VI Curso de Políticas y Programas para la Promoción de
Hábitos y Estilos de Vida Saludable

28 de septiembre al 1 de octubre de 2017. Bogotá, Colombia

Cómo utilizar los resultados de mediciones de actividad física en las intervenciones

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GPAQ
Grupo de Pesquisa em Atividade Física
e Qualidade de Vida

SCIENTIA, VITA ET FIDES
PUCPR

AGENDA

- Evaluación de la actividad física
- Por qué evaluar la actividad física?
- Cómo utilizar los datos?

Evaluación de actividad física

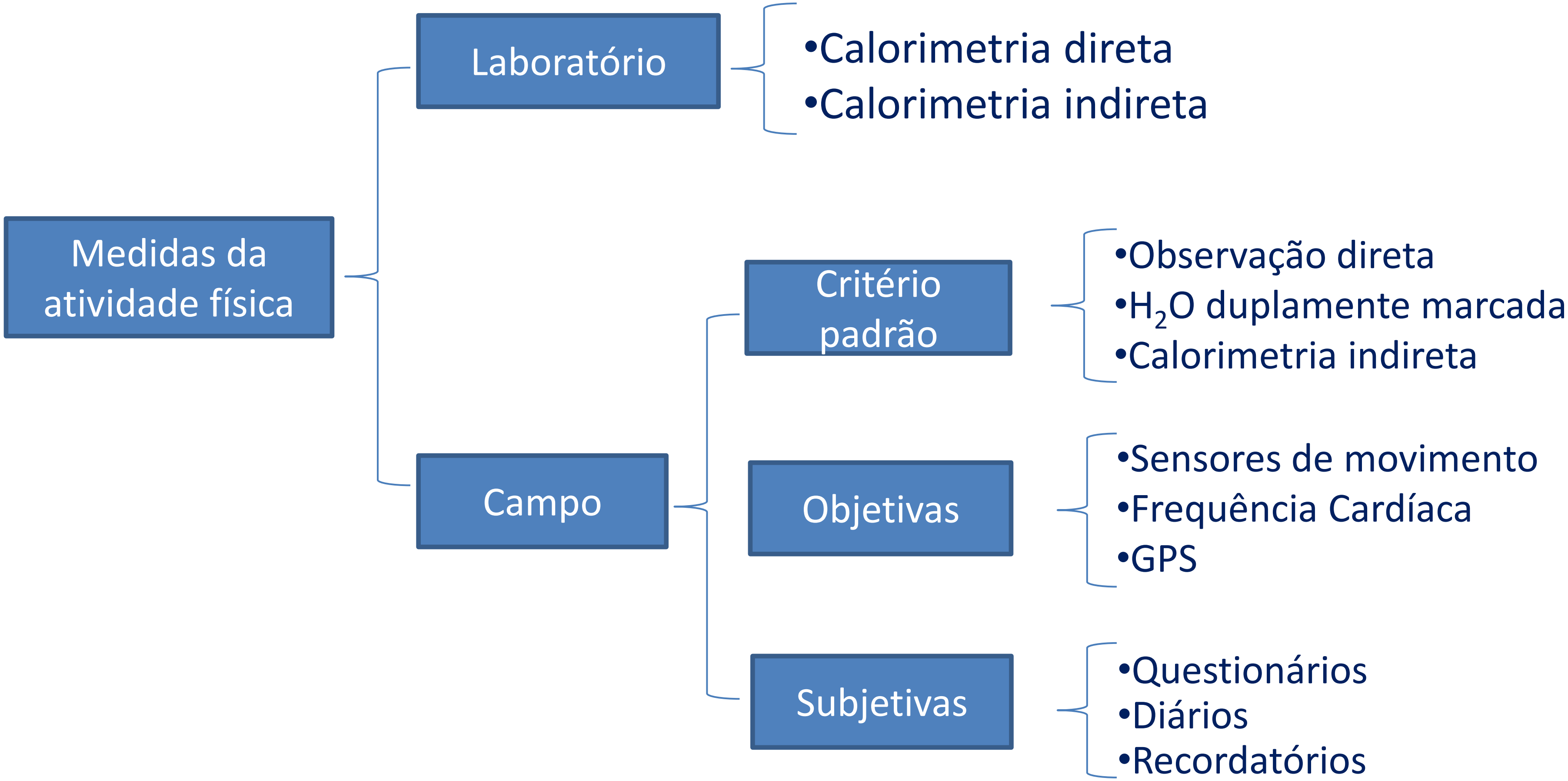
Contexto

- Tempo libre
- Desplazamiento
- Hogar
- Trabajo

Dimensiones

- Tipo
- Frecuencia
- Intensidad
- Duración

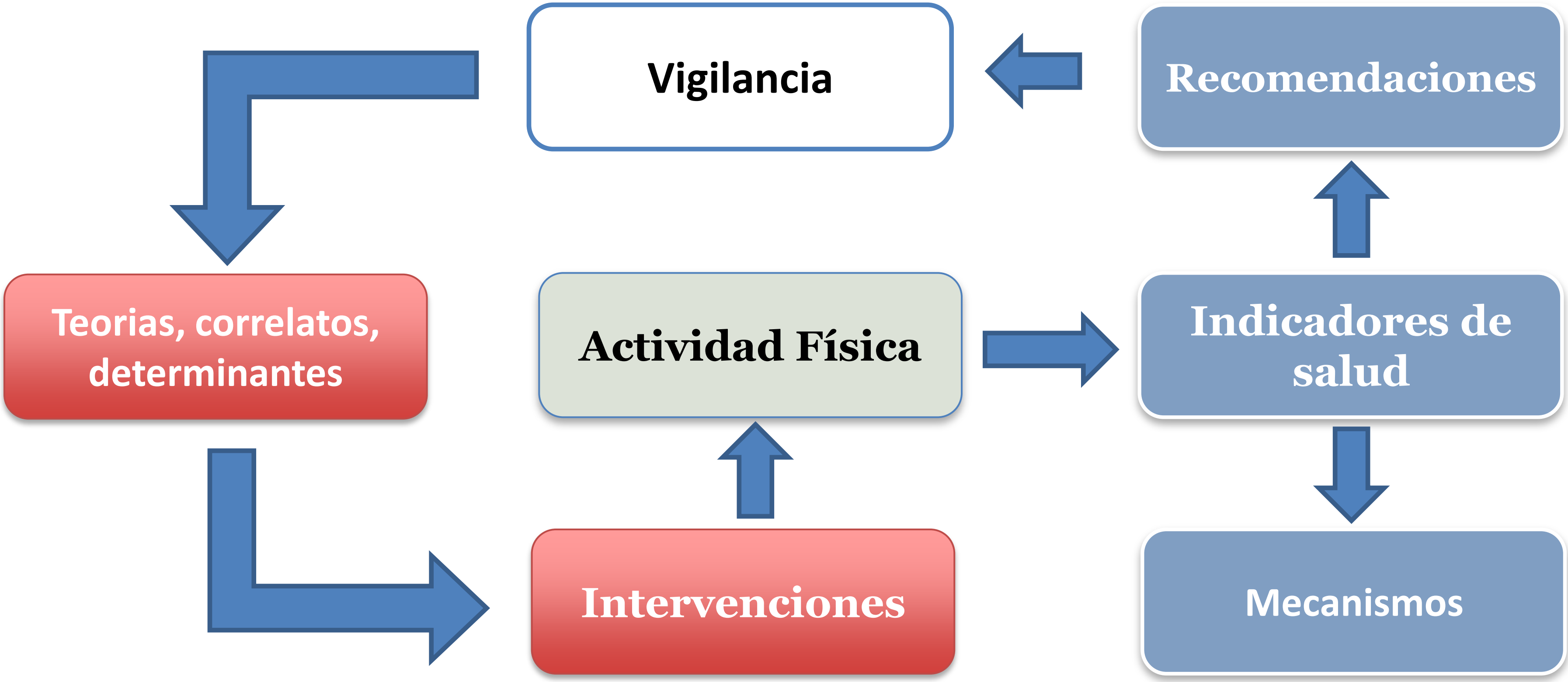
Evaluación de actividad física



Medidas da atividade física

- Laboratório
  - Calorimetria direta
  - Calorimetria indireta
- Campo
  - Critério padrão
    - Observação direta
    - H_2O duplamente marcada
    - Calorimetria indireta
  - Objetivas
    - Sensores de movimento
    - Frequência Cardíaca
    - GPS
  - Subjetivas
    - Questionários
    - Diários
    - Recordatórios

Por qué evaluar actividad física?



Vigilancia

Recomendaciones

Teorias, correlatos, determinantes

Actividad Física

Indicadores de salud

Intervenciones

Mecanismos

Cómo utilizar en el nível individual?

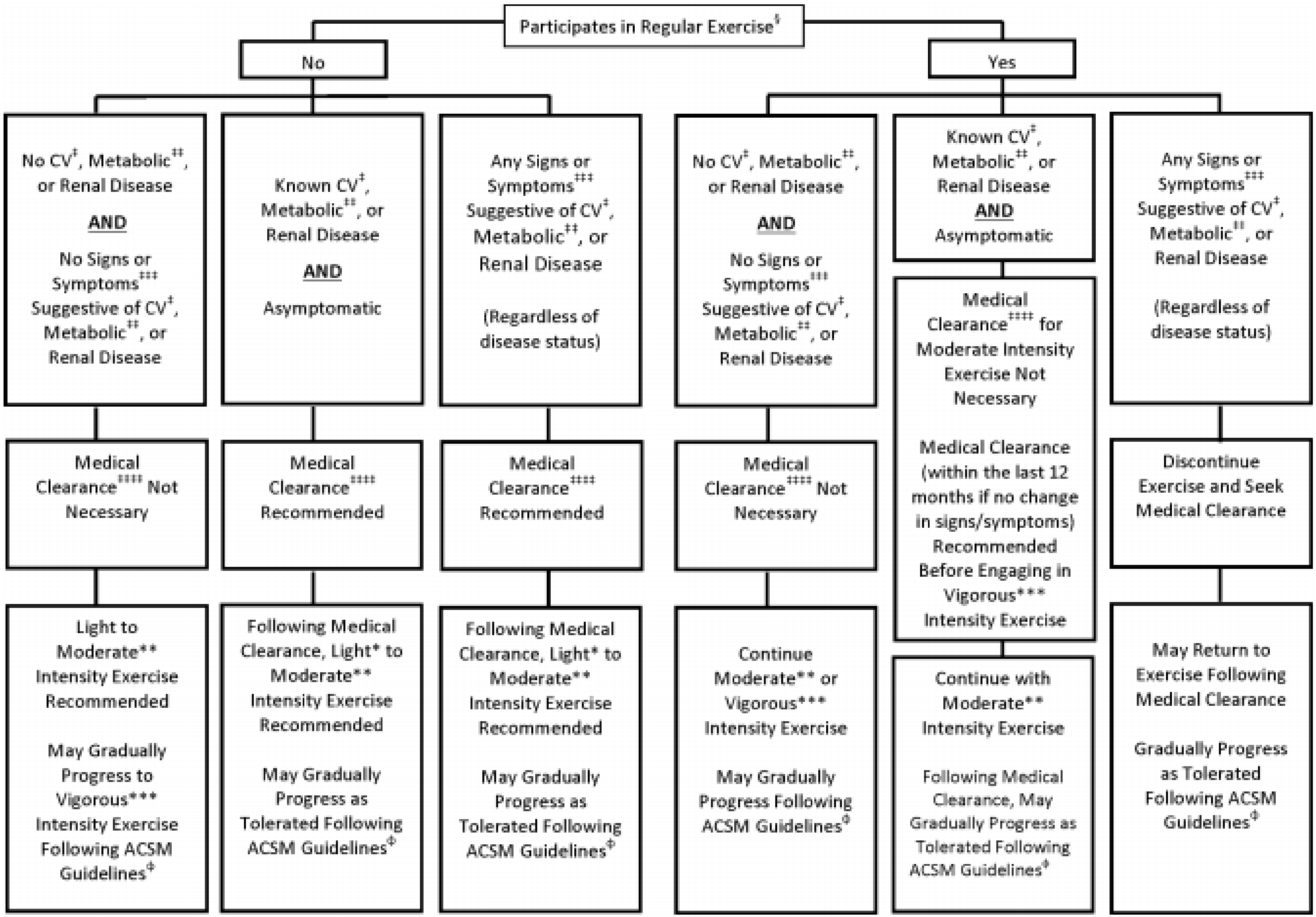
- *Baseline* de una intervención (prescripción)

- Contexto
  - Tempo libre
  - Desplazamiento
  - Hogar
  - Trabajo
- Dimensiones
  - Tipo
  - Frecuencia
  - Intensidad
  - Duración

Cómo utilizar los datos?

- Individual
- Pequeños grupos
- Comunidade
- Vigilancia

Cómo utilizar en el nível individual?



