nature aging

Healthy aging meta-analyses and scoping review of risk factors across Latin America reveal large heterogeneity and weak predictive models

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Supplementary file 1. Search strategy (16/8/2023)

MEDLINE: 313

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PsycNet: 132

(Any Field: "brain health" OR Any Field: "brain health 120 dementia" OR Any Field: "healthy aging" OR Any Field: "cognitive health" OR Any Field: "cognitive health and aging" OR Any Field: "aging brain health" OR Any Field: "instrumental functioning" OR Any Field: "instrumental functionality" OR Any Field: "aging health" OR Any Field: "health functioning" OR Any Field: "daily life functioning" OR Any Field: "barthel index" OR Any Field: "lawton" OR Any Field: "minimental state examination" OR Any Field: "mmse" OR Any Field: "cognitive screening" OR Any Field: "dementia" OR Any Field: "cognitive decline" OR Any Field: "mild cognitive impairment" OR Any Field: "cognitive impairment" OR Any Field: "functional ability" OR Any Field: "mild behavior impairment" OR Any Field: "mild behavioral impairment" OR Any Field: "mild behavioral impairment checklist" OR Any Field: "neuropsychiatric inventory" OR Any Field: "functional decline" OR Any Field: "daily life disturbance" OR Any Field: "instrumental functioning" OR Any Field: "instrumental functionality" OR Any Field: "instrumental functioning" OR Any Field: "cognition" OR Any Field: "cognitive functioning" OR Any Field: "cognitive screening" OR Any Field: "neurocognitive disorders") AND (Any Field: "prediction" OR Any Field: "predictor" OR Any Field: "risk factor" OR Any Field: "protective factor" OR Any Field: "preventable factors" OR Any Field: "social determinants of health" OR Any Field: "socioeconomic status" OR Any Field: "education level" OR Any Field: "scholarly" OR Any Field: "scholarship" OR Any Field: "years of education" OR Any Field: "isolation" OR Any Field: "social participation" OR Any Field: "living alone" OR Any Field: "social exclusion" OR Any Field: "social group" OR Any Field: "income" OR Any Field: "inequalities" OR Any Field: "inequities" OR Any Field: "poverty" OR Any Field: "health access" OR Any Field: "neighborhood conditions" OR Any Field: "age" OR Any Field: "aging" OR Any Field: "ageing" OR Any Field: "female" OR Any Field: "male" OR Any Field: "women" OR Any Field: "woman" OR Any Field: "men" OR Any Field: "man" OR Any Field: "gender" OR Any Field: "sex" OR Any Field: "hypoacusia" OR Any Field: "cardiometabolic risk" OR Any Field: "cardiometabolic factors" OR Any Field: "hypertension" OR Any Field: "diabetes" OR Any Field: "obesity" OR Any Field: "gait speed" OR Any Field: "handgrip strength" OR Any Field: "heart disease" OR Any Field: "cardiovascular risk" OR Any Field: "cardiovascular disease" OR Any Field: "stroke" OR Any Field: "heart attack" OR Any Field: "sedentarism" OR Any Field: "physical activity" OR Any Field: "smoking" OR Any Field: "alcohol consumption" OR Any Field: "nutrition habits" OR Any Field: "nutritional factors" OR Any Field: "lifestyle" OR Any Field: "nutrition" OR Any Field: "diet" OR Any Field: "selfperceptions" OR Any Field: "depression" OR Any Field: "anxiety" OR Any Field: "depressive symptoms" OR Any Field: "anxiety symptoms" OR Any Field: "depressive problems" OR Any Field: "stress" OR Any Field: "stress related disorders" OR Any Field: "mental health" OR Any Field: "quality of life") AND (Any Field: aruba OR Any Field: bahamas OR Any Field: barbados OR Any Field: "cayman islands" OR Any Field: cuba OR Any Field: dominica OR Any Field: "dominican republic" OR Any Field: grenada OR Any Field: guadeloupe OR Any Field: haiti OR Any Field: jamaica OR Any Field: martinique OR Any Field: 'puerto rico' OR Any Field: "saint barthélemy" OR Any Field: "virgin islands" OR Any Field: belize OR Any Field: "costa rica" OR Any Field: 'el salvador' OR Any Field: guatemala OR Any Field: honduras OR Any Field: mexico OR Any Field: nicaragua OR Any Field: panama OR Any Field: argentina OR Any Field: bolivia OR Any Field:

