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TEENAGERS LIFESTYLES: SCREEN TIME AND PHYSICAL ACTIVITY

ESTILOS DE VIDA DOS JOVENS: TEMPO DE ECRÃ E ATIVIDADE FISICA

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Abstract: This study aims to characterize the lifestyle (LS) of private school Portuguese students. Five lifestyle profiles (LSP) were recognized and interpreted based on physical activity (PA) and screen time (ST). The methodology and tools used in this study are the result of an adaptation of the international study Health Behaviour in School-aged Children conducted under the auspices of the World Health Organization. The participants were an extension of the Portuguese sample integrated in that study, recruiting students from private schools in Lisbon (Portugal). The study included 1385 students of both genders, with an average of 13.6 years of age (SD=1.84). The results showed that in private schools, strategies to promote healthy LSP should consider the students specific profile identified by the practice of PA and ST. The increasing of technological development, driven by policies encouraging the acquisition of technological means, conducted these students to reduce the practice of PA. They should therefore be accompanied by strategies to promote PA practice and screen time consumption education.

Key-words: Lifestyle profiles, screen time, sedentary lifestyle, physical activity

Resumo: O presente estudo pretende caracterizar o estilo de vida (EV) dos alunos de escolas privadas Portuguesas. Cinco perfis de estilo de vida (PEV), foram reconhecidos e interpretados em função da prática de atividade física

(AF) e do tempo de ecrã (TE). A metodologia e instrumentos utilizados neste estudo resultam de uma adaptação do estudo Internacional Health Beaviour in School-aged Children (HBSC) realizado sob a égide da Organização Mundial de Saúde. Os participantes foram uma extensão da amostra Portuguesa integrada naquele estudo, recrutando alunos de escolas privadas de Lisboa (Portugal). O estudo inclui 1385 alunos de ambos os géneros, com uma média de idades de 13,6 anos (DP=1,84). Os resultados mostraram que em escolas privadas devem ser utilizadas estratégias de promoção de EV saudáveis adequadas aos diferentes perfis identificados de AF e de TE. A crescente evolução tecnológica, potenciada por políticas de incentivo à aquisição de meios tecnológicos, conduziu os alunos a realizarem menos AF. Pelo que deveriam ter sido acompanhadas de estratégias de consolidação da AF e de educação sobre o TE.

Palavras-chave: Perfis de estilo de vida, tempo de ecrã, sedentarismo, atividade física

Introduction

The reduction or absence of physical education, even reported in the literature for a long time (e.g. Morris, Heady, Raffle, Roberts, & Parks, 1953) as a health risk, remains a current subject of growing concern and it is a topic of several studies. Everyday life promoted a lifestyle with more ST and less PA. This happens due to the mechanization of labour, the improvement of transportation, new forms of leisure (television, consoles, computers etc.). These changes are so many and so deep that they have reached a point that physical inactivity has become the most prevalent risk factor for non-transmittable diseases (Fundação Professor Fernando de Padua, 2012). Physical inactivity is associated with various diseases such as increased risk of cardiovascular disease, premature mortality (Stofan, DiPietro, Davis, Kohl, & Blair, 1998) and obesity - classified as an epidemic of the XXI century (Aranceta et al., 2007). Along with the worsening of physical inactivity comes the big increase in obesity. The causes are behavioural, and inactivity being as important or more than nutrition (Prentice & Jebb, 1995; Schmitt, 2007). The consequences are alarming: obesity is currently the second leading cause of premature death (Batista, Lima, & de Almeida, 2006). WHO even considers that in 2020, non-contagious diseases, resulting from food and sedentary lifestyle will be the cause of more than 70% of all maladies (WHO, 2002). The prevalence of obesity and overweight have been progressively overlapping the traditional public health problems, such as malnutrition and infectious diseases (WHO, 1998). In the European Union (EU) the number of children who are overweight or obese increases over 400,000 per year. Countries like Spain, Portugal and Italy report having percentages of overweight and

obesity over 30% in children aged 7-11. Being that overweight affects almost 1 in 4 children in the UE (Schmitt, 2007). Technological evolution has been enormous, which has advantages but also disadvantages such as increased sedentary youth in most of the world (Garcia-Ferrando, 2001) that, especially since the middle of last century, has influenced our LS. The first and most studied moment was the "massification" of TV: Burke and colleagues (2006) reported an association between lack of PA and consumption of TV and video games; Stettler, Signer and Suter (2004) found an association in children between being overweight and watching TV; Matos & Equipa do Aventura Social e Saúde (2010) claim that 25% of adolescents watch four hours or more of TV during the week and over 50% have this consumption on weekends; The second great moment comes with the spread of the use of PC: Burke and colleagues (2006) found a negative correlation between the Pager test results and time of PC usage; Marshall, Biddle, Gorely, Cameron and Murdey (2004) determined a negative association between consumption of TV and PC games, with the practice of PA; Kautianen, Koivusilta, Lintonen, Virtanen and Rimpela (2005) found an association between overweight, watching TV and computer use in general; Matos and Equipa do Aventura Social e Saúde (2010) reported that over 50% of teenagers play PC over 1h/day during the week and almost 75% play over 1 h/day on weekends, and nearly 30% of these play 4 hours or more. The third moment is the present, and is an accentuation of the previous phase, i.e., a "massification" of PC usage. Generally in Europe the cause was due to constant technological development that allowed the various PC manufacturers to launch mainly laptops with a very affordable price. Furthermore, in some countries, such as Portugal, "technological plans" have been undertaken by public policies (Portuguese Government 2005/2009), namely the *e.escola* program, which provided among other things the acquisition of a laptop computer at a very low price or even for free (Ministério da Educação, n/d). This program has helped 66% of young people aged 9-16 to buy laptops, especially those of lower socioeconomic status (Ponte, 2011). To sum up, there has been an increase of inactivity that combined with unhealthy eating habits led to an increase in obesity for several generations that, in turn, is associated with other health problems. We have experienced technological progress that is associated with a more sedentary lifestyle, and the current generation of youngsters is experiencing a further evolution and technological growth. Besides that, they also were the focus of "technological plans" and others public policies and supplementary promotional campaigns that facilitated the purchase of PCs. Despite the numerous pedagogical advantages this has been a reality that was not accompanied by any assessment or by measures to counteract the tendency to inactivity. It is important to increase the knowledge of LS of young people in a plural logic (Marshall, Biddle, Sallis, McKenzie, & Conway, 2002) with particular emphasis on how they use technologies (PC, video games, TV, etc.) and practice PA. With this goal 5 LSP, built on different ST consumptions to and diverse PA practice profiles were identified and characterized and interpret. This study

was conducted in Portuguese private schools. These educational institutions are characterized for being frequented by a small proportion of the population whose parents have a medium-high socio-economic status, with more academic qualifications wage, and they pay for their child' studies a monthly amount higher than the national minimum wage. So the students involved in this study tend to have high purchasing power and access to new technologies.