Participates in Regular Exercise[†]

No

Yes

No CV[‡], Metabolic[‡‡], or Renal Disease **AND** No Signs or Symptoms[‡‡‡] Suggestive of CV[‡], Metabolic[‡‡], or Renal Disease

Medical Clearance[‡‡‡‡] Not Necessary

Light to Moderate** Intensity Exercise Recommended

May Gradually Progress to Vigorous*** Intensity Exercise Following ACSM Guidelines[Φ]

Known CV[‡], Metabolic[‡‡], or Renal Disease **AND** Asymptomatic

Medical Clearance[‡‡‡‡] Recommended

Following Medical Clearance, Light* to Moderate** Intensity Exercise Recommended

May Gradually Progress as Tolerated Following ACSM Guidelines[Φ]

Any Signs or Symptoms[‡‡‡] Suggestive of CV[‡], Metabolic[‡‡], or Renal Disease

(Regardless of disease status)

Medical Clearance[‡‡‡‡] Recommended

Following Medical Clearance, Light* to Moderate** Intensity Exercise Recommended

May Gradually Progress as Tolerated Following ACSM Guidelines[Φ]

No CV[‡], Metabolic[‡‡], or Renal Disease **AND** No Signs or Symptoms[‡‡‡] Suggestive of CV[‡], Metabolic[‡‡], or Renal Disease

Medical Clearance[‡‡‡‡] Not Necessary

Continue Moderate** or Vigorous*** Intensity Exercise

May Gradually Progress Following ACSM Guidelines[Φ]

Known CV[‡], Metabolic[‡‡], or Renal Disease **AND** Asymptomatic

Medical Clearance[‡‡‡‡] for Moderate Intensity Exercise Not Necessary

Medical Clearance (within the last 12 months if no change in signs/symptoms) Recommended Before Engaging in Vigorous*** Intensity Exercise

Continue with Moderate** Intensity Exercise

Following Medical Clearance, May Gradually Progress as Tolerated Following ACSM Guidelines[Φ]

Any Signs or Symptoms[‡‡‡] Suggestive of CV[‡], Metabolic[‡‡], or Renal Disease

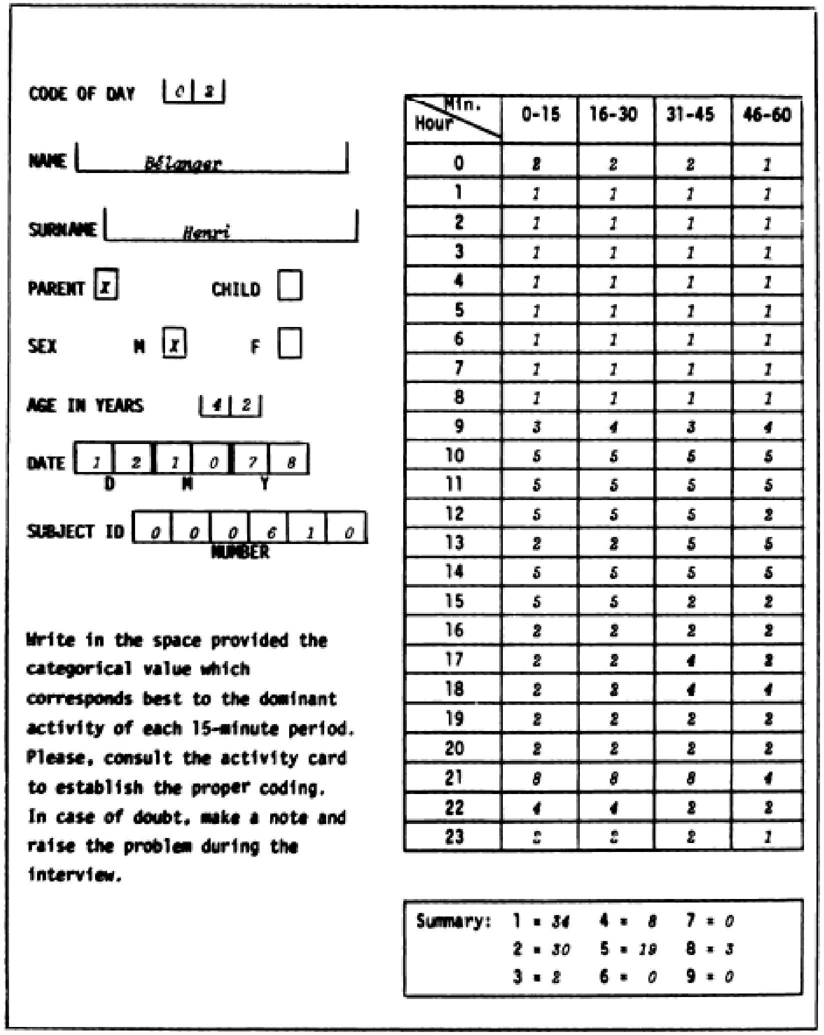
(Regardless of disease status)

Discontinue Exercise and Seek Medical Clearance

May Return to Exercise Following Medical Clearance

Gradually Progress as Tolerated Following ACSM Guidelines[Φ]

Cómo utilizar en el nível individual?



CODE OF DAY | 0 | 2 |

NAME Bélanger

SURNAME Henri

PARENT ☒ CHILD ☐

SEX M ☒ F ☐

AGE IN YEARS | 4 | 2 |

DATE | 1 | 2 | 1 | 0 | 7 | 8 |
D M Y

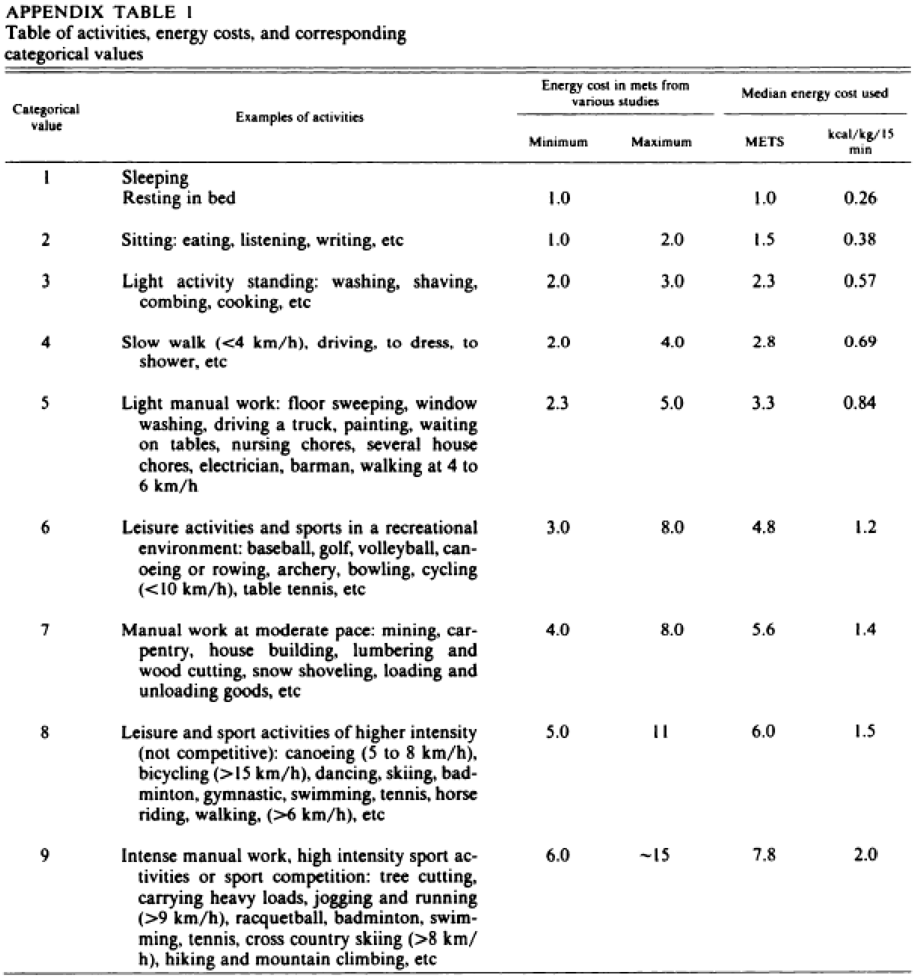
SUBJECT ID | 0 | 0 | 0 | 6 | 1 | 0 |
NUMBER

Write in the space provided the categorical value which corresponds best to the dominant activity of each 15-minute period. Please, consult the activity card to establish the proper coding. In case of doubt, make a note and raise the problem during the interview.

Min. / Hour	0-15	16-30	31-45	46-60
0	2	2	2	1
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	3	4	3	4
10	5	5	5	5
11	5	5	5	5
12	5	5	5	2
13	2	2	5	5
14	5	5	5	5
15	5	5	2	2
16	2	2	2	2
17	2	2	4	2
18	2	2	4	4
19	2	2	2	2
20	2	2	2	2
21	8	8	8	4
22	4	4	2	2
23	2	2	2	1

Summary:
1 = 34 4 = 8 7 = 0
2 = 30 5 = 19 8 = 3
3 = 2 6 = 0 9 = 0

APPENDIX FIG 1. Daily energy expenditure record.

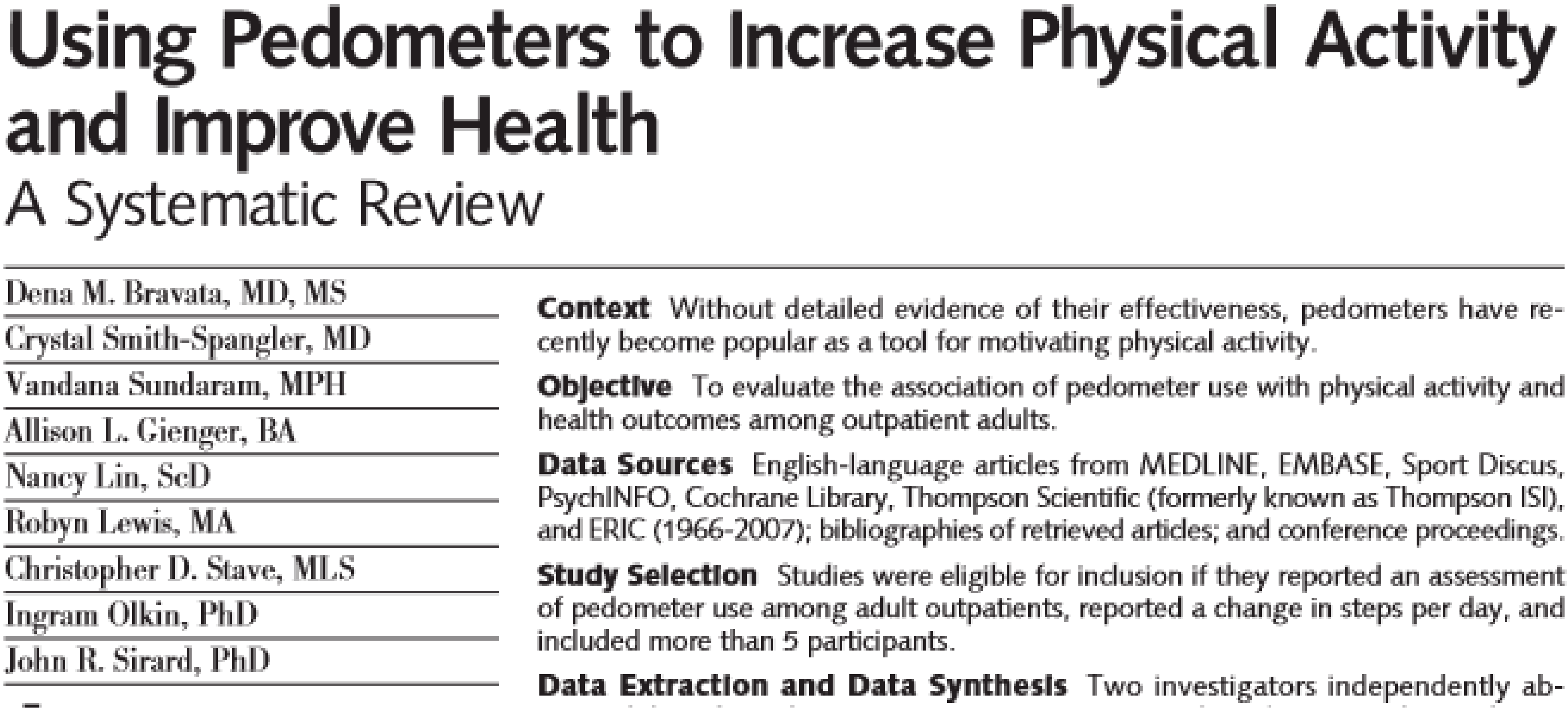


APPENDIX TABLE 1
Table of activities, energy costs, and corresponding categorical values

Categorical value	Examples of activities	Energy cost in mets from various studies		Median energy cost used	
		Minimum	Maximum	METS	kcal/kg/15 min
1	Sleeping Resting in bed	1.0		1.0	0.26
2	Sitting: eating, listening, writing, etc	1.0	2.0	1.5	0.38
3	Light activity standing: washing, shaving, combing, cooking, etc	2.0	3.0	2.3	0.57
4	Slow walk (<4 km/h), driving, to dress, to shower, etc	2.0	4.0	2.8	0.69
5	Light manual work: floor sweeping, window washing, driving a truck, painting, waiting on tables, nursing chores, several house chores, electrician, barman, walking at 4 to 6 km/h	2.3	5.0	3.3	0.84
6	Leisure activities and sports in a recreational environment: baseball, golf, volleyball, canoeing or rowing, archery, bowling, cycling (<10 km/h), table tennis, etc	3.0	8.0	4.8	1.2
7	Manual work at moderate pace: mining, carpentry, house building, lumbering and wood cutting, snow shoveling, loading and unloading goods, etc	4.0	8.0	5.6	1.4
8	Leisure and sport activities of higher intensity (not competitive): canoeing (5 to 8 km/h), bicycling (>15 km/h), dancing, skiing, badminton, gymnastic, swimming, tennis, horse riding, walking, (>6 km/h), etc	5.0	11	6.0	1.5
9	Intense manual work, high intensity sport activities or sport competition: tree cutting, carrying heavy loads, jogging and running (>9 km/h), racquetball, badminton, swimming, tennis, cross country skiing (>8 km/h), hiking and mountain climbing, etc	6.0	~15	7.8	2.0

Bouchard, C., et al., *A method to assess energy expenditure in children and adults. Am J Clin Nutr, 1983.* ***37(3): p. 461-7.***

Cómo utilizar en el nível individual?



