

Association of aging and self-reported health in Latin American urban areas and its modifications by gender and city level socio-economic characteristics

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BACKGROUND

- Urbanization and ageing are two phenomena affecting Latin-American countries
- Aging may affect men and women differently
- Self-rated or self-reported health (SRH) is an important indicator of health
- Studies analyzing SRH have focused on the elderly
- In Latin-America, the relationship between SRH and aging has not been studied. The gaps:
 - Focus on urban settings
 - Role of socioeconomic environment
 - Full adulthood



RESEARCH QUESTIONS

1. Is there an association between age and self-rated health (SRH) in Latin-American cities?
2. Is the association between age and SRH modified by sex?
3. Is there an association between contextual SE characteristics with SRH even after adjustment for individual SE status ?
4. Is the association between age and SRH modified by city-level socio-economic characteristics?

STUDY SETTING

- SALURBAL is a multi-country project in LATAM
- Health Survey's data for Argentina, Brazil, Colombia, Chile, El Salvador, and Guatemala
- Adults from 25 to 97 years, who answered SRH health module

11 countries
371 cities
n = 98,346



6 countries
114 cities
n = 71,541

Exclusions:

- 4 countries without SRH data; n = 10,147
- 1 country without SE city-level data; n= 1,397
- Adults under 25 year n=12,036
- Other missing n=3225

EXPOSURES AND OUTCOMES

Outcome: Self-rated (SRH) health

- Dichotomous fair/poor vs. good/better
- Previously harmonized outcomes

Individual exposures

- Individual age
 - Age quartiles, continuous age in ten years,
 - Spline (25-65, and >65 years)
- Sex

City-level exposures

- Socio economic index – SEI- based on census data
- Gross Domestic Product per capita - GDP pc - in constant 2011 Int USD - 5-year mean

Country	Survey year	Census year
Argentina	2013	2010
Brazil	2013	2010
Chile	2010	2002
Colombia	2007	2005
El Salvador	2004	2007
Guatemala	2002	2002

STATISTICAL ANALYSIS

- Exploratory analysis to identify non-linear association of age and SRH
- Multilevel Poisson regression analysis with robust variance
- Two-level model: individual nested in cities
 - After confirming effect modification by gender (RQ2), all models were stratified by gender
 - Interactions of city-level factors (in tertiles) and age, were tested one by one.
 - We run 4 models with progressive adjustments + 2 interactions models
 - Models were adjusted by country (fixed-effect)

Characteristics of the study population by age quartiles (n= 71,541)

Variables	Quartile 1 N = 19,052	Quartile 2 N =17,871	Quartile 3 N = 17,508	Quartile 4 N = 17,110
Age quartile [range]	25-34	35-44	45- 57	58- 97
% Female	58	58	56	61
% Poor SRH	16.1	19.6	28.2	36.1
Educational attainment				
% Less than primary	9.9	15.9	27.1	47.1
% Primary Completed	24.2	25.8	26.4	23.7
% High-School completed	37.9	27.9	21.1	13.1
% University completed or higher level	28.4	28.9	24.7	18.0
Country contribution to sample				
% Argentina	24.5	24.1	22.8	32.8
% Brazil	46.2	46.1	45.3	45.4
% Chile	2.4	2.9	3.8	4.5
% Colombia	23.1	23.1	24.0	14.5
% Central-America	3.9	3.8	4.1	2.7
City-level socioeconomic characteristics (Z-score)				
Mean SE index	-0.14	-0.11	-0.06	0.02
Mean GDP per capita	-0.05	-0.05	-0.05	0.11

All differences across quartiles significant, p value <0.001

Characteristics of the study population by SEI tertiles. SALURBAL Study (N=71,541)

Characteristics	Tertile 1	Tertile 2	Tertile 3
SEI range	(-3.4) – (- 0.2)	(-0.2) - (0.40)	(0.4) – (1.5)
Mean (SD) Age in years	44.8 (14.4)	47.6 (15.6)	46.5 (14.8)
% 25-65 years old	90	85	88
% >65 years old	10	15	12
% Female	59	58	58
% Poor SRH	37.6	28.5	28.1
Educational attainment			
% Less than primary	24.3	18.7	18.0
% Primary Completed	27.3	28.8	33.1
% High-School completed	34.5	34.1	34.8
% University completed or higher level	13.9	18.4	14.1
City-level factor (Z-score)			
Mean GDP per capita	-0.54 (0.33)	0.45 (0.67)	0.02 (1.06)

All differences across tertiles significant, p value <0.001, except from % of female

Characteristics of the study population by GDP per capita (in constant 2011 USD) tertiles. SALURBAL Study (N=71,541)