brazil OR Any Field: chile OR Any Field: colombia OR Any Field: ecuador OR Any Field: "french guiana" OR Any Field: guyana OR Any Field: paraguay OR Any Field: peru OR Any Field: suriname OR Any Field: uruguay OR Any Field: venezuela OR Any Field: "South America" OR Any Field: "Latin America" OR Any Field: "Central America" OR Any Field: "Hispanic Americans") AND (Any Field: "machine learning methods" OR Any Field: "random forest" OR Any Field: "elastic net" OR Any Field: "lasso" OR Any Field: "logistic regression" OR Any Field: "predictive model" OR Any Field: "datadriven" OR Any Field: "automatized analysis") AND Any Field: ("cross-sectional study" OR "National aging survey" OR "national survey" OR cross-sectional studies OR "longitudinal studies" OR "observational studies" OR "cohort studies" OR "10 66 cohort study" OR "sabe survey" OR "Encuesta de salud, bienestar y envejecimiento")

Virtual health library: 8

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Web of Science: 2

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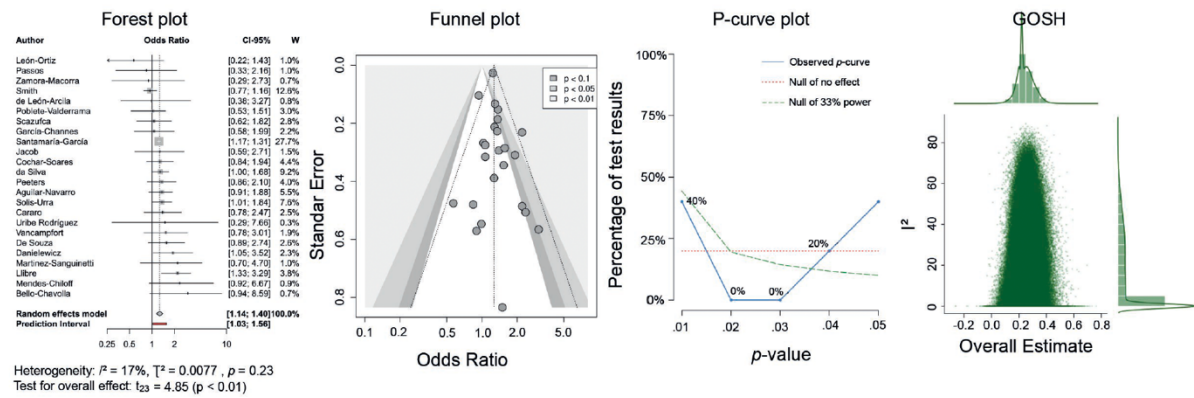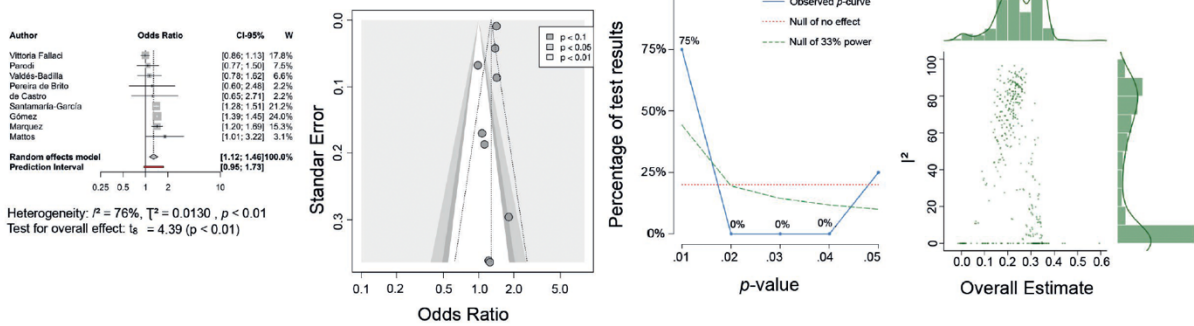
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ALL=("machine learning methods" OR "random forest" OR "elastic net" OR "lasso" OR "logistic regression" OR "predictive model" OR "datadriven" OR "automatized analysis")