Using Pedometers to Increase Physical Activity and Improve Health

A Systematic Review

Dena M. Bravata, MD, MS
Crystal Smith-Spangler, MD
Vandana Sundaram, MPH
Allison L. Gienger, BA
Nancy Lin, ScD
Robyn Lewis, MA
Christopher D. Stave, MLS
Ingram Olkin, PhD
John R. Sirard, PhD

Context Without detailed evidence of their effectiveness, pedometers have recently become popular as a tool for motivating physical activity.

Objective To evaluate the association of pedometer use with physical activity and health outcomes among outpatient adults.

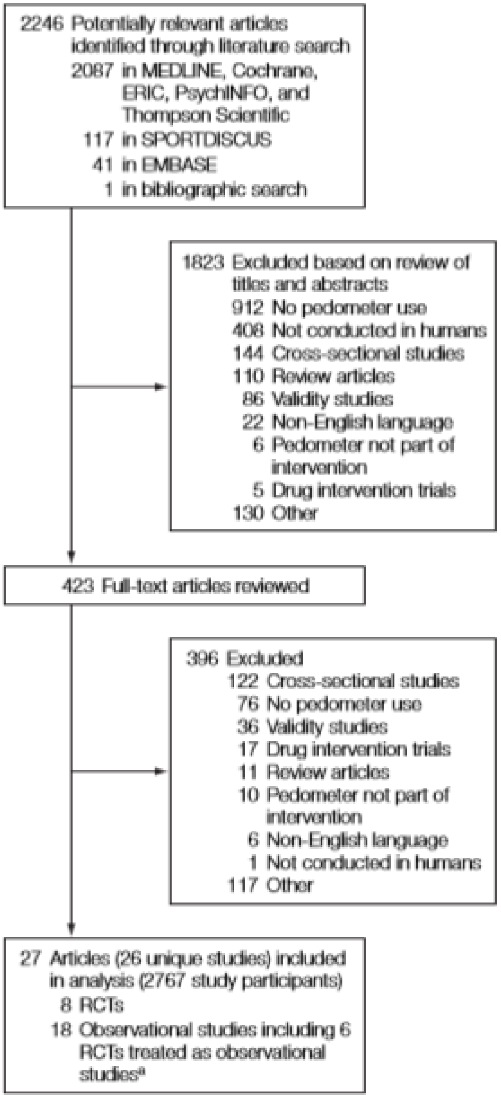
Data Sources English-language articles from MEDLINE, EMBASE, Sport Discus, PsychINFO, Cochrane Library, Thompson Scientific (formerly known as Thompson ISI), and ERIC (1966-2007); bibliographies of retrieved articles; and conference proceedings.

Study Selection Studies were eligible for inclusion if they reported an assessment of pedometer use among adult outpatients, reported a change in steps per day, and included more than 5 participants.

Data Extraction and Data Synthesis Two investigators independently ab-

Cómo utilizar en el nível individual?

Figure 1. Study Flow Diagram



2246 Potentially relevant articles identified through literature search
- 2087 in MEDLINE, Cochrane, ERIC, PsychINFO, and Thompson Scientific
- 117 in SPORTDISCUS
- 41 in EMBASE
- 1 in bibliographic search

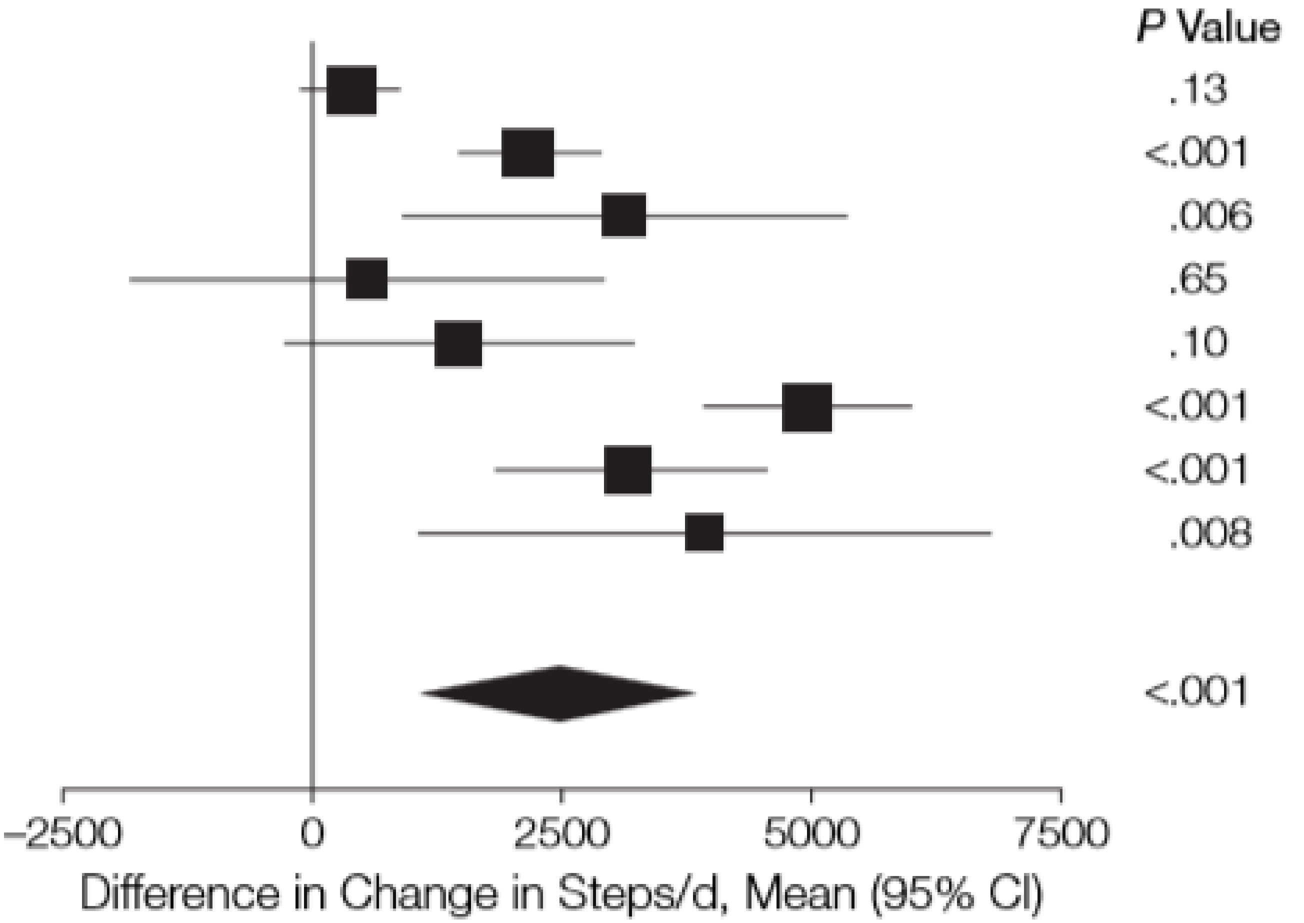
1823 Excluded based on review of titles and abstracts
- 912 No pedometer use
- 408 Not conducted in humans
- 144 Cross-sectional studies
- 110 Review articles
- 86 Validity studies
- 22 Non-English language
- 6 Pedometer not part of intervention
- 5 Drug intervention trials
- 130 Other

423 Full-text articles reviewed

396 Excluded
- 122 Cross-sectional studies
- 76 No pedometer use
- 36 Validity studies
- 17 Drug intervention trials
- 11 Review articles
- 10 Pedometer not part of intervention
- 6 Non-English language
- 1 Not conducted in humans
- 117 Other

27 Articles (26 unique studies) included in analysis (2767 study participants)
- 8 RCTs
- 18 Observational studies including 6 RCTs treated as observational studies[a]

Increase in Physical Activity Among Participants Randomly Assigned to Pedometer Interventions vs Control Participants



Cómo utilizar en el nível individual?

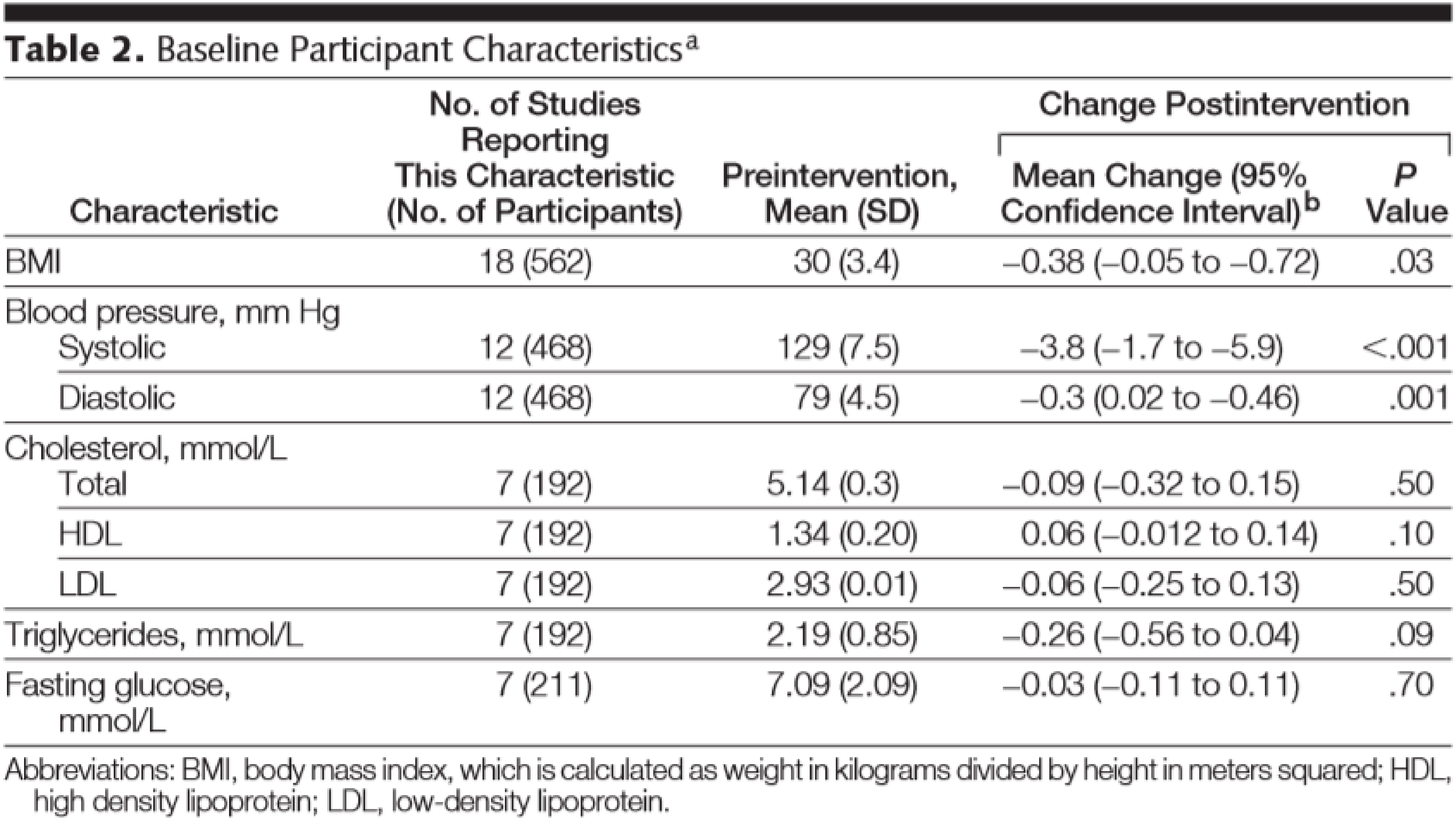


Table 2. Baseline Participant Characteristics[a]

Characteristic	No. of Studies Reporting This Characteristic (No. of Participants)	Preintervention, Mean (SD)	Change Postintervention	
			Mean Change (95% Confidence Interval)[b]	*P* Value
BMI	18 (562)	30 (3.4)	–0.38 (–0.05 to –0.72)	.03
Blood pressure, mm Hg				
Systolic	12 (468)	129 (7.5)	–3.8 (–1.7 to –5.9)	<.001
Diastolic	12 (468)	79 (4.5)	–0.3 (0.02 to –0.46)	.001
Cholesterol, mmol/L				
Total	7 (192)	5.14 (0.3)	–0.09 (–0.32 to 0.15)	.50
HDL	7 (192)	1.34 (0.20)	0.06 (–0.012 to 0.14)	.10
LDL	7 (192)	2.93 (0.01)	–0.06 (–0.25 to 0.13)	.50
Triglycerides, mmol/L	7 (192)	2.19 (0.85)	–0.26 (–0.56 to 0.04)	.09
Fasting glucose, mmol/L	7 (211)	7.09 (2.09)	–0.03 (–0.11 to 0.11)	.70

Abbreviations: BMI, body mass index, which is calculated as weight in kilograms divided by height in meters squared; HDL, high density lipoprotein; LDL, low-density lipoprotein.