Methodology

This study is an adaptation of the Health Behaviour in School-aged Children (HBSC) conducted under the auspices of World Health Organization (WHO). The participants were an extension of the Portuguese sample used in that study now including students from private schools in Lisbon. The international HBSC study has as its central objective to increase understanding of health behaviours and wellbeing of adolescents in their social contexts, collecting data that enables national and international comparisons (Roberts et al., 2007). This research is in its 8th edition and has the participation of 43 European and non-European countries (HBSC, 2009). In this study we chose to divide the sample into five profiles that are defined by the consumption of PA and ST, and study which variables characterize them.

Sample

This is a convenience sample of students from Portuguese private schools in Lisbon and Tejo Valley, belonging to 5 private schools. The sample consists of N=1.385 students from 6th to 12th grade, with an average age of 13.6 years (SD=1.84) ranging from 10 to 19 years-old (58.8% male and 41.2% female). Six participants were removed because of their responses were considered outliers.

Instrument

The HBSC survey instrument consists of an international questionnaire that is applied every 4 years (Currie, Samdal, & Boyce, 2001). This self-completion questionnaire was adapted for this research and named HBSC / WHO - Version B Private Education (VEPB). Before applying the VEPB a preliminary study was conducted to evaluate this version of the questionnaire and anthropometric measurements conducted for all students in this study. The application of the questionnaires was carried during Physical Education classes. Students' participation was voluntary and anonymous.

Variables

Considering the literature review and the objectives of the study, we selected a set of variables. Aiming to better interpret the results, data was re-coded or grouped, and variables were reorganized to better characterize the 5 LSP. More specifically "PA" was recodificated into 3 groups: "-active" (<3days/week), "±active" ([3,5]days/week) and "+active" (>5days/week), the variables "watch tv/dvd/video, "play computer games/console) and "use pc" was constructed through a pondered average between consumption during the week and weekend, and "ST" resulting from the sum of the variable "watch tv/dvd/video" with "play computer games" and with "use pc", and recodification of the variable ST in 3 groups : "screen" (<3h/day), "±screen" ([3, 5] h/day) and "+screen" (>5h/day).

The LSP variable was constructed from the joining of the variable ST and the variable PA (days/week) organized in five profiles, more specifically: LSP1 "classic" (PA>5 days/week (days/week) and ST<3h/day), LSP2 "moderate / mixed" (±PA/±ST), LSP3 "modern" (PA>5days/week and ST>5h/day), LSP4 "passive" (PA<3days/week and ST<3h/day) and LSP5 "risk" (PA<3 days/week and ST>5h/ day).

In these five LSP we evaluated its association with the variables: Personal (gender, age, school year), Sleep (sleep duration, difficulty in falling asleep), School (performance, motivation), Health (body mass index, satisfaction, self-image), Family (relationship, own room, parents and free time, financial situation, siblings), Symptoms (physical, psychological), Neighbourhood (social, physical), Computer (E&media communications, internet at home, number of computers, on line games, new relationships and internet, school performance and internet, dissatisfaction without internet, communications and internet). Emphasizing that the variable "age" results from the variable "year and month of birth", the variable "sleep" results from the calculation of average weekly sleep, the variable "Body mass index" results of the calculation Weight/ Height² with classification according to the parameters of Cole and colleagues (2000). Regarding the variables "social characteristics of the neighbourhood" and "physical characteristics of the neighbourhood", as well as the variables "psychological symptoms" and "physical symptoms", we determined the Cronbach's alpha to examine the internal consistency among the items comprising each factor, yielding acceptable values for the variable "social characteristics of the neighbourhood" (α=.654) and "physical characteristics of the neighbourhood" (α=.663), as well as for variables "physical symptoms" (α=.639) and for the variable "psychological symptoms" (α=.611) (Maroco, 2010).

Statistical Analysis

Data from the questionnaires were scanned (ReadSoft software), and analysed statistically, with SPSS software (SPSS, Chicago, IL, USA). We compared the five profiles through statistical Chi Square, ANOVA, Multivariate Logistic

Regression between five profiles and Multivariate Logistic Regression in Peer Profiles. We also calculated the average time of PA and ST by gender and average times of PA and ST by age.

Results

Results were selected to only present those with statistical significance. Some variables were not included in Multivariate logistic regressions due to co-linearity.

Total Results

Table 1 presents the totals and data by gender regarding the variable ST, built by variables: watch "tv/dvd/video", "use computer" and "play computer games (or console)".

Table 1: Results ST and PA

Variables	Gender				Total		
	Masculine		Feminine				
	Average	SD	Average	SD	Average	%	SD
Watch tv/dvd/video	2 (2h)	1,43	2 (2h)	1,27	2 (2h)	44%	1,36
Play computer games (or console)	1,46 (1h28)	1,44	0,6 (36 min)	0,87	1,1 (1h06)	24%	1,31
Use computer	1,41 (1h25)	1,38	1,59 (1h35)	1,33	1,48 (1h29)	32%	1,36
Screen Time	4,75 (4h45)	3,06	4,18 (4h11)	2,61	4,51 (4h31)	100%	2,89
Physical Activity (days/wheek)	4,35	1,82	3,37	1,75	3,95		1,85

Tables 2 and 3 show the distribution of students in PA and ST, as well as the variation of PA and ST from 11 years-old to adulthood.

