

Television viewing time as a risk factor for frailty and functional limitations in older adults: results from 2 European prospective cohorts

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Background and objectives

Sedentary time is an important risk factor for cardiovascular disease, type 2 diabetes, cancer, cause-specific and all-cause mortality, independently of physical activity

Objective: To examine the prospective association between TV viewing time and indicators of physical function, mobility, agility, and frailty

Methods

Study population: Community-dwelling older adults from the Seniors-ENRICA (n=2392, follow-up 3.5 yrs) and ELSA (n=3989, follow-up 3.9 yrs) cohorts

Study variables:

Sedentary behaviors

Seniors-ENRICA: The Nurses' Health Study questionnaire was used to obtain information on the n° hours/day spent:

- a) watching TV
- b) sitting in front of a computer
- c) reading
- d) listening to music
- e) commuting
- f) sunbathing in summer and in winter

ELSA: Two questions were used to estimate the n° hours spent watching TV on an ordinary day (M-F) and over the weekend

In **both cohorts** TV viewing time was divided into **sex-specific tertiles**

Physical function

Overall physical functioning: Physical component summary (PCS) of the SF-12 Health Survey. (Only available in Seniors- ENRICA)

Mobility limitation: Affirmative answer to ≥1 of the following questions

Agility limitation: Affirmative answer to ≥1 of the following questions

Seniors-ENRICA:

- 1) 'Do you experience difficulty in picking up /carrying a shopping bag?'
- 2) 'Do you experience any difficulty in climbing one flight of stairs?'
- 3) 'Do you experience any difficulty in walking several city blocks?'

Seniors-ENRICA:

- 1) 'Do you experience any difficulty in bending/kneeling?'

ELSA:

- 1) 'Do you experience difficulty lifting/carrying weights over 10 pounds?'
- 2) 'Do you experience difficulty climbing 1 flight of stairs without resting?'
- 3) 'Do you experience any difficulty walking 1/4 mile unaided?'

ELSA:

- 1) 'Do you experience any difficulty stooping/kneeling/crouching?'

Frailty: At least 3 of the following criteria.

Exhaustion: In **both cohorts** affirmative response to any of two statements taken from the CESD Scale

Weakness: In **both cohorts** Lowest quintile of grip strength adjusted for sex and BMI

Unintentional weight loss: **Seniors-ENRICA:** ≥4.5 kg of body weight in the preceding year

ELSA: ≥ 10% of body weight or BMI<18.5 kg/m²

Low physical activity: **Seniors-ENRICA:** Walking ≤2.5 h/week in men and ≤2 h/week in women

ELSA: lowest sex-specific quintile of the distribution if overall physical activity

Slow walking speed: In **both cohorts** lowest quintile in 3-m walking speed test adjusted for sex and height

Statistical analyses: Linear and logistic multivariate regression models

Random effects meta-analysis to combine the effect sizes obtained in both cohorts.

Results

Association between TV time and incident physical function limitations

Study cohort	PCS			Mobility limitations			Agility limitations			Frailty		
	Mean (SD)	Model 1 Beta (95% CI)	Model 2 Beta (95% CI)	n events/ total	Model 1 OR (95% CI)	Model 2 OR (95% CI)	n events/ total	Model 1 OR (95% CI)	Model 2 OR (95% CI)	n events/ total	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Seniors-ENRICA												
T1*	45.8 (12.0)			236/875	1.00	1.00	341/837	1.00	1.00	49/996	1.00	1.00
T2*	45.1 (11.6)	0.37 (-0.63,1.36)	0.04 (-1.08,1.15)	103/356	1.05 (0.79,1.40)	1.00 (0.74,1.34)	163/364	1.12 (0.87,1.45)	1.05 (0.81,1.37)	31/448	1.14 (0.70,1.85)	1.20 (0.73,1.37)
T3*	41.2 (13.4)	-1.42 (-2.44,-0.41)	-1.66 (-2.81,-0.52)	131/333	1.47 (1.10,1.95)	1.25 (0.93,1.69)	175/316	1.58 (1.21,2.97)	1.40 (1.05,1.86)	57/443	1.91 (1.25,2.92)	1.60 (1.02,2.49)
p-trend		0.02	0.01		0.01	0.19		<0.01	0.03		<0.01	0.06
Per 1 hour increase		-0.34 (-0.61,-0.08)	-0.41 (-0.70,-0.11)		1.10 (1.02,1.18)	1.05 (0.97,1.14)		1.09 (1.02,1.18)	1.06 (0.98,1.14)		1.17 (1.05,1.29)	1.10 (1.00,1.23)
ELSA												
T1*				462/2128	1.00	1.00	574/2038	1.00	1.00	104/2398	1.00	1.00
T2*				324/1387	1.10 (0.92,1.31)	1.00 (0.84,1.20)	427/1359	1.27 (1.02,1.57)	1.18 (0.97,1.44)	91/1717	1.15 (0.84,1.56)	1.10 (0.80,1.51)
T3*				317/1127	1.41 (1.18,1.69)	1.17 (1.00,1.38)	385/1123	1.40 (1.15,1.71)	1.25 (1.03,1.51)	145/1761	1.81 (1.37,2.40)	1.47 (1.09,1.97)
p-trend					<0.01	0.12		<0.01	0.02		<0.01	0.03
Per 1 hour increase					1.05 (1.00,1.12)	1.01 (0.99,1.04)		1.05 (1.00,1.10)	1.02 (1.00,1.04)		1.08 (0.95,1.24)	1.05 (0.95,1.13)