Cómo utilizar en el nível individual?

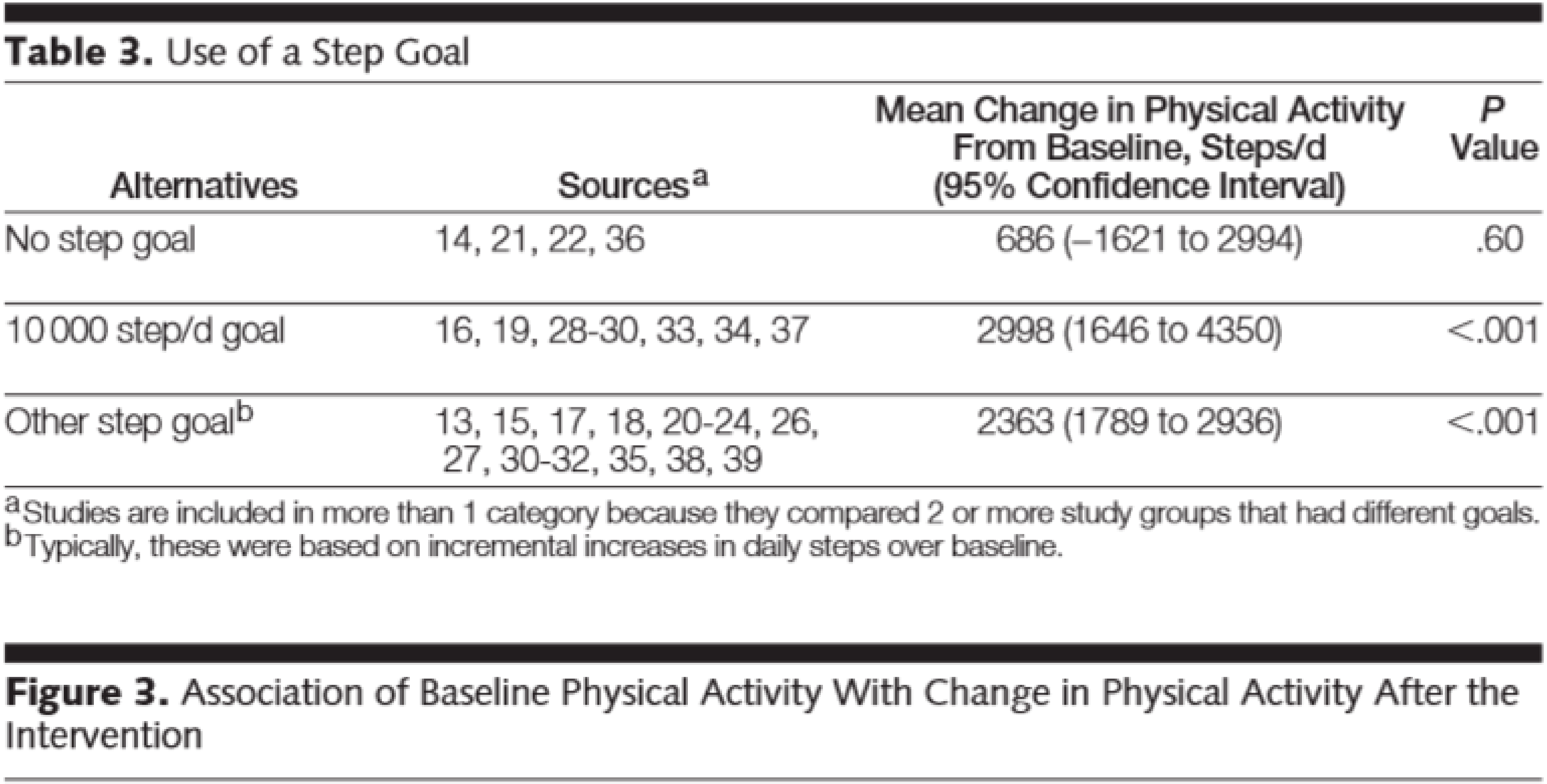


Table 3. Use of a Step Goal

Alternatives	Sources[a]	Mean Change in Physical Activity From Baseline, Steps/d (95% Confidence Interval)	*P* Value
No step goal	14, 21, 22, 36	686 (−1621 to 2994)	.60
10 000 step/d goal	16, 19, 28-30, 33, 34, 37	2998 (1646 to 4350)	<.001
Other step goal[b]	13, 15, 17, 18, 20-24, 26, 27, 30-32, 35, 38, 39	2363 (1789 to 2936)	<.001

[a] Studies are included in more than 1 category because they compared 2 or more study groups that had different goals.

[b] Typically, these were based on incremental increases in daily steps over baseline.

Figure 3. Association of Baseline Physical Activity With Change in Physical Activity After the Intervention

Cómo utilizar en el nível individual?

BJSM

Effortless activity tracking with Google Fit

Paolo Menaspà

Br J Sports Med published online September 10, 2015

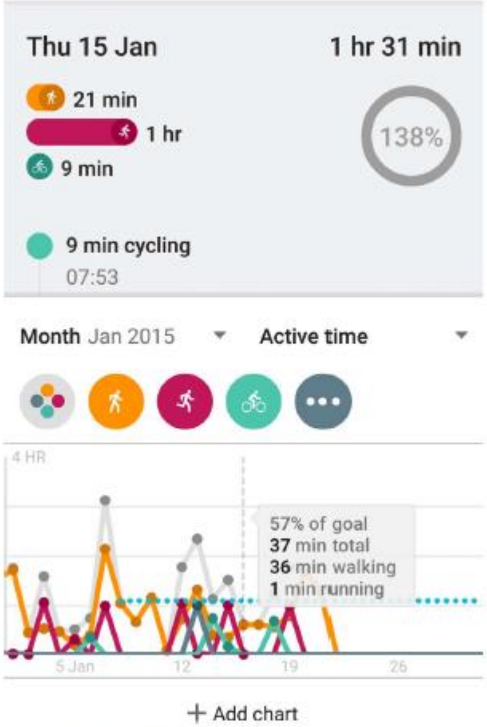

Thu 15 Jan
1 hr 31 min
21 min
1 hr
9 min
138%
9 min cycling
07:53
Month Jan 2015
Active time
4 HR
57% of goal
37 min total
36 min walking
1 min running
5 Jan
12
19
26
+ Add chart

Figure 1 Google Fit app.

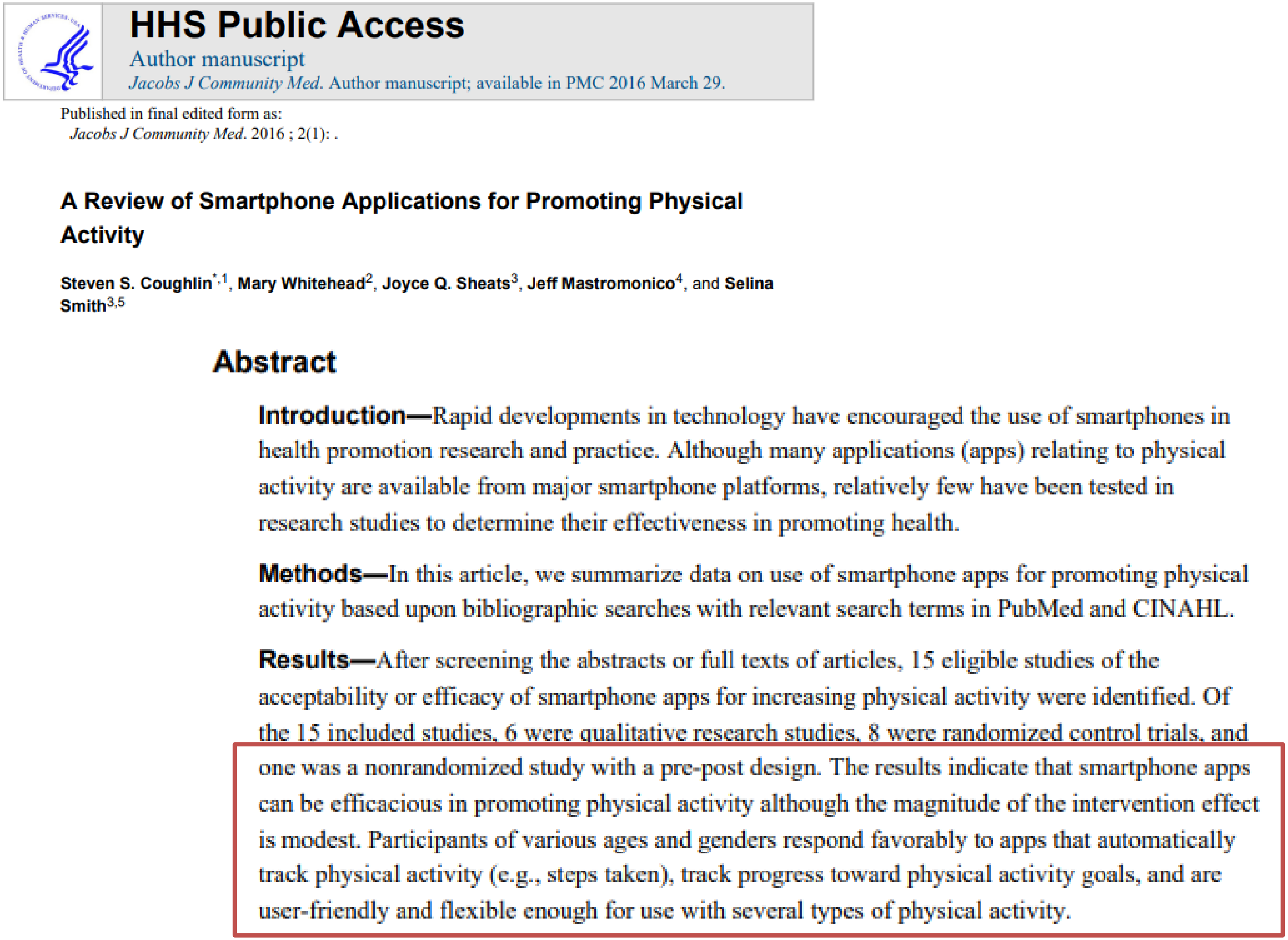
PROS

- Automatically tracks walking, running and cycling
- Ease of use
- Estimates the caloric expenditure
- Allows personalised goal setting (ie, duration or steps)
- Allows to connect to third-party devices and apps
- Data are accessible from tablets and web site

CONS

- Accuracy of data unknown
- For effortless tracking the phone must be carried all the time (however, activities can be manually inserted)
- In case it makes a mistake in recognising an activity, it is not possible to delete it (although it is possible to edit it or hide it from the timeline).
- The high accuracy mode (distance) reduces the battery life.

Cómo utilizar en el nível individual?



HHS Public Access

Author manuscript

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Published in final edited form as:
Jacobs J Community Med. 2016 ; 2(1): .

A Review of Smartphone Applications for Promoting Physical Activity

Steven S. Coughlin[*,1], **Mary Whitehead**[2], **Joyce Q. Sheats**[3], **Jeff Mastromonico**[4], and **Selina Smith**[3,5]

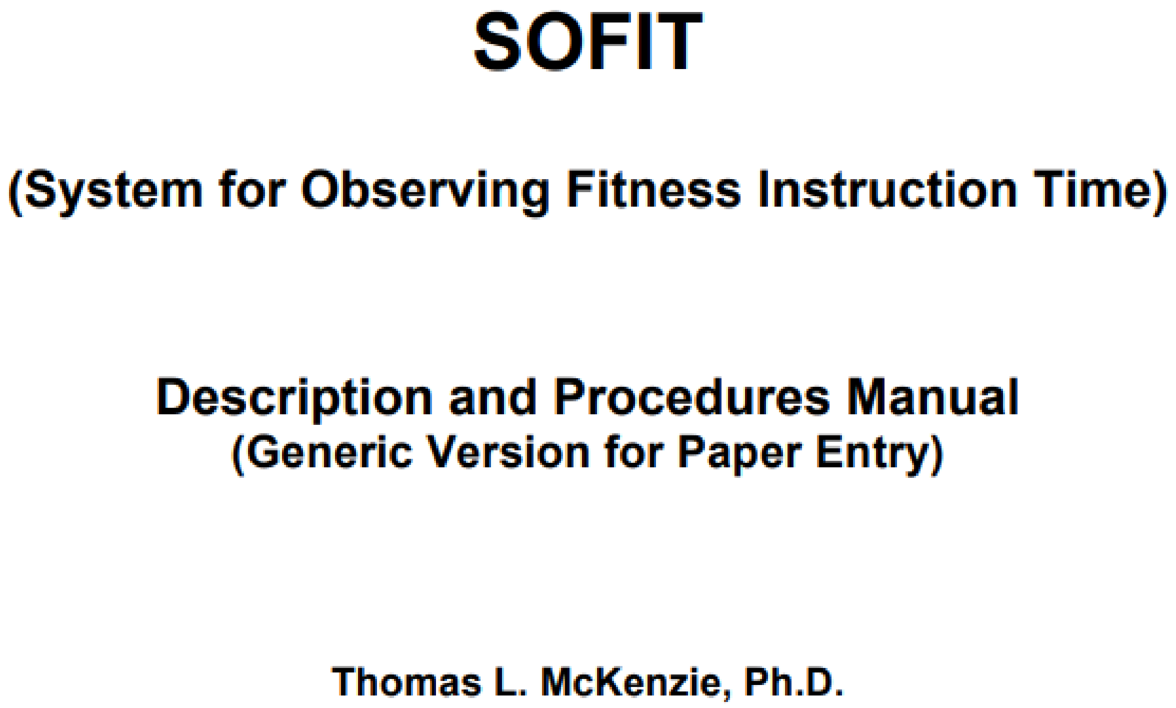
Abstract

Introduction—Rapid developments in technology have encouraged the use of smartphones in health promotion research and practice. Although many applications (apps) relating to physical activity are available from major smartphone platforms, relatively few have been tested in research studies to determine their effectiveness in promoting health.