ALL=("10 66 cohort study" OR "sabe survey" OR "Encuesta de salud, bienestar y envejecimiento")

Supplementary figures

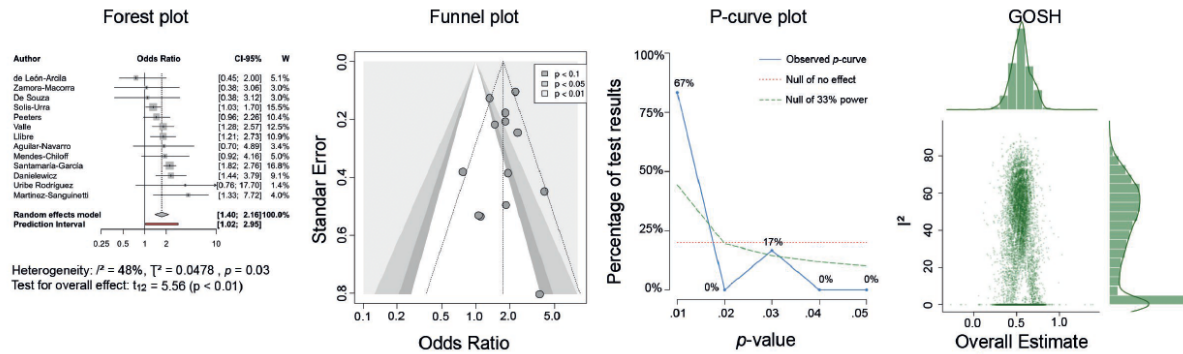### a Cognition without outliers
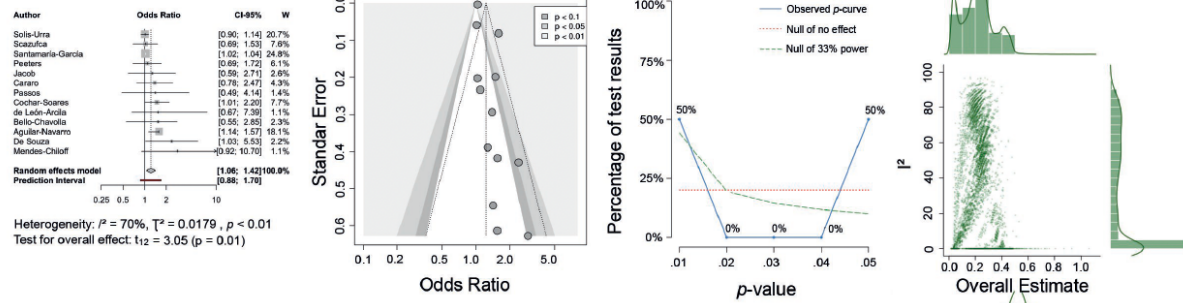