TV VIEWING SEX-SPECIFIC TERTILES:

*Seniors-ENRICA

T1: ≤2 h/day M and W

T2: 2.1-3 h/day M and W

T3: >3 h/day M and W

*ELSA T1: ≤3 M and ≤3.6 W h/day

T2: 3-5 M and 3.7-5.6 h/day W

T3: >5 and >5.6 W h/day

ADJUSTMENT VARIABLES:

Model 1 age, sex and education; Model 2 further adjusted for BMI, tobacco consumption, PA, CV disease, diabetes, chronic lung disease and osteoarthral disease.

In the ENRICA study, model 2 also controlled for total energy intake and the MEDAS index. Linear regression models with follow-up PCS scores as dependent variable further adjusted for baseline PCS scores.

Association between tertiles of time in sedentary behaviors other than TV viewing and incident physical function limitations

Study cohort	Sedentary behavior	Tertile	PCS			Mobility limitations		Agility limitations		Frailty	
			n	Mean (SD)	Beta (95% CI)	n events/total	OR (95% CI)	n events/total	OR (95% CI)	n events/total	OR (95% CI)
ENRICA	Computer/ Internet use	T1	1676	43.1 (12.9)		365/1052	1.00	508/1036	1.00	125/1337	1.00
		T2	250	48.3 (10.1)	1.36 (-0.20,2.91)	42/183	0.88 (0.58,1.34)	70/176	0.99 (0.69,1.42)	2/203	0.28 (0.07,1.18)
		T3	437	48.0 (10.4)	1.20 (-0.14,2.55)	63/329	0.81 (0.57,1.16)	305/101	0.74 (0.54,1.02)	10/342	0.81 (0.38,1.71)
p-trend				0.05		0.24		0.08		0.33	
ELSA	Computer/ Internet use	No					1.00		1.00		1.00
		Yes					0.82 (0.67,1.01)		0.76 (0.62,0.93)		0.64 (0.43,0.95)
ENRICA	Reading	T1	898	42.8 (13.1)		183/553	1.00	248/513	1.00	67/667	1.00
		T2	969	45.3 (11.9)	1.15 (0.09,2.22)	187/649	0.79 (0.60,1.05)	270/610	0.95 (0.73,1.23)	45/772	0.81 (0.52,1.25)
		T3	615	45.9 (11.9)	1.09 (-0.15,2.33)	100/382	0.86 (0.62,1.21)	161/394	0.89 (0.66,1.19)	25/443	0.83 (0.48,1.44)
p-trend				0.07		0.31		0.42		0.42	
ENRICA	Listening to music	No	1971	44.4 (12.5)		364/1213	1.00	523/1177	1.00	117/1482	1.00
		Yes	511	44.9 (12.3)	-0.47 (-1.58,0.64)	106/351	1.18 (0.89,1.57)	156/340	1.18 (0.91,1.54)	20/400	0.72 (0.42,1.22)
ENRICA	Transportation	T1	1208	43.2 (12.8)		266/736	1.00	349/699	1.00	86/934	1.00
		T2	609	45.8 (11.7)	0.30 (-0.85,1.44)	88/422	0.72 (0.53,0.99)	151/418	0.71 (0.54,0.93)	29/480	1.26 (0.76,2.08)
		T3	575	45.9 (12.1)	0.60 (-0.54,1.74)	116/406	0.91 (0.67,1.21)	179/400	0.94 (0.72,1.23)	22/468	0.91 (0.54,1.55)
p-trend				0.30		0.34		0.47		0.94	
ENRICA	Sunbathing	No	1841	44.1 (12.7)		355/1172	1.00	517/1126	1.00	119/1442	1.00
		Yes	551	46.1 (11.4)	0.87 (-0.21,1.95)	392/115	0.93 (0.71,1.23)	162/391	0.85 (0.66,1.09)	18/440	0.63 (0.37,1.01)

Seniors-ENRICA SEX-SPECIFIC TERTILES:

*COMPUTER/INTERNET USE:

T1: 0 h/day M and W

T2: 0.1-0.4 M and 0.1-0.6 W

T3: >0.4 M and >0.6 W

*READING

T1: <0.3 M and <0.1 W

T2: 0.3-1.0 M and 0.2-1.0 W

T3: >1 M and W

*TRANSPORTATION

T1: 0 M and W

T2: 0.1-0.4 M and 0.1-0.2 W

T3: >0.4 M and 0.2 W

CONCLUSIONES

Among older adults, greater longer television viewing time is prospectively associated with limitations in physical function independently of physical activity. No association between other types of sedentary behavior (time seated at the computer, while commuting, lying in the sun, listening to music/reading, internet use) and risk of functional limitations was found.

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