Methods—In this article, we summarize data on use of smartphone apps for promoting physical activity based upon bibliographic searches with relevant search terms in PubMed and CINAHL.

Results—After screening the abstracts or full texts of articles, 15 eligible studies of the acceptability or efficacy of smartphone apps for increasing physical activity were identified. Of the 15 included studies, 6 were qualitative research studies, 8 were randomized control trials, and one was a nonrandomized study with a pre-post design. The results indicate that smartphone apps can be efficacious in promoting physical activity although the magnitude of the intervention effect is modest. Participants of various ages and genders respond favorably to apps that automatically track physical activity (e.g., steps taken), track progress toward physical activity goals, and are user-friendly and flexible enough for use with several types of physical activity.

Cómo utilizar en pequeños grupos?



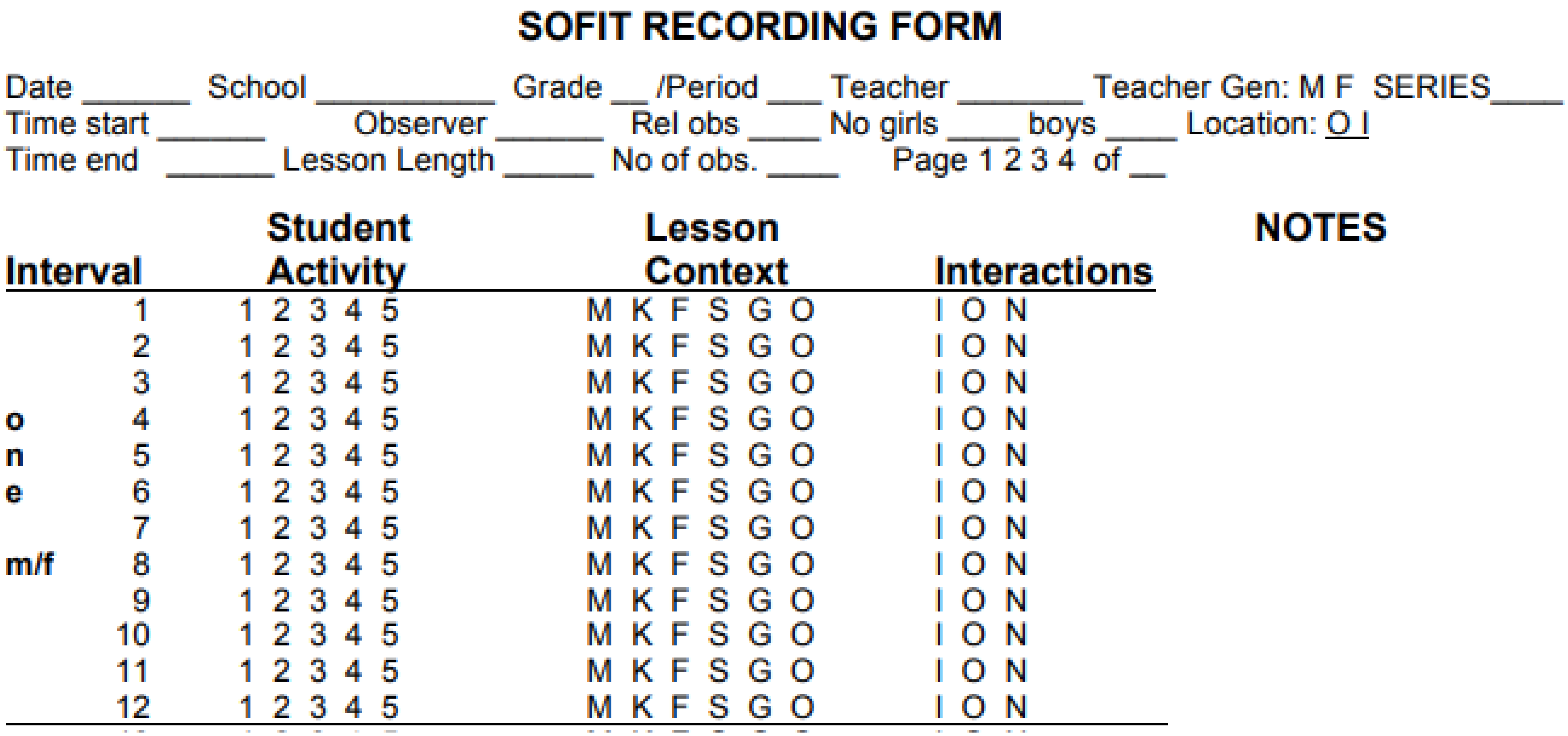
SOFIT

(System for Observing Fitness Instruction Time)

Description and Procedures Manual
(Generic Version for Paper Entry)

Thomas L. McKenzie, Ph.D.

Cómo utilizar en pequeños grupos?

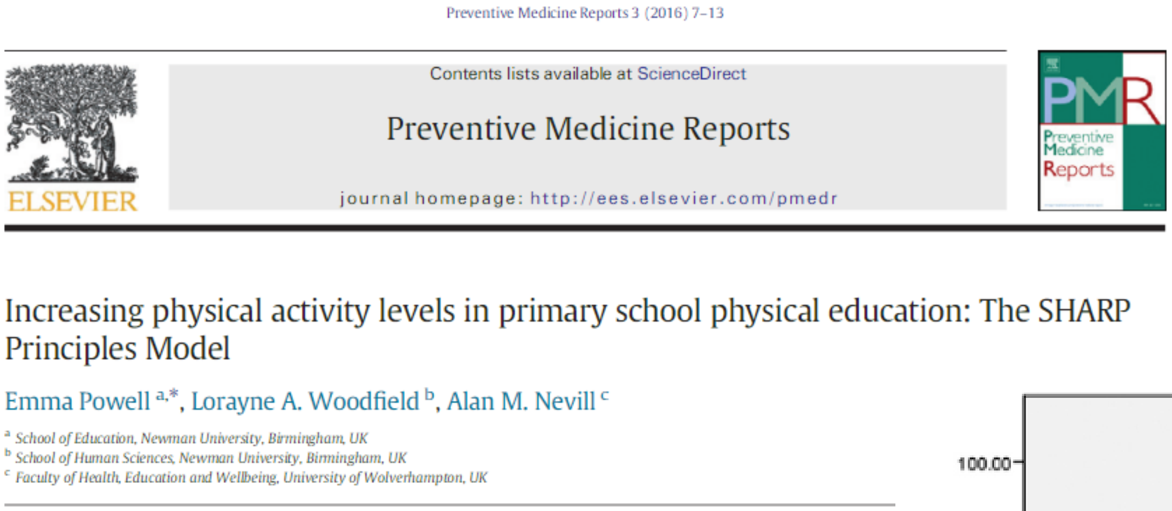


SOFIT RECORDING FORM

Date ______ School __________ Grade __ /Period ___ Teacher _______ Teacher Gen: M F SERIES____
Time start ______ Observer ______ Rel obs ____ No girls ____ boys ____ Location: O I
Time end ______ Lesson Length _____ No of obs. ____ Page 1 2 3 4 of __

Interval		Student Activity	Lesson Context	Interactions	NOTES
	1	1 2 3 4 5	M K F S G O	I O N	
	2	1 2 3 4 5	M K F S G O	I O N	
	3	1 2 3 4 5	M K F S G O	I O N	
o	4	1 2 3 4 5	M K F S G O	I O N	
n	5	1 2 3 4 5	M K F S G O	I O N	
e	6	1 2 3 4 5	M K F S G O	I O N	
	7	1 2 3 4 5	M K F S G O	I O N	
m/f	8	1 2 3 4 5	M K F S G O	I O N	
	9	1 2 3 4 5	M K F S G O	I O N	
	10	1 2 3 4 5	M K F S G O	I O N	
	11	1 2 3 4 5	M K F S G O	I O N	
	12	1 2 3 4 5	M K F S G O	I O N	

Cómo utilizar en pequeños grupos?



Preventive Medicine Reports 3 (2016) 7–13

Contents lists available at ScienceDirect

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journal homepage: http://ees.elsevier.com/pmedr

Increasing physical activity levels in primary school physical education: The SHARP Principles Model

Emma Powell [a,*], Lorayne A. Woodfield [b], Alan M. Nevill [c]

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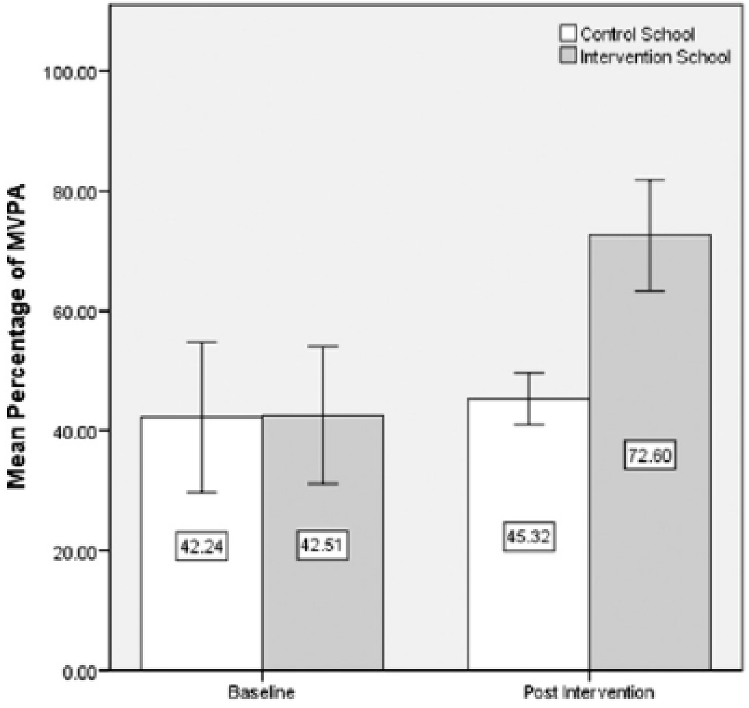


Fig. 2. Mean percentage of time children engaged in MVPA at baseline and post-intervention.

Cómo utilizar en pequeños grupos?