Characteristics	Tertile 1	Tertile 2	Tertile 3
GDP pc range	2144 - 9093	9260-18723	19209 - 64667
Mean (SD) Age in years	44.7 (14)	46.2 (15)	48.2 (16)
% 25-65 years old	91	87	83
% >65 years old	9	13	17
% Female	59	58	58
% Poor SRH	35.6	30.7	27.4
Educational attainment			
% Less than primary	23	21	17
% Primary Completed	28	32	29
% High-School completed	35	33	35
% University completed or higher level	26	14	19
city-level factor (Z-score)			
Mean (SD) SEI	-0.36 (1.03)	-0.15 (1.00)	0.32 (.35)

All differences across tertiles significant, p value <0.001, except from % of female

Association between individual level age and education, and city level social environment index and GDP, and poor self-reported health in 114 cities in Latin America among men (n=29,808).

Variable	Model 1: Age		Model 2: Age, adjusting for individual education		Model 3: Model 2+ SEI Tertiles		Model 4: Model 2 + GDP Tertiles	
	RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
Individual-level factors								
Age, per 10 years increase, among people aged 25-65 years	1.38 (1.35, 1.42)	<0.001	1.30 (1.27, 1.33)	<0.001	1.30 (1.27, 1.33)	<0.001	1.30 (1.27, 1.33)	<0.001
Age, per 10 years increase, among people aged >65 years	1.10 (1.06, 1.15)	<0.001	1.05 (1.01, 1.09)	0.02	1.05 (1.01, 1.09)	0.02	1.05 (1.01, 1.09)	0.02
City-level factors								
SEI tertile 1					1.39 (1.24, 1.56)	<0.001		
SEI tertile 2					1.21 (1.07, 1.36)	0.002		
SEI tertile 3					1.00 (reference)			
GDP tertile 1							1.33 (1.18, 1.49)	<0.001
GDP tertile 2							1.09 (0.98, 1.22)	0.11
GDP tertile 3							1.00 (reference)	

All models consider country as fixed effect

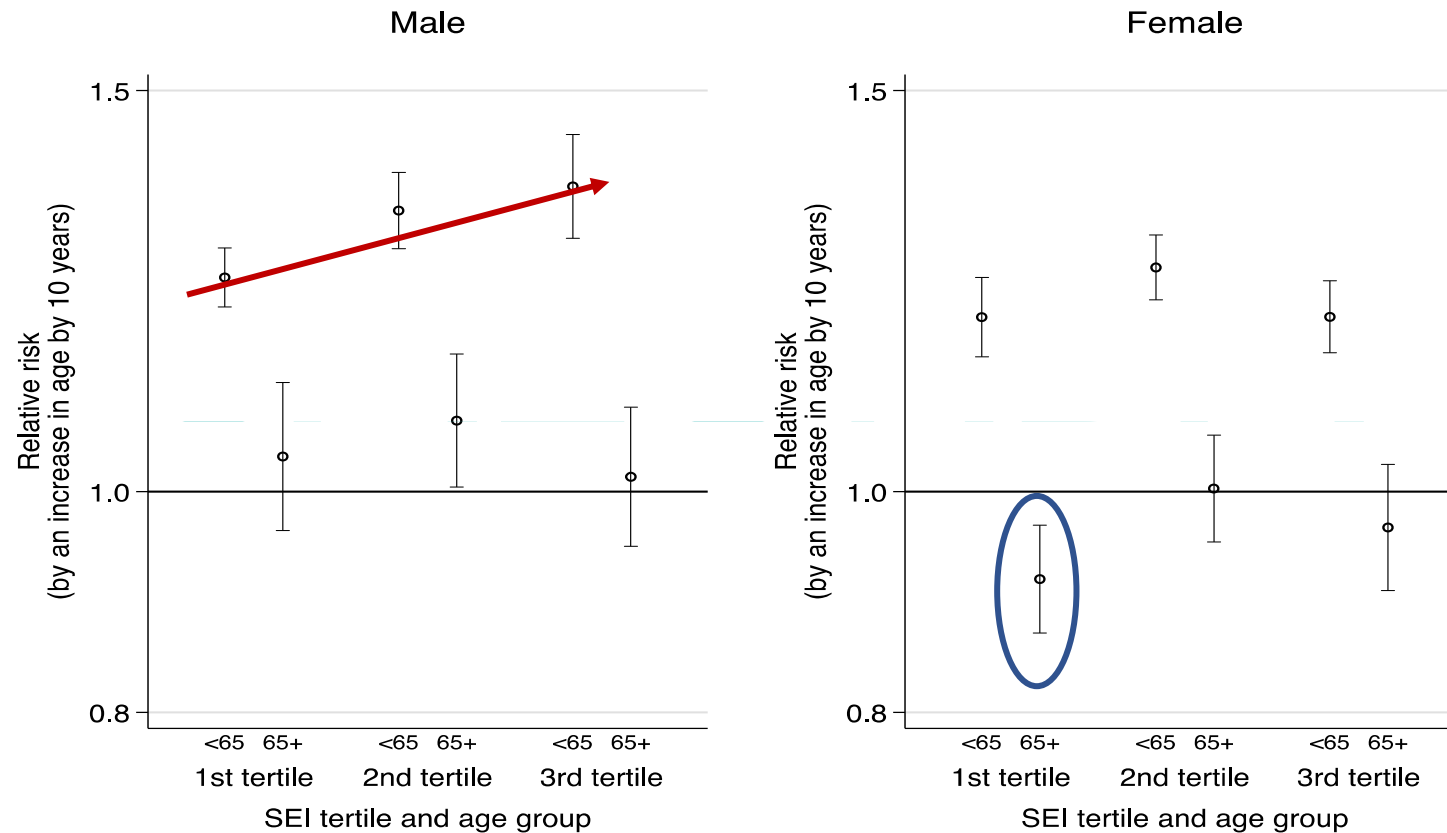
Association between individual level age and education, and city level social environment index and GDP, and poor self-reported health in 114 cities in Latin America among women (n=41,733).