Table 2: Distribution PA and ST

			Physical Activity (days/week)			
			-active -3 days	±active 3 a 5 days	+active +5 days	Total
Screen Time	-screen -3h	N	76	225	127	428
		%	5,90%	17,60%	9,90%	33,50%
	±screen 3 a 5h	N	105	226	74	405
		%	8,20%	17,70%	5,80%	31,70%
	+screen +5h	N	136	227	83	446
		%	10,60%	17,70%	6,50%	34,90%
	Total	N	317	678	284	1279
		%	24,80%	53%	22,20%	100%

Table 3: PA and ST child/adult

Variables	Age	Gender				Total	
		Masculine		Feminine			
		Average	SD	Average	SD	Average	SD
Physical Activity (days/week)	11	4,71	1,94	4,01	1,86	4,46	1,94
	17	3,24	1,64	3,17	1,64	3,21	1,62
Screen time	11	3,91 (3h55)	2,62	3,24 (3h14)	1,76	3,67 (3h40)	2,36
	17	4,54 (4h32)	2,99	4,11 (4h07)	2,65	4,34 (4h20)	2,82

We highlight the variables Internet at home and number of computers that were not statistically significant but represent important figures considering that 99.7% of the students have a PC at home and 98.9% have Internet connection.

Results for profile

Table 4 shows the ANOVA test of PA, "watch tv/dvd/video, "play computer games (or console)", "use computer" and ST, yielding significant values between the 5 LSP.

Table 4: PA e ST in the 5 LSP

Variables	LSP1 classic (+A/-S)			LSP2 mod/mist (±A/±S)			LSP3 modern(+A/+S)			LSP4 passive (-A/-S)			LSP5 risk (-A/+S)			p´1
	Med	SD	%	Med	SD	%	Med	SD	%	Med	SD	%	Med	SD	%	
Physical activity (days/week)	6,6	0,49		3,92	1,3		6,48	0,5		1,5	0,72		1,51	0,68		,000**
Watch tv/dvd/video	0,85	0,47	48,6	1,96	1,2	44,9	3,03	1,41	40,2	0,97	0,53	54	3,15	1,54	40	,000**
Play computer games (or console)	0,36	0,38	20,6	1,05	1,16	24	1,95	1,39	25,9	0,24	0,32	13,4	1,93	1,76	24,5	,000**
Use pc	0,54	0,44	30,9	1,36	1,17	31,1	2,56	1,35	34	0,58	0,38	32,4	2,79	1,61	35,5	,000**
Screen time	1,75	0,73		4,33	2,5		7,53	2,41		1,79	0,68		7,87	2,5		,000**

* $p < .05$ ** $p < .01$; [1] ANOVA

The variables with statistically significant differences between the 5 LSP are presented in table 5.

Table 5: Chi-squared between LSP

Variables		LSP1 +A/-E classic		LSP2 ±A/±E mod/mix		LSP3 +A/+E modern		LSP4 -A/-E passive		LSP5 -A/+E risk		Total		p[1]
		N	%	N	%	N	%	N	%	N	%	N	%	
Gender (N=1331)	Masculine	93	73,2	541	59,5	64	77,1	24	31,6	60	44,1	782	58,8	,000*
	Feminine	34	26,8	368	40,5	19	22,9	52	68,4	76	55,9	549	41,2	
Age (N=1331)	≤ 12 years	44	34,6	260	28,6	28	33,7	24	31,6	21	15,4	377	28,3	,000*
	[13,15[years	43	33,9	340	37,4	36	43,4	23	30,3	76	55,9	518	38,9	
	≥15 years	40	31,5	309	34	19	22,9	29	38,2	39	28,7	436	32,8	
Sleep duration (N=1171)	Less than 8 hours	32	29,6	218	27,3	22	29,7	33	46,5	44	37	349	29,8	,029*
	8 to 9 hours	35	32,4	271	33,9	25	33,8	17	23,9	42	35,3	390	33,3	
	9 hours or more	41	38	310	38,8	27	36,5	21	29,6	33	27,7	432	36,9	
School performance (N=1325)	Good and very good	87	68,5	555	61,5	51	61,4	44	57,9	60	44,1	797	60,2	,011*
	Average	35	27,6	297	32,9	29	34,9	27	35,5	65	47,8	453	34,2	
	Below average	5	3,9	51	5,6	3	3,6	5	6,6	11	8,1	75	5,7	
School demotivation (N=1313)	Always or almost always	32	25,8	262	29,1	28	34,1	24	31,6	53	40,2	399	30,4	,001**
	Sometimes	44	35,5	401	44,6	35	42,7	33	43,4	63	47,7	576	43,9	
	Rarely or never	48	38,7	236	26,3	19	23,2	19	25	16	12,1	338	25,7	
Satisfaction (N=1280)	Dissatisfied	6	5,1	47	5,4	3	3,8	7	9,5	16	11,9	79	6,2	,017*
	Satisfied	38	32,5	356	40,6	25	31,6	27	36,5	57	42,5	503	39,3	
	Very satisfied	73	62,4	473	54	51	64,6	40	54,1	61	45,5	698	54,5	
Relationship with family (N=1281)	Bad	6	5,2	28	3,2	1	1,3	3	4,1	9	6,7	47	3,7	,015*
	Satisfactory	15	12,9	162	18,5	13	16,5	11	14,9	38	28,4	239	18,7	
	Good	95	81,9	688	78,4	65	82,3	60	81,1	87	64,9	995	77,7	
Number of siblings (N=1331)	0 siblings	42	33,1	197	21,7	16	19,3	20	26,3	32	23,5	307	23,1	,048*
	1 or 2 siblings	65	51,2	582	64	53	63,9	48	63,2	93	68,4	841	63,2	
	3 or more siblings	20	15,7	130	14,3	14	16,9	8	10,5	11	8,1	183	13,7	
Psic symptoms (N=1286)	Casually	31	27	161	18,2	16	19,8	12	16,2	11	8,3	231	18	,004**
	Frequently	84	73	722	81,8	65	80,2	62	83,8	122	91,7	1055	82	
E&media communication with friends(N=1324)	Rarely or never	15	11,9	85	9,4	1	1,2	11	14,5	11	8,1	123	9,3	,000**
	Some days	60	47,6	331	36,6	20	24,4	26	34,2	39	28,7	476	36	
	Every day	51	40,5	488	54	61	74,4	39	51,3	86	63,2	725	54,8	
on line games *(N=1304)*	Rarely or never	78	63,4	442	49,6	28	34,1	54	73	60	45,1	662	50,8	,000**
	Sometimes	40	32,5	303	34	30	36,6	19	25,7	36	27,1	428	32,8	
	Every day or +1x day	5	4,1	147	16,5	24	29,3	1	1,4	37	27,8	214	16,4	
School performance and internet (N=1301)	Rarely	117	95,9	825	92,7	64	78	72	97,3	112	84,2	1190	91,5	,000*
	Sometimes	5	4,1	48	5,4	12	14,6	2	2,7	15	11,3	82	6,3	
	Many times	0	0	17	1,9	6	7,3	0	0	6	4,5	29	2,2	
Dissatisfaction without internet (N=1304)	Rarely	107	87	700	78,6	52	63,4	68	90,7	92	69,2	1019	78,1	,000*
	Sometimes	6	4,9	76	8,5	16	19,5	4	5,3	15	11,3	117	9	
	Many times	10	8,1	115	12,9	14	17,1	3	4	26	19,5	168	12,9	
Communication and internet (N=1304)	Rarely or never	87	71,9	426	47,7	14	17,3	55	73,3	37	27,8	619	47,5	,000*
	Sometimes per week	24	19,8	266	29,8	30	37	14	18,7	34	25,6	368	28,2	
	Every day or +1xday	10	8,3	202	22,6	37	45,7	6	8	62	46,6	317	24,3	
Physical characteristics of the neighborhood (N=957)	Unhappy	4	5,3	60	9	8	14,5	7	14	17	15,7	96	10	,020*
	Indifferent	13	17,3	150	22,4	4	7,3	11	22	28	25,9	206	21,5	
	Happy	58	77,3	459	68,6	43	78,2	32	64	63	58,3	655	68,4	