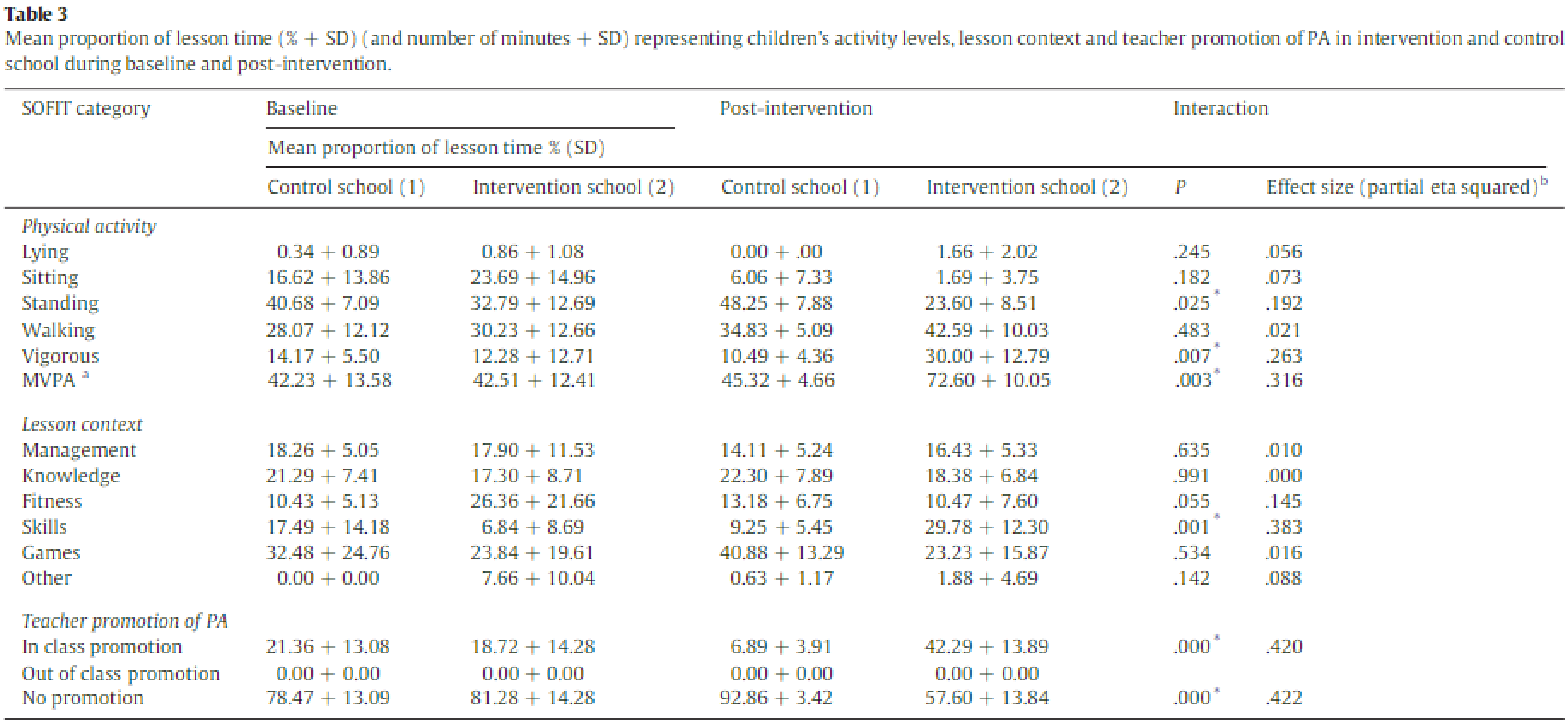
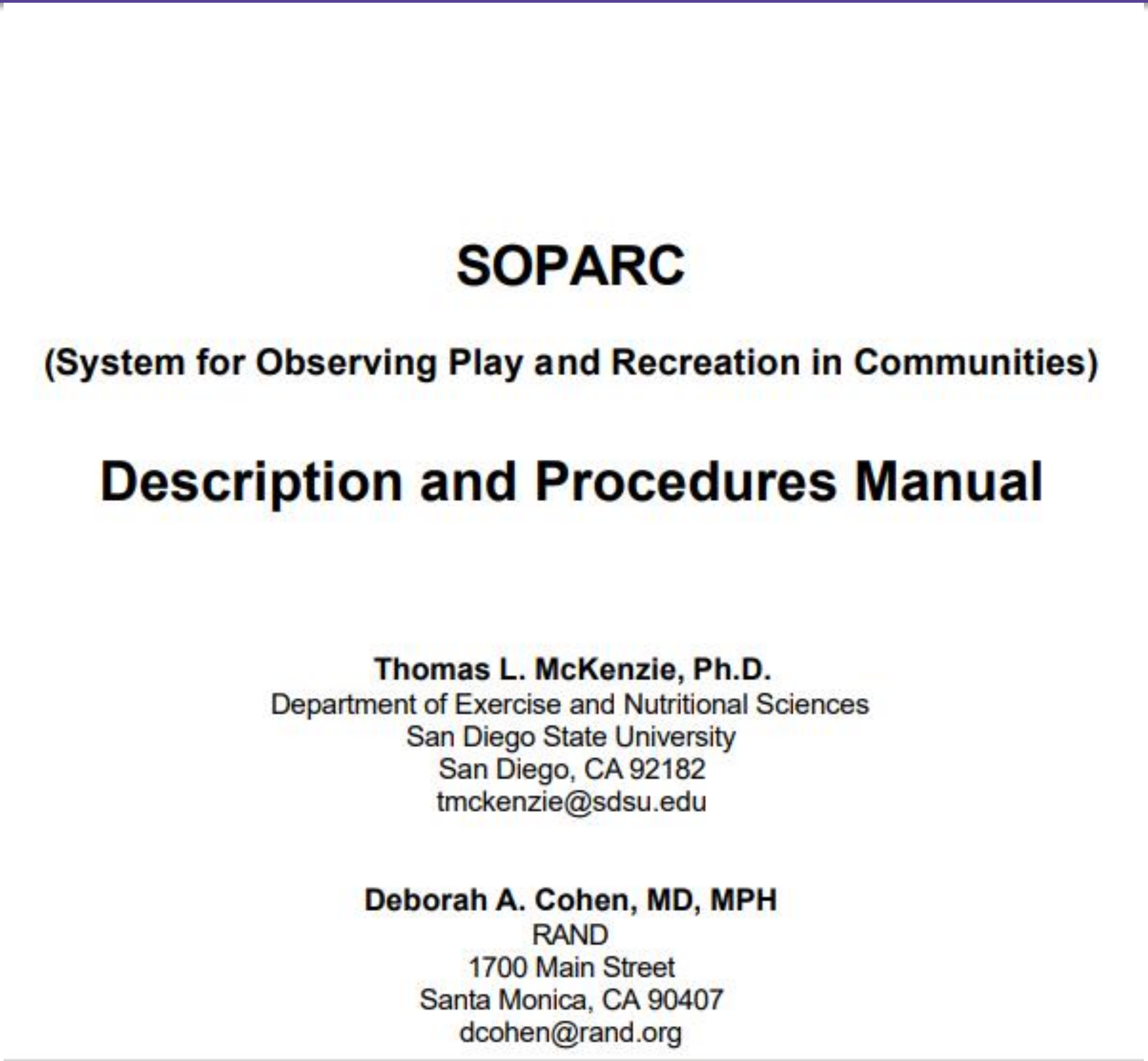


Table 3
Mean proportion of lesson time (% + SD) (and number of minutes + SD) representing children's activity levels, lesson context and teacher promotion of PA in intervention and control school during baseline and post-intervention.

SOFIT category	Baseline		Post-intervention		Interaction	
	Mean proportion of lesson time % (SD)					
	Control school (1)	Intervention school (2)	Control school (1)	Intervention school (2)	*P*	Effect size (partial eta squared)[b]
Physical activity						
Lying	0.34 + 0.89	0.86 + 1.08	0.00 + .00	1.66 + 2.02	.245	.056
Sitting	16.62 + 13.86	23.69 + 14.96	6.06 + 7.33	1.69 + 3.75	.182	.073
Standing	40.68 + 7.09	32.79 + 12.69	48.25 + 7.88	23.60 + 8.51	.025*	.192
Walking	28.07 + 12.12	30.23 + 12.66	34.83 + 5.09	42.59 + 10.03	.483	.021
Vigorous	14.17 + 5.50	12.28 + 12.71	10.49 + 4.36	30.00 + 12.79	.007*	.263
MVPA[a]	42.23 + 13.58	42.51 + 12.41	45.32 + 4.66	72.60 + 10.05	.003*	.316
Lesson context						
Management	18.26 + 5.05	17.90 + 11.53	14.11 + 5.24	16.43 + 5.33	.635	.010
Knowledge	21.29 + 7.41	17.30 + 8.71	22.30 + 7.89	18.38 + 6.84	.991	.000
Fitness	10.43 + 5.13	26.36 + 21.66	13.18 + 6.75	10.47 + 7.60	.055	.145
Skills	17.49 + 14.18	6.84 + 8.69	9.25 + 5.45	29.78 + 12.30	.001*	.383
Games	32.48 + 24.76	23.84 + 19.61	40.88 + 13.29	23.23 + 15.87	.534	.016
Other	0.00 + 0.00	7.66 + 10.04	0.63 + 1.17	1.88 + 4.69	.142	.088
Teacher promotion of PA						
In class promotion	21.36 + 13.08	18.72 + 14.28	6.89 + 3.91	42.29 + 13.89	.000*	.420
Out of class promotion	0.00 + 0.00	0.00 + 0.00	0.00 + 0.00	0.00 + 0.00		
No promotion	78.47 + 13.09	81.28 + 14.28	92.86 + 3.42	57.60 + 13.84	.000*	.422

Cómo utilizar en nível comunitário?



SOPARC

(System for Observing Play and Recreation in Communities)

Description and Procedures Manual

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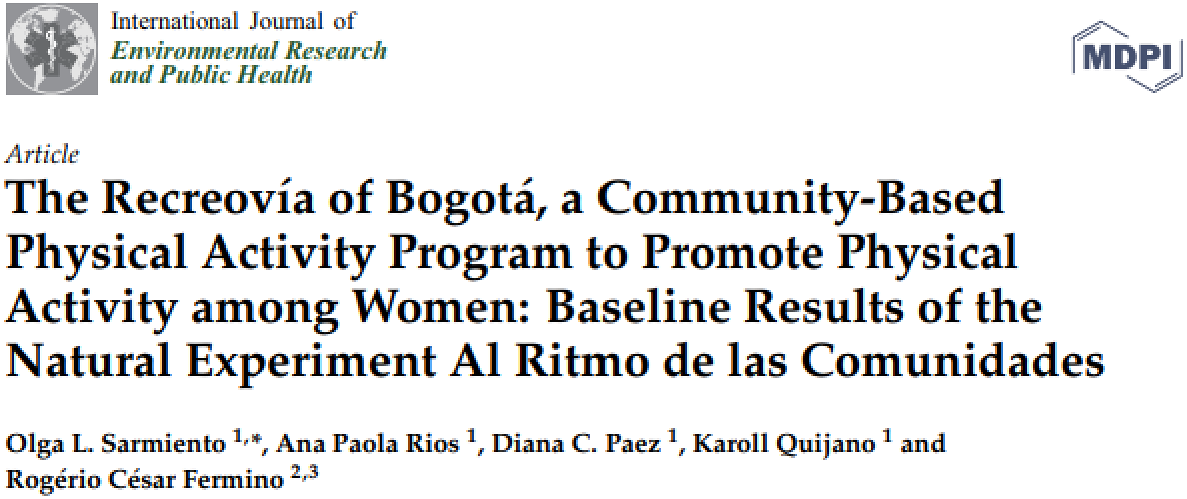
Cómo utilizar en nível comunitário?



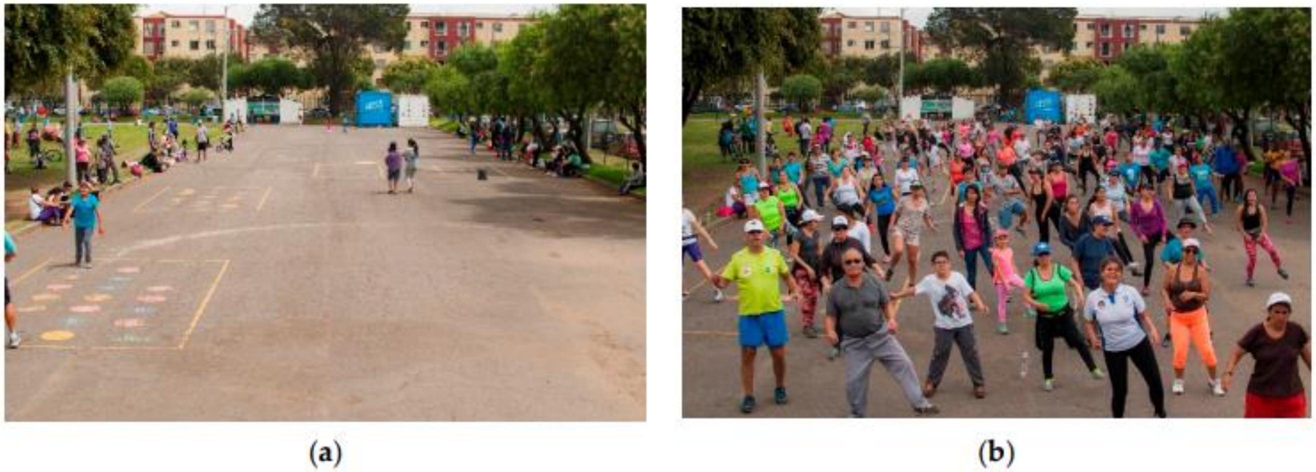
International Journal of
Environmental Research and Public Health

MDPI

Article

The Recreovía of Bogotá, a Community-Based Physical Activity Program to Promote Physical Activity among Women: Baseline Results of the Natural Experiment Al Ritmo de las Comunidades

Olga L. Sarmiento [1,*], Ana Paola Rios [1], Diana C. Paez [1], Karoll Quijano [1] and Rogério César Fermino [2,3]



(a) (b)

Figure 1. (**a**) Target area in a park without the Recreovía program and; (**b**) The same park target area with the Recreovía program. The park is located in a low-income neighborhood. Photo by Karoll Quijano.

Cómo utilizar en nível comunitário?