b Functional ability without outliers

Supplementary Figure 1: Metanalysis of cognition and functional ability without outliers. Panel a shows results for cognition and **panel b** results for functional ability. Forest plot shows the studies in random effects model (first author, Odd Ratio, Confidence Interval, and weights). The random effects model results (Cognition: k = 24, n = 102064, OR = 1.2651, p-value = 0.00001, CI = [1.1443; 1.3987]; Functional ability: k = 9, n = 99428, OR = 1.2795, p-value = 0.0023, CI = [1.242; 1.4562]) are reported with Knapp-Hartung correction for false discovery rate, the prediction interval and heterogeneity values (I^2, tau^2). Contour-enhanced funnel plot showing effect sizes, standard errors, and significance. P-curve analysis, showing the accumulation of p-values over the significant studies (observed p-curve), the no-effect curve and 33% power curve. GOSH (Graphic Display of Heterogeneity) shows distribution for all 2^{k-1} possible study combinations (1 million randomly selected models when $2^{k-1} > 10^6$) in blue and leaving out the most negatively influential study in green.
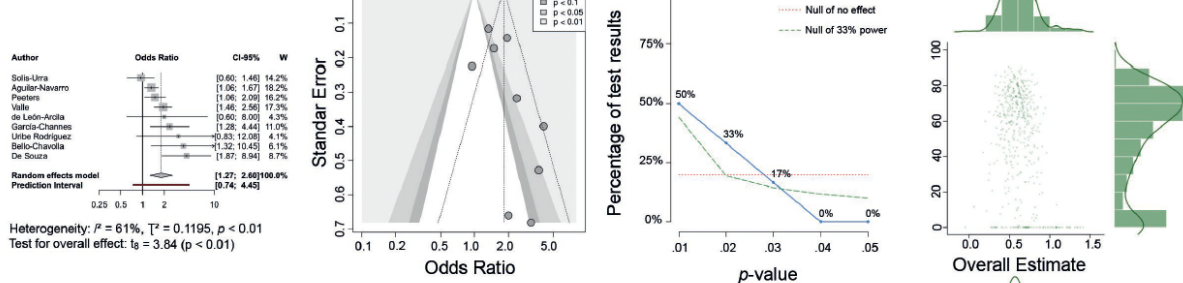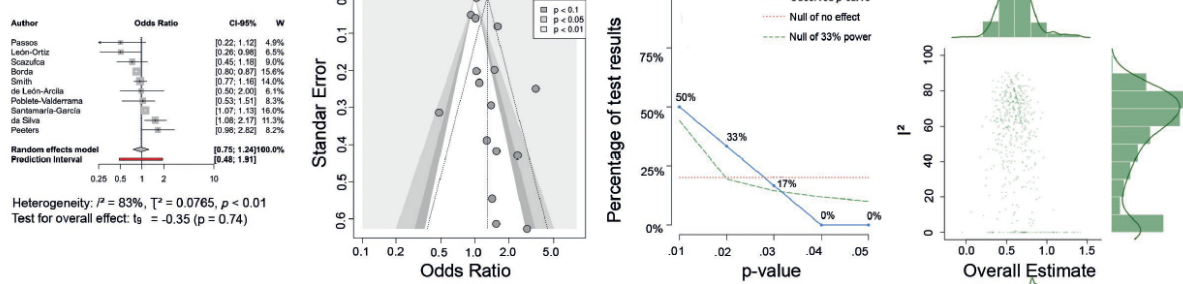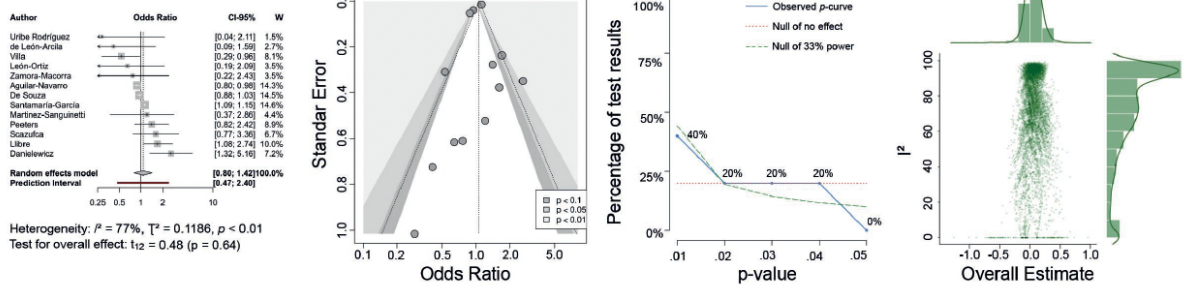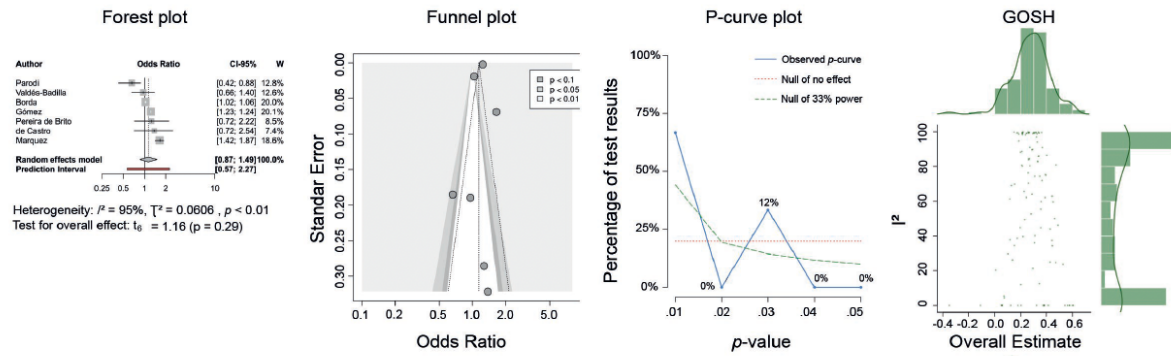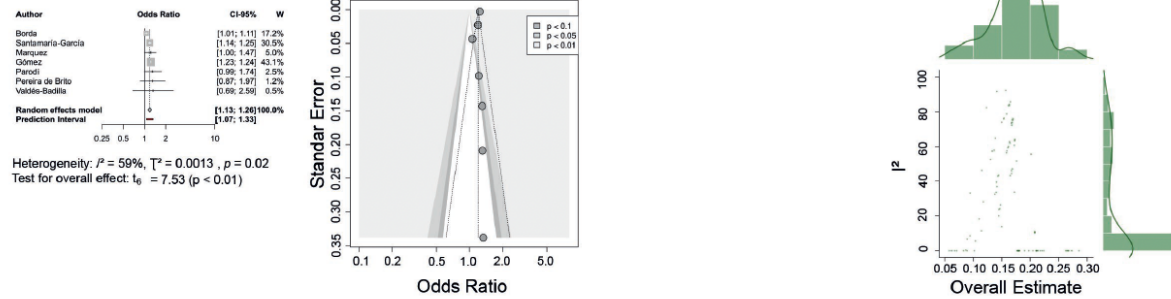
Supplementary Figure 2: Cognition without outliers. Each panel illustrates the major effects for each factor analyzed: **panel a** focuses on demographics; **panel b** on health; **panel c** on mental health; **panel d** on lifestyle; and **panel e** on Social Determinants of Health (SDH). Forest plot shows the studies in random effects model (first author, Odd Ratio, Confidence Interval, and weights). The random effects model results (Demographics: $k = 13$, $n = 66634$, $OR = 1.73862$, p-$value = 0.0001$, $CI = [1.3997;$