* p < .05 ** p < .01; 1 Chi-squared test

Table 6 shows the variables with statistically significant results in Multivariate Logistic Regression between the 5 profiles.

Table 6: Multivariate Logistic Regression in the 5 LSP

	Variables	LSP1 classic +A/-S OR [CI95%]	LSP2 mod/mixed ±A/±S OR [CI95%]	LSP3 modern +A/+S OR [CI95%]	LSP4 passive -A/-S OR [CI95%]	LSP5 risk -A/+S OR [CI95%]
Gender	Feminine	**0,4 [0,2 - 0,7]****	0,9 [0,6 - 1,4]	**0,4 [0,2 - 0,9]***	**4,2 [1,8 - 9,8]****	**2,6 [1,4 - 5]****
Sleep duration	9 hours or more	0,7 [0,3 - 1,6]	**1,6 [1 - 2,4]***	0,6 [0,3 - 1,5]	0,5 [0,2 - 1,2]	0,8 [0,4 - 1,5]
Satisfaction	Satisfied	4,5 [0,5 - 40,8]	1,5 [0,7 - 3]	2,1 [0,2 - 25,1]	**0,3 [0,1 - 0,9]***	0,5 [0,2 - 1,3]
Physical symtoms	Frequently	1 [0,4 - 2,3]	1 [0,6 - 1,6]	3 [0,9 - 9,3]	**0,3 [0,1 - 0,8]***	1,3 [0,6 - 3,1]
Online games	Sometimes	**0,5 [0,2 - 1]***	1,4 [0,9 - 2]	0,9 [0,4 - 2,1]	0,5 [0,2 - 1,2]	1,3 [0,7 - 2,5]
New relationships and internet	Many times	0,3 [0 - 3,2]	0,5 [0,2 - 1,1]	1,5 [0,4 - 6]	3,3 [0,6 - 19,7]	**3 [1,1 - 8,4]***
School performance and internet	Many times	0 [0 - 7,6]	**0,3 [0,1 - 1]***	**21,8 [3,4 - 139]***	0 [0 - NC]	1,4 [0,4 - 5,7]
BMI	Overweight	0,4 [0,1 - 1,4]	**1,8 [1 - 3,1]***	0,5 [0,2 - 1,5]	0,5 [0,1 - 2,2]	1 [0,5 - 2,1]
Communications and internet	Sometimes	**0,4 [0,2 - 0,9]***	1,5 [1 - 2,3]	2 [0,8 - 5,2]	0,6 [0,3 - 1,4]	1,2 [0,6 - 2,6]
	Every day or more than 1x per day	**0,2 [0,1 - 0,4]****	0,8 [0,5 - 1,2]	**3,2 [1,3 - 8]***	0,3 [0,1 - 1]	**5,3 [2,6 - 10,8]***
Physical charact. of the neighborhood	Indifferent	1,3 [0,3 - 6,9]	2,1 [1 - 4,6]	**0,2 [0 - 0,9]***	0,8 [0,2 - 3,8]	0,6 [0,2 - 1,9]
R^2 Nagelkerke / $\chi 2$ Hosmer-Lemeshow		0,238 / 10,4	0,097 / 5,4	0,237 / 6	0,262 / 14,2	0,224 / 4,1

* $p < .05$ ** $p < .01$; OR – Odds Ratio; IC – Confidence interval; NC – Not computed

Table 7 represents variables with statistically significant results in Multivariate Logistic Regression between pairs of profiles.

Table 7: Multivariate Logistic Regression between LSP pairs

Variables		LSP3 (1) vs LSP1 OR [CI95%]	LSP 1 (1) vs LSP5 OR [CI95%]	LSP3 (1) vs LSP5 OR [CI95%]
Gender	Feminine	1,3 [0,2 - 8,1]	**12,1 [1,6 - 92,1]***	**9,2 [2,2 - 37,8]****
Difficulty in sleeping	Sometimes	0,7 [0 - 12,6]	**81,6 [1,1 – 593,2]***	0,4 [0 - 10,3]
	Rarely or never	0,5 [0 - 9,7]	**311,6 [3 - 3266]***	0,7 [0 - 16,4]
Parents and free time	Do not know anything, do not have or do not see	1,4 [0 - 1302,3]	**8,4 [5,2 - 13,7]****	4,7 [0,3 - NC]
School performance and internet	Sometimes	**0,04 [0 - 0,6]***	0,6 [0 - 17,4]	0,2 [0 - 1,6]
Communications and internet	Every day or more than 1x per day	**0,03 [0 - 0,3]****	**188,3 [12,9 - 2755]****	1,6 [0,3 - 9,5]
R^2 Nagelkerke/$\chi 2$ Hosmer-Lemeshow		0,645 / 4,3	0,767 / 43,1	0,546 / 5,2

* $p < .05$ ** $p < .01$; OR – Odds Ratio; CI – Confidence interval; NC – Not computed

Discussion

These students have much technological access

In fact these students are well equipped technologically: 99.7% reported having a PC and 98.9 % Internet connection at home. This value is even higher than that found by Rideout, Foehr and Roberts (2010) who reported values for the U.S., namely 93% had PC and 84% had Internet connection at home in 2009.