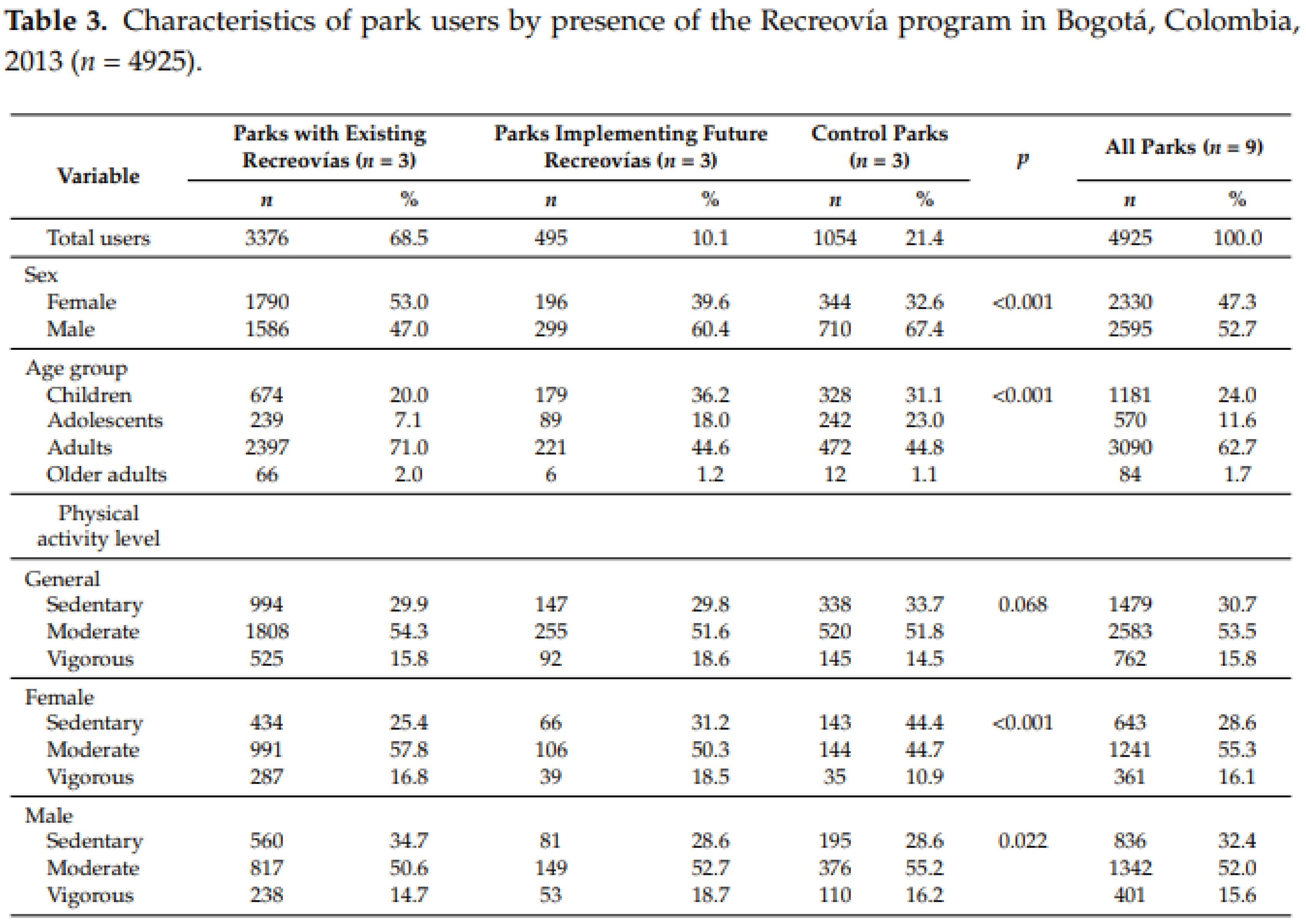
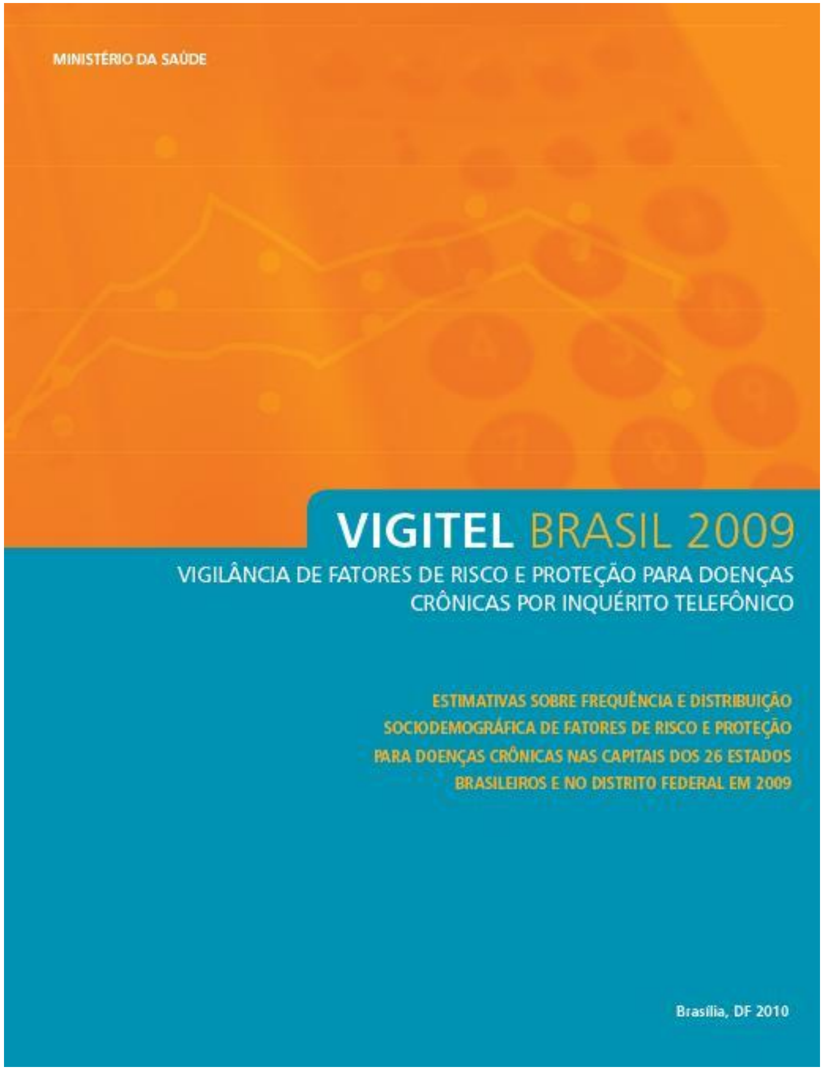


Table 3. Characteristics of park users by presence of the Recreovía program in Bogotá, Colombia, 2013 (n = 4925).

Variable	Parks with Existing Recreovías (n = 3)		Parks Implementing Future Recreovías (n = 3)		Control Parks (n = 3)		p	All Parks (n = 9)	
	n	%	n	%	n	%		n	%
Total users	3376	68.5	495	10.1	1054	21.4		4925	100.0
Sex									
Female	1790	53.0	196	39.6	344	32.6	<0.001	2330	47.3
Male	1586	47.0	299	60.4	710	67.4		2595	52.7
Age group									
Children	674	20.0	179	36.2	328	31.1	<0.001	1181	24.0
Adolescents	239	7.1	89	18.0	242	23.0		570	11.6
Adults	2397	71.0	221	44.6	472	44.8		3090	62.7
Older adults	66	2.0	6	1.2	12	1.1		84	1.7
Physical activity level									
General									
Sedentary	994	29.9	147	29.8	338	33.7	0.068	1479	30.7
Moderate	1808	54.3	255	51.6	520	51.8		2583	53.5
Vigorous	525	15.8	92	18.6	145	14.5		762	15.8
Female									
Sedentary	434	25.4	66	31.2	143	44.4	<0.001	643	28.6
Moderate	991	57.8	106	50.3	144	44.7		1241	55.3
Vigorous	287	16.8	39	18.5	35	10.9		361	16.1
Male									
Sedentary	560	34.7	81	28.6	195	28.6	0.022	836	32.4
Moderate	817	50.6	149	52.7	376	55.2		1342	52.0
Vigorous	238	14.7	53	18.7	110	16.2		401	15.6

Cómo utilizar en vigilancia?



MINISTÉRIO DA SAÚDE

VIGITEL BRASIL 2009

VIGILÂNCIA DE FATORES DE RISCO E PROTEÇÃO PARA DOENÇAS CRÔNICAS POR INQUÉRITO TELEFÔNICO

ESTIMATIVAS SOBRE FREQUÊNCIA E DISTRIBUIÇÃO SOCIODEMOGRÁFICA DE FATORES DE RISCO E PROTEÇÃO PARA DOENÇAS CRÔNICAS NAS CAPITAIS DOS 26 ESTADOS BRASILEIROS E NO DISTRITO FEDERAL EM 2009

Brasília, DF 2010

Cómo utilizar en vigilancia?

Mielke *et al. International Journal of Behavioral Nutrition and Physical Activity* 2014, **11**:101
http://www.ijbnpa.org/content/11/1/101

International Journal of Behavioral Nutrition and Physical Activity

RESEARCH **Open Access**

Time trends of physical activity and television viewing time in Brazil: 2006-2012

Grégore I Mielke[1*], Pedro C Hallal[1], Deborah C Malta[2] and I-Min Lee[3]

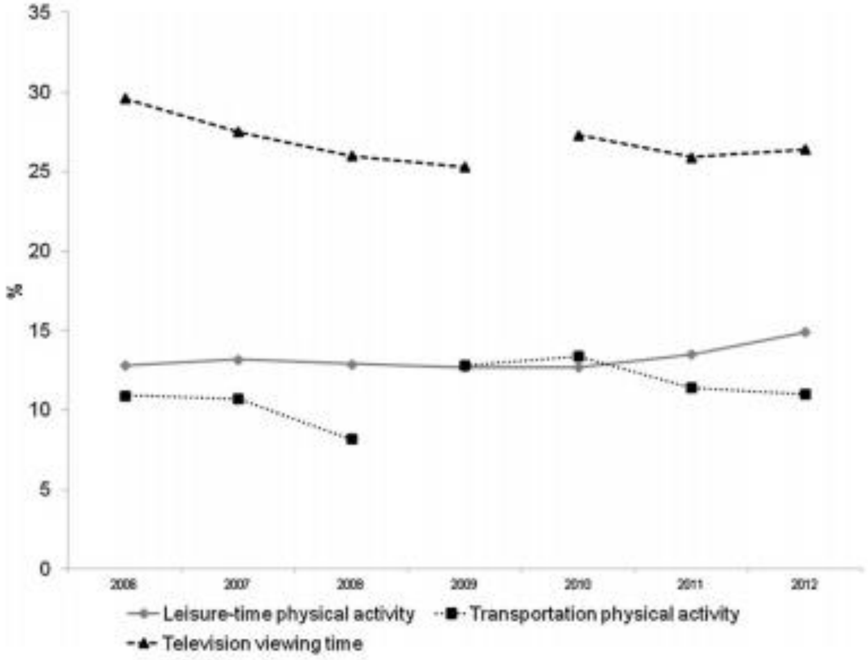


Figure 1 Time trends in leisure-time and transportation physical activity and television viewing time. Brazil 2006-2012. a-The lines for transportation physical activity and television viewing time are not continuous, with the breaks indicating the year in which minor changes occurred in the wording of questions related to each variables; b-Leisure time physical activity: practicing sports and/or exercise on at least five days per week for at least 30 minutes each day; c-Transportation physical activity: walk or bicycle from/ to work at least 30 minutes per day; d-watching television more than three hours per day.

Cómo utilizar en vigilancia?

