Association of mentally-passive and mentally-active sedentary behaviours during adolescence with psychological distress during adulthood: a 26-year prospective study

André O. Werneck^{1,2}, Erin Hoare^{2,3}, Brendon Stubbs⁴, Esther M. F. van Sluijs² and Kirsten Corder².
1. Universidade Estadual Paulista "Júlio de Mesquita Filho" (UNESP), Presidente Prudente, Brazil. 2. MRC Epidemiology Unit and Centre for Diet and Activity Research (CEDAR), University of Cambridge, Cambridge, UK. 3. Deakin University, Melbourne, Victoria 3004, Australia. 4. King's College London, De Crespigny Park, London, UK. E-mail: andre.o.werneck@unesp.br

Introduction

- Behaviours as physical activity associated with depressive symptoms.
- Sedentary behaviour associated with elevated depressive symptoms.
- Different types of sedentary behaviour can have different associations with depressive symptoms.
- Sedentary behaviours can be classified as mentally-active and mentally-passive sedentary behaviour.
- Reduced evidence (only among middle-aged adults).
- Potential mediators unexplored (including behaviours, physical and psychological factors).

Objective

To analyse the association between mentally-active and mentally-passive sedentary behaviour during adolescence and psychological distress during adulthood, and to examine potential mediators

Methods

- 1970 British Cohort Study (n=1,787 - 706 men).
- During adolescence (16 years):
Frequency of reading newspaper and magazine during previous week.
Time watching TV, movies, reading books and doing homework.
mentally-passive (TV-viewing, watching movies – 3h/day or more) and mentally-active (reading books, newspapers, and magazines, homework, playing computer games – two or more) sedentary behaviour created.
- Psychological distress (malaise inventory) and organized sports participation.
- During adulthood (42 years):
TV-viewing, psychological distress (malaise inventory), smoking, pain perception, physical limitations, self-rated health, were considered as potential mediators (all treated as binary)
- Covariates: Sex, employment status (42y), education, sports participation at 16y and psychological distress at 16y.

Statistics

- Frequencies and estimated 95% confidence intervals
 - Logistic regression models
 - Mediation models (Karlsson-Holm-Breen)
- Decomposes total effect into direct effect and indirect effect as well as provide % meditation using logistic regressions.
- Theoretical model presented on **Figure 1**.

Figure 1. Theoretical model. Note. SB, sedentary behaviour

Results

Table 1. Association of sedentary behaviour during adolescence and elevated psychological distress symptoms (Malaise Inventory) at adolescence (cross-sectional) and adulthood (prospective).

	Elevated psychological distress symptoms	
	16 years OR (95%CI)	42 years OR (95%CI)
<i>Base model</i>		
Mentally-active SB	0.99 (0.76 to 1.30)	0.89 (0.71 to 1.13)
Mentally-passive SB	0.97 (0.74 to 1.26)	1.28 (1.01 to 1.63)
<i>Lifestyle potential mediators</i>		
Mentally-active SB	-	0.91 (0.71 to 1.15)
Mentally-passive SB	-	1.22 (0.95 to 1.55)
<i>Physical and psychological potential mediators</i>		
Mentally-active SB	-	0.88 (0.69 to 1.12)
Mentally-passive SB	-	1.20 (0.94 to 1.54)

Note. Base model: adjusted for sex, other sedentary behaviour pattern (e.g. mentally-active SB adjusting the model of mentally-passive SB) (for 16 years analysis) plus employment status, education and psychological distress symptoms at 16 years for 42 years analysis. Lifestyle potential mediators: Base model + physical activity, TV-viewing during weekdays and weekends and tobacco smoking. Physical and psychological potential mediators: Base model + physical limitation, self-rated health and pain. OR, odds ratio. 95%CI, 95% confidence interval. SB, sedentary behaviour.

Table 2. Mediation models of lifestyle potential mediators and physical / psychological potential mediators of the association between mentally-passive sedentary behaviour at adolescence and elevated psychological distress symptoms at adulthood (Malaise Inventory).

Potential Mediators	Total effect OR (95%CI)	Direct effect OR (95%CI)	Indirect Effect OR (95%CI)	Mediated %
<i>Lifestyle potential mediators</i>				
Tobacco	1.29 (1.02 to 1.63)	1.29 (1.02 to 1.63)	1.00 (0.99 to 1.01)	N/A
Physical activity	1.28 (1.01 to 1.63)	1.28 (1.01 to 1.63)	1.00 (0.99 to 1.01)	N/A
TV-viewing during weekdays	1.28 (1.01 to 1.62)	1.25 (0.98 to 1.58)	1.03 (1.00 to 1.07)	N/A
TV-viewing during weekends	1.28 (1.01 to 1.63)	1.21 (0.95 to 1.54)	1.06 (1.01 to 1.11)	23.1
<i>Physical and psychological potential mediators</i>				
Any chronic disease	1.28 (1.01 to 1.63)	1.29 (1.02 to 1.63)	1.00 (0.98 to 1.01)	N/A
Pain	1.29 (1.01 to 1.63)	1.26 (0.99 to 1.60)	1.02 (0.99 to 1.06)	N/A
Physical limitation	1.28 (1.01 to 1.62)	1.25 (0.98 to 1.58)	1.03 (0.99 to 1.07)	N/A
Self-rated health	1.28 (1.01 to 1.63)	1.21 (0.95 to 1.55)	1.06 (1.01 to 1.11)	22.3

Note. Adjusted for mentally-active SB, organized sports practice and psychological distress symptoms (Malaise Inventory) at 16 years, education and employment status at 42 years. OR, odds ratio. 95%CI, 95% confidence interval. % mediated was only estimated for significant indirect effects.

Conclusion

Weekend TV-viewing and self-rated health are potential mediators of the harmful association between mentally-passive sedentary behaviour in adolescence and psychological distress during adulthood. Interventions to improve mental health could focus on mentally-passive behaviours instead of total sedentary behaviour and also potential mediators during adulthood.

Acknowledgements

We thank to São Paulo Research Foundation for the scholarship of André O. Werneck (process 2018/19183-1).