The numbers obtained are considerably higher than those described by Bringué and Sádaba (2008) in Argentina, Brazil, Chile, Colombia, Peru and Mexico and refer to the existence of 65% with a PC and 46% with Internet connection. In addition to this data, more than half of these students seem very familiar with technology as they communicate "every day" (54,8%) with friends by phone, mobile phone, sms or email and speak with "some or a lot of frequency" (52,4%) with friends over the Internet. These results are in agreement with Ponte (2011) who states that young Portuguese have Internet usage skills that are well above the European average. The results do not follow however those that have been reported. In this scope we could refer to Bennett, Maton and Kervin (2008) and Livingstone, Haddon, Gorzig and Olafsson (2011) who refer to the existence of a still great marginalization of some young people in society with regard to knowledge and access to new technologies. This popularization of PC and its use was a consequence of technological evolution, but was also enhanced by policies of the Portuguese government (Plano Tecnológico da Educação, n/d) brought into practice by programs like *e.escolas* that promoted the democratization of the portable PC and Internet in Portugal. Ponte (2011) states that in 2010 Portugal had figures approaching three times the European average regarding young people with personal laptop (66%) and more than twice of EUA figures (29%) Rideout and colleagues (2010).

The relation of students with activity and sedentary behaviour is not homogeneous

In this study there are students in the five profiles. The first LSP2 "moderate/mixed" (±active/±screen) with 68.3%, second LSP5 "risk" (-active/+screen) with 10.2%, third LSP1 "classic" (+active/-screen) with 9.5%, fourth LSP3 "modern"(+active/+screen) with 6.2% and fifth LSP4 "passive"(-active/-screen) with 5.7%. These results confirm those disclosed by Marshall and colleagues (2002 and 2004) that in their meta-analysis indicate that the relationship between a sedentary behavior and health is difficult to explain just relating an element of inactivity. Furthermore Burke and colleagues (2006) report that they are unlikely to explain the inactivity as a result of an isolated and generic lifestyle.

It is possible to be active and to have sedentary behaviours.

Six per cent of students are both very active and spend much time in front of a screen (LSP3 "modern" +active/+screen). This confirms information reported by Nelson, Gordon-Larsen, Adair and Popkin (2005) who says that sedentary behaviour may not limit the practice of PA. As referred by Biddle, Gorely and Stensel (2004), Granich, Rosenberg, Knuiman and Timperio (2010) and Owen, Leslie, Salmon and Fotheringham (2000) sedentary behaviours sometimes coexist and other times compete with practice of PA. This profile would not have been possible in the past. It belongs to this generation due to massive access to technology, hence designating this modern profile. Its existence may

have shown that it is necessary to be careful about the associations between technological consumption and inactivity. For example Eisenmann, Bartee and Wang (2002) reported having observed an association between more practice of moderate-to-vigorous PA and less consumption of TV. This profile ("modern") is characterized by: being less common than LSP5 "risk" (-active/+screen), having almost two times less students than this one; having more male students (2.5 times) (OR=0.4, p<.05), which is in agreement with teVelde and colleagues (2007) who reported that male students spent more time in sedentary behaviors but also in physical exercise; it has the greatest number of students between 13 and 15 years-old; Students in this group are more likely (22 times) to decrease school marks due to time spent on the Internet (OR=21.8, p<.05), and comparing with the other active profile, LSP1 "classic" (+active/-screen) students who "rarely" lower grades due to time spent on the Internet are more likely to belong to LSP1 and not to LSP3 (OR=0.04, p<.05). They are students who are more "satisfied/ very satisfied" with life (96,2%) and have a good relationship with their family (82,3%), and are also the ones that communicate daily through E&media with friends (telephone, mobile phone, sms or emails) (74,4%); They are the ones who most play online and that have the highest average consumption of computer games (or console) (1h 57min) that are the most likely to speak more frequently (3.2 times) with friends on the Internet (OR=3.2, p<.05), which also are the ones that more often refer the need to use the Internet so that their life is not boring, empty and joyless (36,6%); they are also the group where there are more students who are "unhappy" with "physical characteristics of the neighbourhood" (OR=0.2, p<.05); It seems to be a profile with the tendency to grow because it is associated with high consumption, as Rideout and colleagues (2010) report, access to the Internet at home in the U.S. increased from 2004 to 2009 about 10% (74% to 84%), in 2011, 30,2 % of the world population uses internet (Miniwatts Marketing Group, n/d).

ST has potential to replace the practice of PA.

As noted before, although it is possible to be active and have sedentary behaviours, ST may have implications for PA, considering that the average of PA practice in profiles "+ active" (PA>5 days/week) is lower in profile "+screen" (ST> 5h/day) than in profile "-screen" (ST<3h/day), which suggests that a higher ST even in more active students, can reduce PA time. This fact has also been pointed out by Marshall and colleagues (2002) and Sandercock, Ogunleye and Voss (2012) who reported that sedentary behaviours limit PA practice. Biddle, Marshall, Gorely and Cameron (2009) reported that sedentary behaviours have greatly increased. Several studies show that the total time of sedentary behaviour has increasingly negative implications for health. Thus it is important to consolidate habits of PA practice and establish rules of technology consumption (Barradas et al., 2007). Rideout and colleagues (2010) reported that only about 30% of students have these rules, which existence reduces the

ST consumption. It seems however that the recommendations of the American Academy of Pediatrics (2001), Spinks, Macpherson, Bain and McClure (2007) and Tremblay and colleagues (2011) to limit entertainment ST to 2h/day (TV and PC) are excessive and should be updated, because with the popularization of PCs and its use in new contexts and activities made it much more present, whether at work or leisure. While there are students that combine long screen hours with much physical activity, there are others in which screen time replaces physical activity. This suggests, from our point of view, that the PC acquisition policies, such as those previously held by the Portuguese government, should be accompanied by an investment in the consolidation of PA practice and education of rules about technology consumption. Note that there is technology, specifically video games involving PA, and that have the potential to increase the amount of practice of PA in sedentary populations (Palmeira et al., 2007), however the use of this technology is still very low when compared to video games not involving AF.