2.1595]; Health: k = 13, n = 67736, OR = 1.2259, *p-value* = 0.00001, *CI* = [1.0601; 1.4175]; Mental health symptoms: k = 9, n = 38679, OR = 1.8175, *p-value* = 0.0049, *CI* = [1.2699; 2.6012]; Lifestyle: k = 10, n = 89457, OR = 0.9623, *p-value* = 0.7364, *CI* = [0.7490; 1.2363]; SDH: k = 13, n = 68250, OR = 1.0658, *p-value* = 0.6373, *CI* = [0.7997; 1.4205]) are reported with Knapp-Hartung correction for false discovery rate, the prediction interval and heterogeneity values (I^2, tau^2). Contour-enhanced funnel plot showing effect sizes, standard errors, and significance. P-curve analysis, showing the accumulation of p-values over the significant studies (observed p-curve), the no-effect curve and 33% power curve. GOSH (Graphic Display of Heterogeneity) shows distribution for all 2^{k-1} possible study combinations (1 million randomly selected models when $2^{k-1} > 10^6$) in blue and leaving out the most negatively influential study in green.
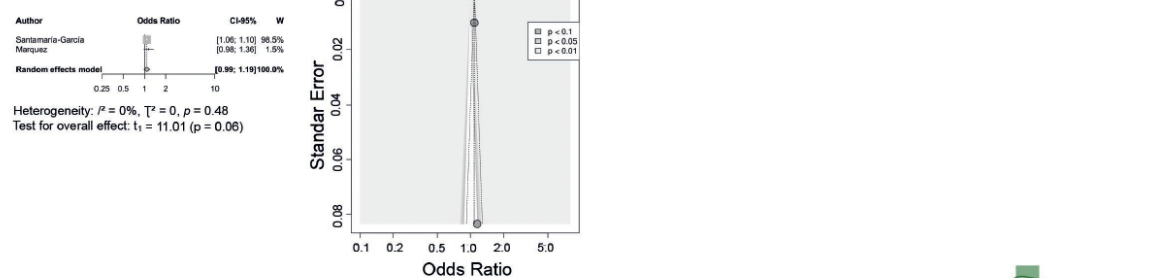
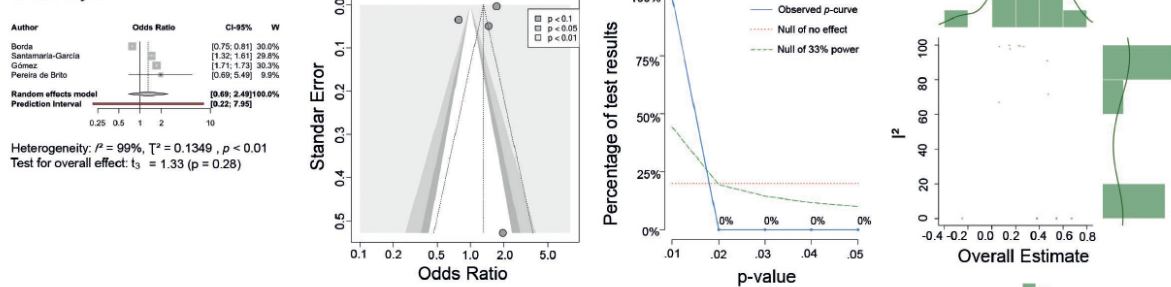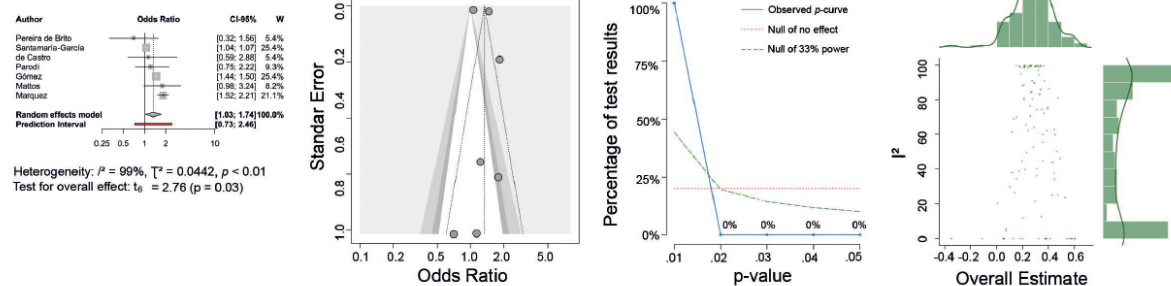**Supplementary Figure 3: Functional ability without outliers.** Each panel illustrates the major effects for each factor analyzed: **panel a** focuses on demographics; **panel b** on health; **panel c** on mental health; **panel d** on lifestyle; and **panel e** on Social Determinants of Health (SDH). Blank panels indicate that P-Curves and GOSH cannot be estimated due to insufficient studies. Forest plot shows the studies in random effects model (first author, Odd Ratio, Confidence Interval, and weights). The random effects

model results (Demographics: $k = 7$, $n = 99120$, $OR = 1.137$, *p-value* = 0.2887, *CI* = [0.8681; 1.4891]; Health: $k = 7$, $n = 98992$, $OR = 1.1921$, *p-value* = 0.0003, *CI* = [1.1260; 1.2622]; SDH: $k = 7$, $n = 98793$, $OR = 1.3401$, *p-value* = 0.0328, *CI* = [1.0338; 1.7371]. No analyses were conducted on mental health and lifestyle factors as a consequence of a reduced number of studies.) are reported with Knapp-Hartung correction for false discovery rate, the prediction interval and heterogeneity values (I^2, tau^2). Contour-enhanced funnel plot showing effect sizes, standard errors, and significance. P-curve analysis, showing the accumulation of p-values over the significant studies (observed p-curve), the no-effect curve and 33% power curve. GOSH (Graphic Display of Heterogeneity) shows distribution for all 2^{k-1} possible study combinations (1 million randomly selected models when $2^{k-1} > 10^6$) in blue and leaving out the most negatively influential study in green. Blank panels indicate that P-Curves and GOSH cannot be estimated due to the lack of sufficient studies.