Variable	Model 1: Age		Model 2: Age, adjusting for individual education		Model 3: Model 2+ SEI Tertiles		Model 4: Model 2 + GDP Tertiles	
	RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
Individual-level factors								
Age, per 10 years increase, among people aged 25-65 years	1.29 (1.26, 1.32)	<0.001	1.21 (1.18, 1.24)	<0.001	1.21 (1.18, 1.24)	<0.001	1.21 (1.18, 1.24)	<0.001
Age, per 10 years increase, among people aged >65 years	1.02 (0.99, 1.06)	0.19	0.97 (0.94, 1.00)	0.09	0.97 (0.94, 1.01)	0.10	0.97 (0.94, 1.01)	0.09
City-level factors								
SEI tertile 1					1.29 (1.17, 1.42)	<0.001		
SEI tertile 2					1.15 (1.04, 1.26)	0.004		
SEI tertile 3					1.00 (reference)			
GDP tertile 1							1.24 (1.13, 1.36)	<0.001
GDP tertile 2							1.07 (0.98, 1.17)	0.15
GDP tertile 3							1.00 (reference)	

All models consider country as fixed effect

EFFECT MODIFICATION OF AGE ON POOR SRH BY CITY-SOCIO ECONOMIC INDEX

Association of age with self-reported health by SEI and age

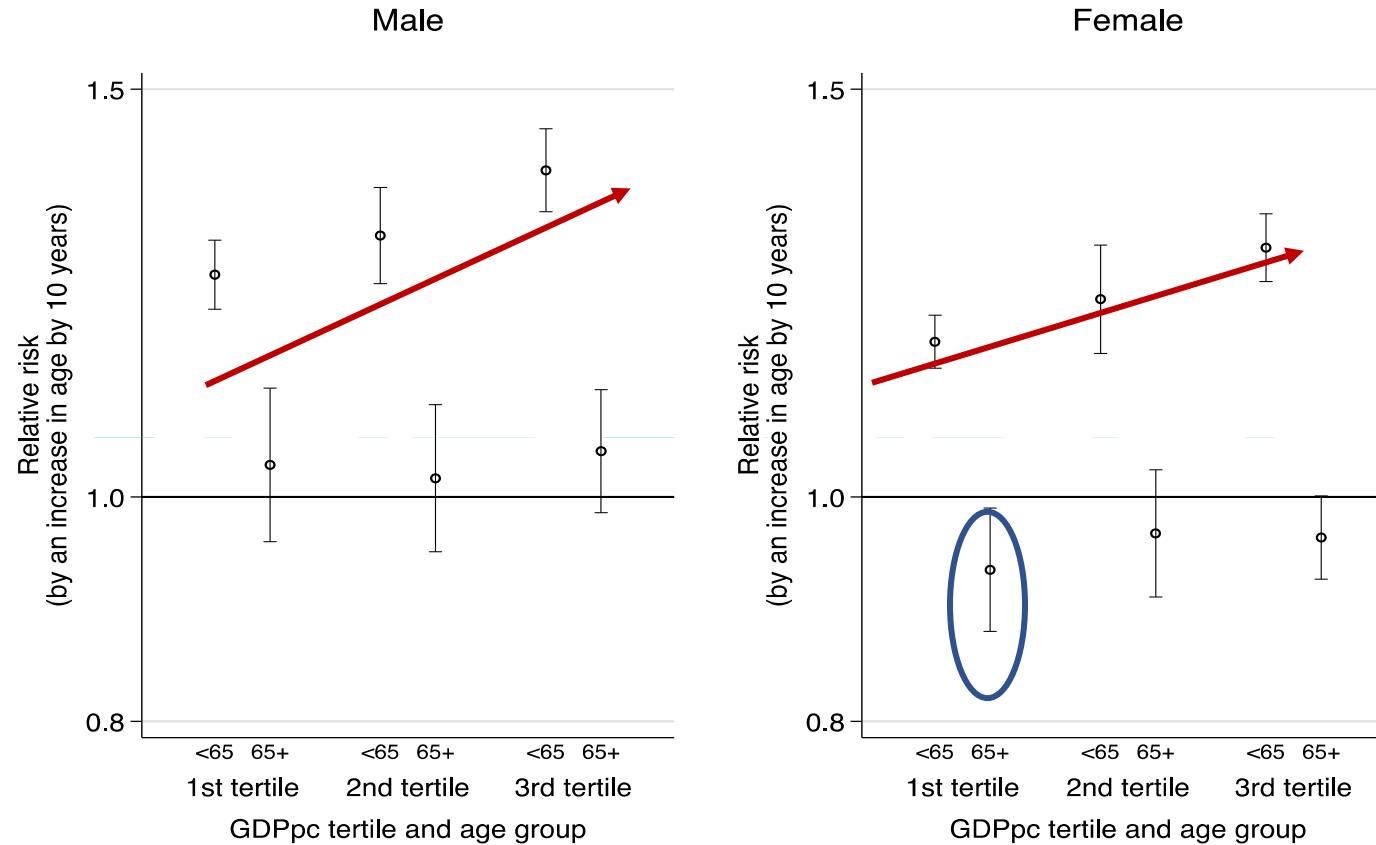


$\log[p(\text{poor SRH}=1)]$

$$= \beta_0 + \beta_1[\text{age1}] + \beta_2[\text{age2}] + \beta_3[\text{educ1}] + \beta_4[\text{educ2}] + \beta_5[\text{educ3}] + \beta_6[\text{SEI}_1] + \beta_7[\text{SEI}_2] + \beta_8[\text{age1xSEI}_1] + \beta_9[\text{age1xSEI}_2] + \beta_{10}[\text{age2xSEI}_1] + \beta_{11}[\text{age2xSEI}_2] + \beta_{12}[\text{country}]$$

EFFECT MODIFICATION OF AGE ON POOR SRH BY GROSS DOMESTIC PRODUCT_{PC}

Association of age with self-reported health by GDPpc and age



$\log[p(\text{poor SRH}=1)]$

$$= \beta_0 + \beta_1[\text{age1}] + \beta_2[\text{age2}] + \beta_3[\text{educ1}] + \beta_4[\text{educ2}] + \beta_5[\text{educ3}] + \beta_6[\text{GDP}_1] + \beta_7[\text{GDP}_2] + \beta_8[\text{age1xGDP}_1] + \beta_9[\text{age1xGDP}_2] + \beta_{10}[\text{age2x GDP}_1] + \beta_{11}[\text{age2x GDP}_2] + \beta_{12}[\text{country}]$$