The habits of PA practice continue without being consolidated

The average practice of PA is less than 4 days/week. The recommendations for ages 6 to 17 of 1 hour or more of daily practice, with moderate-to-vigorous intensity (USDHHS, 2008) are therefore not being followed. Portugal has one of the lowest frequencies of PA practice when compared with 35 countries. Matos and Diniz (2007) and Eurobarometer (2010) reports that Portugal is the European country where most young people mention never having practiced PA. It was also observed that 78% of students are not "+ active" (PA>5days/week), a better figure than Matos and Equipa do Aventura Social e Saúde (2010) obtained in the Portuguese population (public schools) in which 86% did not practice PA every day, but worse than the Centres for Disease Control and Prevention (2010) which states that only 68% of young U.S. students did not perform PA according to recommendations to promote health. Inactive students, even if they have no health problem by being inactive, do not receive health benefits provided to those who meet the recommendations of PA (Donaldson & Ronan, 2006; Juan et al., 2009; Warburton & Nicol, 2006). The WHO (2009) states that a large percentage of children and adolescents in many countries of Europe do not practice any regular PA.

Habits of PA and ST tend to remain

LSP1 "classic" (+active/-screen) is stable over the different age groups, suggesting that the habits of PA and ST after achieved remain, which is in agreement with Kirk (2005) regarding the importance of these habits to be acquired in earlier ages, as well as Kjonniksen, Torsheim, and Wold (2008) who reported a greater likelihood of PA practice in adulthood in those who practiced at a young age, also Telama (2009) refers to the PA tracking from childhood to adulthood. Other authors concluded that sedentary behaviour in children is very harmful to health and, when there, tend to be stable over time while remaining in adulthood (Biddle et al., 2009; Campbell et al., 2001; Ministerio de Sanidad y

Consumo, 2007; Nelson et al., 2005; Janz, Burns, & Levy, 2005; Sundblad, Jansson, Saartok, Renstrom, & Engstrom, 2008).

Large ST consumption

In the variable ST only 33.5% of students are "-screen" (ST<3h/day). The average value of ST is 4h 31min, much less than 7h 11min mentioned by Rideout and colleagues (2010). The average ST is firstly composed by "watch tv/dvd/video" with 2h (44%), second for "computer use" with 1h 29min (32%) and third by "play computer games (or console) with 1h 6min (24%). Compared with other works, also Marshall, Gorely and Biddle (2006) in a revision of 1999-2004 mentions that PC time is about 30 min/day as average, much less than ours, but meeting the WHO (2009) which states that since 2004 the EU consumption of TV decreased while PC time increased. Recently Rideout and colleagues (2010) say that in the US consumption is higher, with 4h 29min for tv/dvd/video, 1h 12min for PC e 1h 30min of video games. In all profiles the largest consumption is "watch tv/dvd/video" then "computer use" and then "computer games (or console)" which is in agreement with to Rideout and colleagues (2010) who reported that watching TV continues to dominate technology consumption. However, the way we watch TV has changed, young people consume 59% of traditional TV and 41% in other forms (recorded, transformed, Internet, iPod, phone, etc.).

The practice of PA decreases until adulthood

The practice of PA at the age of 17 (3.21days/week) is on average lower by 1.25 days/week compared to the age of 11 (4,46 days/week). This result is consistent with that stated by Biddle and colleagues (2004), Duncan and colleagues (2007), Kjonniksen and colleagues (2008), WHO (2008) and WHO (2009). There is a further reduction up to the age of 17 in PA in the male gender (-1.47 days/week) compared to the female gender (-0.84 days/week), which is not in accordance with Calmeiro and Matos (2004), Leslie, Sparling and Owen (2001) and Nelson and Gordon-Larsen (2006), who reported that the decrease is greater in females. These data are not a good indicator. Matos and Equipa do Aventura Social e Saúde (2004), Telama and colleagues (2005) and Kirk (2005) reported associations between the practice of PA in childhood and adulthood.

The consumption of ST increases until adulthood

Students get to 17 years of age with a ST average (4h 20min) that is higher in 40 minutes comparing to when they were 11 years-old (3h 40min), this values are consistent with those found in other studies as Biddle, Pearson, Ross and Braithwaite (2009), Gebremariam and colleagues (2012), Olds, Ridley and Dollman (2006) e Olds and colleagues (2009) who reported that ST increases with age. Data from international HBSC study (WHO, 2009) indicates that with age the consumption of TV, Internet and PC increase and that the consumption of PC games and electronic devices decrease. Ministerio de Sanidad y Consumo (2007)

and Campbell and colleagues (2001) state that present sedentary adolescents will probably be the next inactive adults. Comparing genders, there is a greater consumption of ST in 17 year-old female (+52min) than in the male (+38min), compared with 11 years-old participants.

ST consumption increases between 13 and 15 years of age

The profiles "+screen" (ST>5h/day) have more students between 13 and 15 years old. This result was also found in a study of Olds and colleagues (2009) in Australia. Sturm (2005) however reported that the consumption of TV has a small reduction during adolescence. In our study, there is a drop in consumption of "watch tv/dvd/video" and "play computer games (or console)," with age, while there is always a growth in "computer use".

There are still differences in gender regarding PA practice

PA practice is superior in almost 1 day per week in male (4.35days, SD=1.82) when compared to female (3.37days, SD=1.75). Moreover, male students are more likely to belong to profiles "+active" (PA>5 days/week) (2.5 times LSP1 and LSP3) (OR=0.4, p<.01 and OR=0.4, p<.05) and females are more likely to belong to profiles "-active" (4.2 times LSP4 and 2.6 times LSP5) (OR=4.2, p<.01 and OR=2.6, p<.01), which is in agreement with the authors Nader, Bradley, Houts, McRitchie and O'Brien (2008) and Troiano, Berrigan and Dodd (2008), who reported that PA is lower in females. The female gender is more likely (12 times and 9 times) to belong to LSP5 "risk" (-active/+screen) (than PEV1 and PEV3) (OR=12.1, p<.01 and OR=9.2 p<.01), i.e. despite consuming less ST than the male and being less active, the female gender is more likely to belong to LSP5.

