Safe env.
RIV (predicted)	0.001	-0.002	0.006***	0.004**	-0.004**	0.004***
	0.001	0.001	0.001	0.002	0.002	0.001
RIV (residuals)	0.000	0.003***	0.001	-0.001	0.000	0.000
	0.001	0.001	0.002	0.001	0.001	0.001
Full set of regressors	YES	YES	YES	YES	YES	YES
Country control	YES	YES	YES	YES	YES	YES
Wave interview	YES	YES	YES	YES	YES	YES
N. observations	16490	16478	16480	16503	16282	16450

- Life-control component correlates with rules and restrictions (while the residual doesn't)
- Residual component correlates with leisure and indulgence (while the life-control doesn't)

Source: European Social Survey (ESS), second-generation immigrants. RIV associated to individuals parents' country of origin.

Results: Hypothesis II



- Dependent variable: UCLA (0-9)
- Key variable: life-control (predicted restraint - RIV)
- Full set of demographic and SE controls
- Bootstrapped SE clustered at the country of origin and country of residence level

Results: Hypothesis II

	UCLA	UCLA	UCLA	UCLA
RIV (raw)	0.004***			
	0.001			
RIV (residuals)		0.002		
		0.002		
Crop Yield (pre-1500)			0.148**	0.093
			0.074	0.081
Crop Yield Change (post-1500)			0.098	0.035
			0.136	0.121
Crop Growth Cycle (pre-1500)			-0.114	-0.054
			0.117	0.123
Crop Growth Cycle Change (post-1500)			-0.098	-0.113
			0.088	0.093
RIV (predicted)				0.007**
				0.004
Full set of regressors	YES	YES	YES	YES
Geographic and climate controls	NO	NO	YES	YES
Country control	YES	YES	YES	YES
Wave interview	YES	YES	YES	YES
N. observations	5823	5823	5823	5823

- The effect of aggregated measure of restraint is lower in magnitude
- The coefficient of residual is not statistically different from zero
- Crop yield positively correlates with loneliness - the effect vanishes in the presence of the life-control component
- In addition, other preference dimensions (trust, patience) do not have any effect on loneliness and life-control (not shown)

Results: Hypothesis III

	Euro-D	Euro-D alt	Mobility	ADL	BMI	Chronic	SAH
Loneliness (UCLA)	1.240***	0.952***	1.142*	0.368	3.138**	0.043	0.312
	0.392	0.339	0.683	0.266	1.227	0.692	0.364
Full set of regressors	YES	YES	YES	YES	YES	YES	YES
Country control	YES	YES	YES	YES	YES	YES	YES
Wave interview	YES	YES	YES	YES	YES	YES	YES
N. observations	5823	5823	5823	5821	5792	5820	5823
F-statistic	24.862	24.862	24.862	24.995	21.264	24.514	24.862

- Effects on emotional disorders and BMI (potential channel for indirect effects on physical)
- Emotional disorders: driven by depression* (28.4%), suicidal thoughts (11%) and feelings of guilt (9%)

Results: Hypothesis III

- The effect of instrumented loneliness is **2.05 times larger** in magnitude than the non-instrumented one,

Additional results:

- Being lonely increases the probability of medication for **stomach pain** by 11%, and for **inflammation** by 6%,
- When considering individuals' cognitive functioning, such as **memory, literacy, and numeracy**, as well as physical health-related factors separately, loneliness does not seem to have any direct effect,
- However, Loneliness is likely to increase the likelihood of physical health problems **indirectly** through its economically significant impact on BMI,

Results: Sensitivity checks

- Frequency of **parent-offspring interaction**: 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): effect of loneliness unaltered.
- **Voluntary or charity work**, sporting activities, or **socializing with others**, other types of entertainment: effect of the culturally embodied social norms and restrictions and loneliness remain unaltered;
- Presence of relatives, friends, or neighbors **in times of need**, or by giving help to the others or receiving help from the others does not alter the results;
- Controlling for **loneliness and health in childhood** does not alter the results.

Conclusions

- ✓ Strong evidence on:
 - ✓ The role of **historical mechanisms** driving the formation and transmission of cultural traits (restraint) across generations
 - ✓ The effect of the (predicted value of) **parental cultural background** on individuals' loneliness → **attenuation of reverse causality and exclusion restriction**
 - ✓ The direct effect of loneliness on health
- ✓ **Main findings:** Robust effect of loneliness on emotional disorders and BMI, drug consumption. Traditional estimation techniques under-estimate
- ✓ **Next steps:** address pending econometric issues + younger population

Conclusions

For more info on loneliness in the EU:

https://joint-research-centre.ec.europa.eu/scientific-activities-z/loneliness_en

Thank you!



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Back-up

Restraint versus indulgence

INDULGENT	RESTRAINED
Higher percentages of very happy people	Lower percentages of very happy people
A perception of personal life control	A perception of helplessness: what happens to me is not my own doing.
Higher importance of leisure	Lower importance of leisure
Higher importance of having friends	Lower importance of having friends
Thrift is not very important.	Thrift is important.
Loose society	Tight society
More likely to remember positive emotions	Less likely to remember positive emotions
Less moral discipline	Moral discipline
Positive attitude	Cynicism

Restraint versus indulgent (93 countries)

1	Venezuela		
2	Mexico		
3	Puerto Rico		
4	El Salvador		
5			Nigeria
6	Colombia		
7	Trinidad		
8			Sweden
9			New Zealand
10			
11			Australia
12-13		Cyprus	
12-13			Denmark
14			Great Britain
15-17			Canada
15-17			Netherlands
15-17			United States
18			Iceland
19-20			Switzerland
19-20		Malta	
21-22		Andorra	
21-22			Ireland
23-24			
23-24			
23-24			S Africa
25	Argentina		

Restraint versus indulgent (93 countries)



Restraint versus indulgent (93 countries)

57				Rwanda
58–59				
58–59			Macedonia	
60		Germany E		
61–62	Portugal			
61–62			Croatia	
63–64				Algeria
63–64			Georgia	
65			Hungary	
66	Italy			
67–69				
67–69			Czech Rep.	
67–69			Poland	
70–72			Slovakia	
70–72			Serbia	

Hofstede et al. (2010) data

- Hofstede conducted a large survey (1967-1973) that examined value differences across the divisions of IBM, a multinational corporation.
- Data were collected from 117,000 employees from 50 countries across 3 regions.
- Using factor analysis, Hofstede initially identified four value dimensions (Individualist/Collectivist, Power Distance, Uncertainty Avoidance, and Masculinity/Femininity).
- Additional research that used a Chinese developed tool identified a fifth dimension: Long Term/Short Term orientation (Bond, 1991) and a replication, conducted across 93 separate countries, confirmed the existence of the five dimensions and identified a sixth known as Indulgence/Restraint (Minkov, 2010).
- Beugelsdijk and Welzel (2018) shows that the values within each cultural dimension are transferred from parents to children, and rarely change in later life.
- 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.

Inconsistency between culture and loneliness

	Expected loneliness		Expected loneliness
INDIVIDUALISM	H	COLLECTIVISM	L
Weak rules	L	Strong rules	H
Nuclear family	L	Extended family	H

	Expected loneliness		Expected loneliness
INDULGENCE	L	RESTRAINT	H
Weak rules	L	Strong rules	H
Nuclear family	L	Extended family	H