EFFECT MODIFICATION – ADJUSTED MARGINAL PREDICTIVE PREVALENCE BY SEI AND GDP_{PC}



SUMMARY

- The association between age and SRH in LATAM cities differs by gender, being stronger in man than in woman
- This association changes by age group, being stronger in the group 25- 65 years than the group over 65 years
 - There were gender differences in the strength of association in adults 25- 65, after adjustments for individual and city level factors (stronger in man)
- Lower city- tertiles (SEI and GDPpc) were associated to increase RR of reporting poor SRH, after adjusting for individual SE status, in both men and woman
- The rate of increase in reporting poor SRH by age differed by the cities' socio-economic status

DISCUSSION

LIMITATIONS

- Cross-sectional nature
- Different data years
- Potential differential assessment of SRH by SES or income groups.
- Survival bias in the elderly different across cities with different city-level tertile?

STRENGTHS

- Large sample size
- Large number of cities
- Wide range of ages analyzed
- Wide heterogeneity in (city-level) exposure

CONCLUSIONS

- From this cross-sectional analysis our findings highlight the potential influence of city social and economic factors in healthy aging.
- Gender differences should be considered when driving social policies for aging in LATAM cities.
- More research is needed to better understand how city SE environments influence the age effect on SRH.
- Qualitative studies are needed to understand how and what LATAM people consider when rating their health.

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