Gender differences in ST

Consumption of ST is different between genders. The male gender (4h 45min) consumes more 34 minutes ST than females (4h 11min), which is in agreement with other authors such as Booth and colleagues (2006), Olds and colleagues (2006), Olds and colleagues (2009), Salmon, Telford and Crawford (2004) and Sharif and Sargent (2006). Regarding consumption of "watch tv/dvd/video" (2h) both genders consume the same. Hancox, Milne and Poulton (2004) reported that watching TV is the most prevalent sedentary behaviour in young people, which is also verifiable in our study. Regarding the "computer use" male gender consumes 10 minutes less (male 1h 25min and female 1h 35min). This result is different from that found in the international sample HBSC 2006 (WHO, 2009) in which PC consumption was greater in males. Regarding "play computer games (or console)" the males consume more 52 minutes, or nearly 3 times more, than females (male 1h 28min and female 36min). These results are according with Rideout and colleagues (2010) in the U.S. when they mentioned that male gender consumes more "play computer games (or console)" than the other gender. It should be noted that the order of consumption is different between genders. For

the male gender "watch tv/dvd/video," comes first, second to "play computer games (or console)" and third "computer use ". In the female gender however, "computer use" ranks second, before "play computer games (or console)"

Profiles "+active" sleep more

It was found that 29.8% of students sleep "-8h sleep" which is less than the 8-10 hours that are recommended (Reilly et al. 2007). The youngsters included in our sample, in many cases, do not meet international recommendations for the period of sleep. The value we found is also lower than the Portuguese study Gonçalves, Rodrigues, Carvalho, and Carvalho (2010) who reported that 20% sleep "-8h sleep" and also worse than reported by Ortega and colleagues (2011) who reported that 24% of children and young people in Estonia and Switzerland do not sleep the recommended hours, but much better than the one reported by Seicean and colleagues (2007) that stated that in a sub urban American school 95% of students sleep "sleep-8h" a day. The LSP4 "passive" (-active/-screen) is the profile where there are more students to sleep "-8h sleep". Among profiles "+active" (PA>5 days/week) there are more students to sleep "+8 hours" than in "-active" (PA<3days/week), which is similar to that reported in studies by Ortega and colleagues (2011) and Singh and colleagues (2008). But regarding the five profiles in this study, students who sleep "9 or more hours of sleep" are more likely (1.6 times) to belong to LSP2 "moderate / mixed" (± active / ± screen) than to the other profiles (OR=1.6, p<.05).

Less difficulty in sleeping in "+active" profiles

Mai and Xu (2010) reported that sleep quality is crucial for brain function, behaviour and proper metabolic functioning in children and young people. Our study shows that over 40% have difficulty falling asleep, less than reported in other studies as Spruyt, O´Brien, Cluydts, Verleye and Ferri (2005) that cite 60% of students, but higher than data reported by Roberts, Lee, Hemandez and Solari (2004) who mentions that only 10-13% show sleep problems. In the five profiles, there is less difficulty falling asleep in profiles "+active" (PA>5days/week) which is in agreement with what was reported by Hughes and Rogers (2004), but different from Wong, Halaki and Chow (2013) who only refers the need of light sleep. Analysing the LSP5 "risk" (-active/+screen) which is a profile "-active", it was found that students who "rarely/never" have "trouble sleeping" are more likely (311.6 times) to belong to this profile than the LSP1 "classic" (+active/-screen) (OR=311.6, p<.05), suggesting that students in LSP5 since they sleep less and consume more screen may stay up later, not having difficulty sleeping by the time they go to bed.

Profiles "+active" have better academic performance

Students with "average" academic performance are more likely (1.8 times) to belong to "risk" LSP5 (-active/+screen) (OR=1.8, p<.05), but otherwise it is the

profile in which there are more students with poor school performance. Students of profiles "+active" (PA>5 days/week) have better academic performance, LSP1 "classic" (+active/-screen) having a higher number of students with good academic performance. This is consistent with the study described in Active Healthy Kids Canada (2012) that refers the existence of an association between more PA and better school performance. This result is also confirmed by Sharif and colleagues (2006) who also found an association between longer ST and worse school performance.

Profiles "+active" have more obese students

It was found that 17.4% of students are overweight/obese (14% overweight and 3.4% obese), lower than the value found by Carmo and colleagues (2006) who reported that 30% of children in Portugal are overweight/obese, and also lower than the 34% reported by Miranda (2009), and very close to those reported by Loureiro, Matos and Diniz (2012) who mentioned 17.5% (15% overweight and obese 2.5%). These findings are very worrying because, as Lobstein (2004) states, overweight children, get to adulthood come 17-fold higher risk of developing obesity. It was found that students who are "overweight" are more likely (1.8 times) (OR=1.8, $p<.05$) to belong to LSP2 "moderate/mixed" (±active/± screen), not having found significant results in the profiles exclusively "+screen", which is consistent with the reported by Must and colleagues (2007) who found no association between ST and changes in the percentage of fat mass. But the profile with more students with "overweight/obesity" after the LSP2 is LSP5 "risk" (-active/+screen), meeting the one reported by Janssen and colleagues (2004) and Sisson, Broyles, Baker and Katzmarzyk (2010). To be noted is the fact that the profiles "+active" (PA>5days/week) have more obese students, which may indicate that in the groups that are most socioeconomically favoured (which is the case in our sample), the families and/or students themselves recognize the importance of PA practice for weight control and obesity.

Profiles "+ active" have more life satisfaction

Çiviti and Çiviti (2009) reported that life satisfaction in adolescents is a good indicator of good social and psychological development. In our study, students that are "dissatisfied" with life are more likely to belong to LSP4 "passive" (-active/-screen (OR=0.3, $p<.05$), and in general profiles "+active" (PA>5 days/week) have more students satisfied with life, which is in agreement with that reported by Burgess, Grogan and Burwitz (2006), Debate, Zwald, Huberty and Zhang (2009) and Moreno, Cervelló and Moreno (2008) who found an association between more practice of PA and body satisfaction. Also Sharif and colleagues (2006) reported the existence of an association between ST and very low self-esteem. Rideout and colleagues (2010), in the U.S., reported that young people with more time using media have less personal satisfaction.

Profiles "+ active" have a better relationship with the family

Family plays a key role in the development of children and adolescents, influencing their education, socialization and health among other things (Camacho, 2011). The quality of communication between parents and children is key to balancing the development of young adolescents (Matos & Equipa do Aventura Social e Saúde, 2006). Moreover, good social relations with friends and family help to a healthy development of the adolescent (Wilkinson, 2010). In our study the LSP5 "risk" (-active/+ screen) is the profile where there are more students with a poor relationship with their family. This is a worrying fact, because they are in a profile with lack of PA and a lot of ST. The fact that there is not a good relationship with the family according to Hindelang, Dwyer and Leeming (2001) does not prevent other risky behaviours. In profiles "+active" (AF>5 days/week) there is a better relationship with the family.

Profiles "+ active" have more siblings

Profiles "-screen" (ST<3h/day) is where there are more families with only one child and profiles "+ active" (PA>5 days/week) there are more families with "3 or more children" which is in accordance with Raudsepp and Viira (2000) who found an influence of the siblings in the practice of PA.

Profiles "+ active" have fewer psychological symptoms

There is a contrast in extreme profiles. LSP1 "classic" (+active/-screen) students have fewer psychological symptoms (e.g., sad, depressed, etc.). And in LSP5 "risk" (-active/+screen) students have more psychological symptoms. In Profiles "+active" (PA>5days/week) students have fewer psychological symptoms which is in agreement with Babiss and Gangwisch (2009), Donaldson and Ronan (2006), Health and Human Services (2008) and Pan and colleagues (2009), specifically in the protection of depression, and also with Aranha and Teixeira (2007) and Biddle and colleagues (2004) and Piko and Keresztes (2006) regarding a better mental well-being.

Profiles "+active" are happier with the physical characteristics of the neighbourhood

There are 68.4% of students who reported being happy with the physical characteristics of the neighbourhood, which is a high value. The LSP5 "risk" (-active/+screen) is the profile with more students dissatisfied with or indifferent to the physical characteristics of the neighbourhood and students in profiles "+active" (PA>5days/week) are the most satisfied with the physical characteristics of the neighbourhood, which is in line with the reported by Whitehead, Biddle, O´Donovan and Nevill (2006), Evenson and colleagues (2006), Poltorak (2009) and Utter, Denny, Robinson, Ameratunga and Milfont (2011), regarding young people who say they are happy with the security, recreation spaces, traffic etc. (Duncan & Mummery, 2005; Norman et al., 2006; Schoeppe, Duncan, Badland, Oliver, & Curtis, 2013).

Profiles "+screen" like school less

Students in LSP1 "classic" (+active/-screen) like school the best and students in LSP5 "risk" (-active/+screen) the least. This result is consistent with that reported by Dollman, Norton and Norton (2005) who reported having found a positive association between school involvement and practice of PA. In profiles "+screen" (ST>5h/day) is where there are more students who dislike school. The reasons for this combination of results deserves, in our opinion, to be explored further in future studies.

Parents of profiles "+screen" know less about their children´s free time

It was found that 50% of parents know a lot about what their children do in their free time, which according to Camacho (2011) is a protective factor for risky behaviour and is related to wellness. Students whose parents do not know anything about what they do in their spare time (or do not have / see their parents) are more likely (8.4 times) (OR=8.4, $p<.05$) to belong to LSP5 "risk "(-active/+screen) than to LSP1 "classic"(+active/-screen). Profiles LSP "+ screen"(ST>5h/day) is where there are more parents who know little or nothing about their children´s free time. This result is consistent with the reported by Sharif and colleagues (2006) who refers that less ST during the week is associated with greater parental control, as well as the existence of rules to control screen time (Granich, Rosenberg, Knuiman, & Timperio, 2011; Verloigne, Van, Maes, & Brug, 2012).

Profiles "+screen" have more physical symptoms

It was found that students in profiles "+screen" (ST>5h/day) have more physical symptoms (headaches, backache etc.). The profile with more students with physical symptoms is "risk" LSP5 (-active/+screen). This result, regarding PA, goes along with that by Sollerhed, Andersson, and Ejlertsson (2013) and Sundblad and colleagues (2008), who found more complaints in inactive individuals. However, more specifically, students with fewer physical symptoms are more likely (3.2 times) to belong to "passive" LSP4 (-active/-screen) (OR=0.3, $p<.05$), this result can possibly be explained by the existence of some confusion with physical symptoms (being tired etc.) resulting from the practice of PA.

Different relationship between the Internet and the profiles

It was found that the profiles "+screen" (ST>5h/day) communicate more with friends through E&media and the Internet, play more online, create more relationships on the internet, are more dissatisfied when they do not use the internet, and decrease performance in school due to time spent on the Internet. More specifically, "classic" LSP1 (+active/-screen) is more likely to have students who rarely or never play online (OR=0.5, $p<.05$) and talk on the Internet (OR=0.4, $p<.05$ and OR=0.2, $p<.01$). These students have also been confirmed as likely to belong to LSP1 "classic" (+active/-screen) than the LSP3 "modern"

(+active/+screen) (OR=0.03, p<.01). It is noteworthy that, despite being in profiles "+screen" (ST>5h/day) students with some or much frequency, lower their school performance due to time spent on the Internet, which was also reported by Gentile and colleagues (1999) and Rideout and colleagues (2010). It is in LSP2 "moderate/mixed" (±active/±screen) that students are more likely to rarely lower their grades because of the time spent on the Internet, i.e., the moderation of one or both intakes (ST or PA) rarely causes lower school performance due to time spent on the Internet.

Conclusions

There are distinct profiles of PA practice and ST that in turn have different associated variables, which explains why different strategies should be used to promote healthy and appropriate LS to the different profiles. Technological consumption may or may not involve to be physically inactive, but the ST has the potential to replace the practice of PA. Hence the growing technological incentive policies boosted by the acquisition of technological means, must be accompanied by strategies to promote healthy lifestyles, especially for the promotion of time spent in PA practice.

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