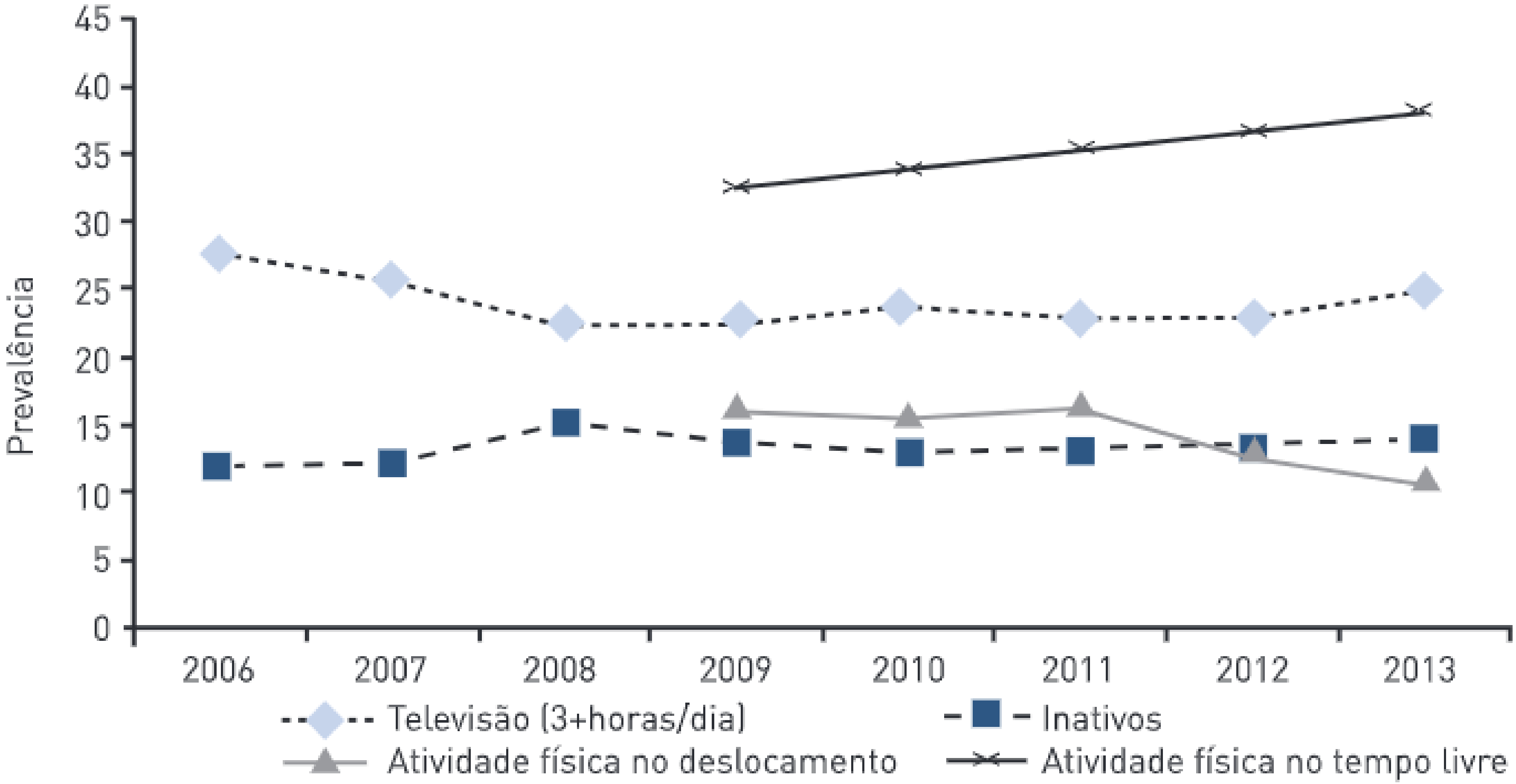


FIGURA 1 – Tendências temporais de atividade física e comportamento sedentário, nas capitais da Região Sul do Brasil, entre 2006 e 2013.

Cómo utilizar en vigilancia?

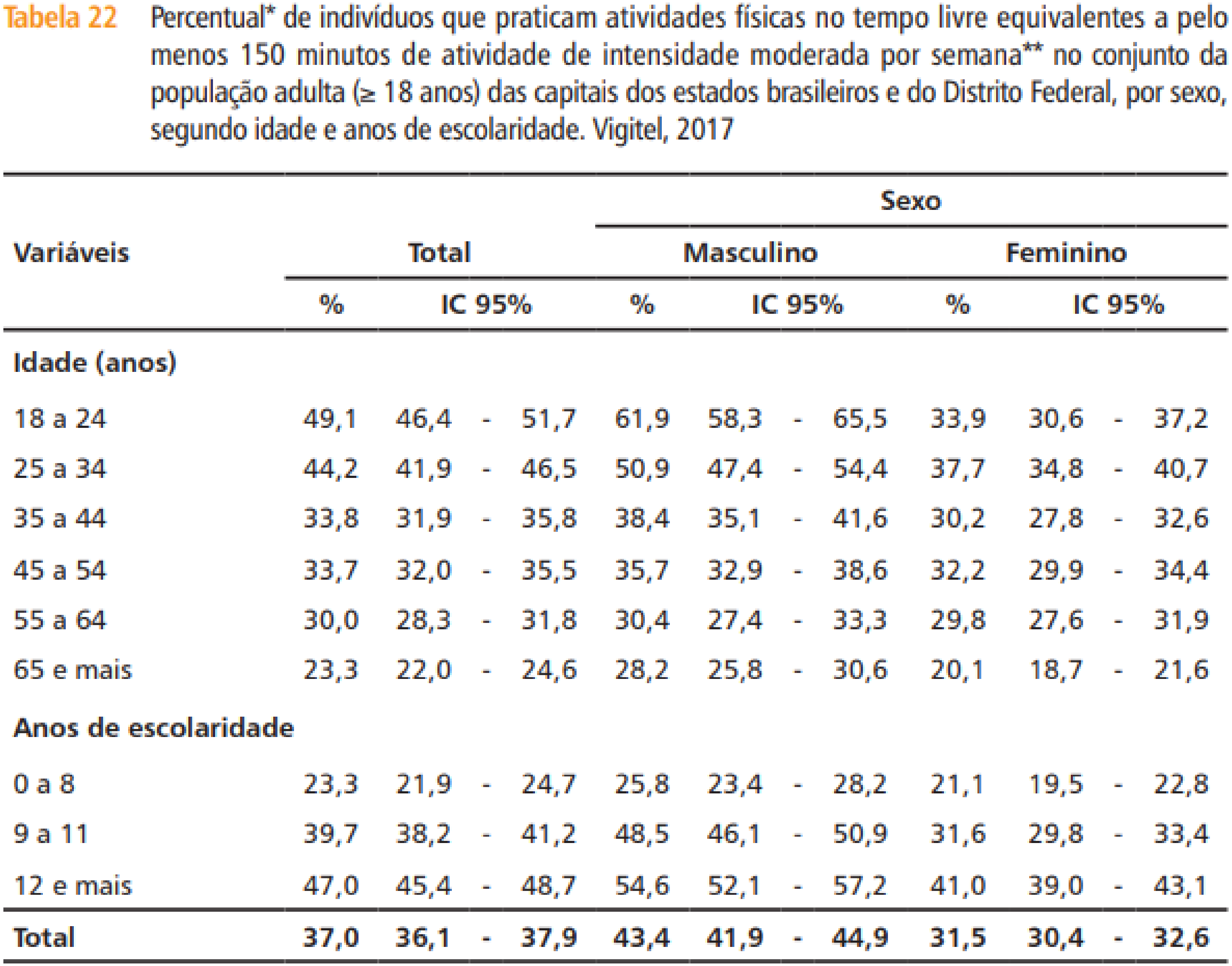
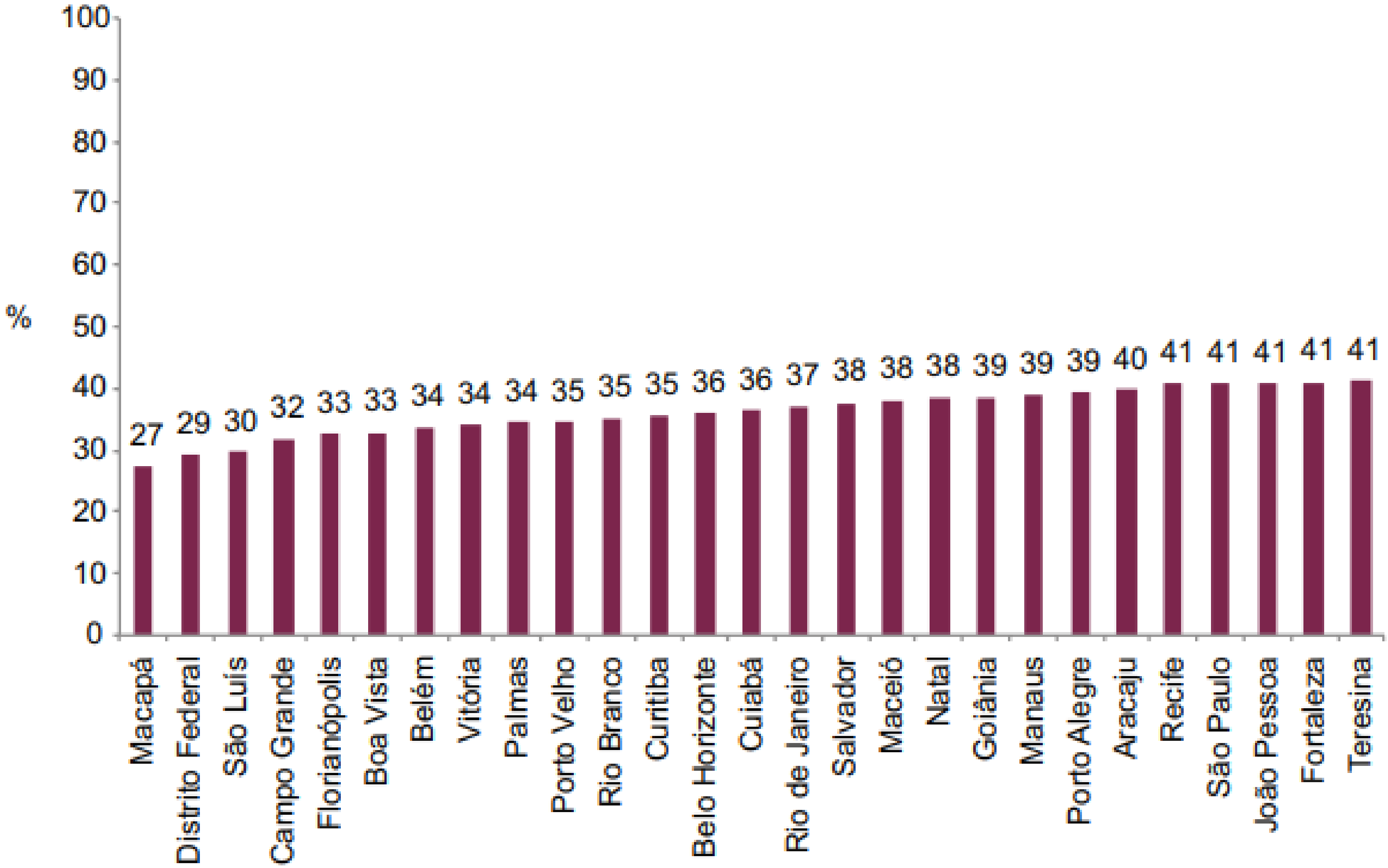


Tabela 22 Percentual* de indivíduos que praticam atividades físicas no tempo livre equivalentes a pelo menos 150 minutos de atividade de intensidade moderada por semana** no conjunto da população adulta (≥ 18 anos) das capitais dos estados brasileiros e do Distrito Federal, por sexo, segundo idade e anos de escolaridade. Vigitel, 2017

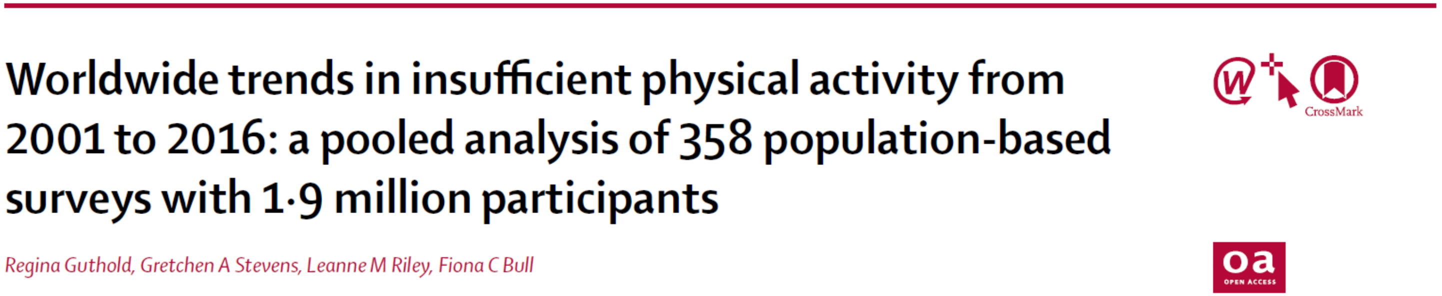
Variáveis	Total		Sexo			
			Masculino		Feminino	
	%	IC 95%	%	IC 95%	%	IC 95%
Idade (anos)						
18 a 24	49,1	46,4 - 51,7	61,9	58,3 - 65,5	33,9	30,6 - 37,2
25 a 34	44,2	41,9 - 46,5	50,9	47,4 - 54,4	37,7	34,8 - 40,7
35 a 44	33,8	31,9 - 35,8	38,4	35,1 - 41,6	30,2	27,8 - 32,6
45 a 54	33,7	32,0 - 35,5	35,7	32,9 - 38,6	32,2	29,9 - 34,4
55 a 64	30,0	28,3 - 31,8	30,4	27,4 - 33,3	29,8	27,6 - 31,9
65 e mais	23,3	22,0 - 24,6	28,2	25,8 - 30,6	20,1	18,7 - 21,6
Anos de escolaridade						
0 a 8	23,3	21,9 - 24,7	25,8	23,4 - 28,2	21,1	19,5 - 22,8
9 a 11	39,7	38,2 - 41,2	48,5	46,1 - 50,9	31,6	29,8 - 33,4
12 e mais	47,0	45,4 - 48,7	54,6	52,1 - 57,2	41,0	39,0 - 43,1
Total	**37,0**	**36,1 - 37,9**	**43,4**	**41,9 - 44,9**	**31,5**	**30,4 - 32,6**

Cómo utilizar en vigilancia?

Figura 25 Percentual de homens (≥ 18 anos) com prática insuficiente de atividade física, segundo as capitais dos estados brasileiros e o Distrito Federal. Vigitel, 2017



Cómo utilizar en vigilancia?

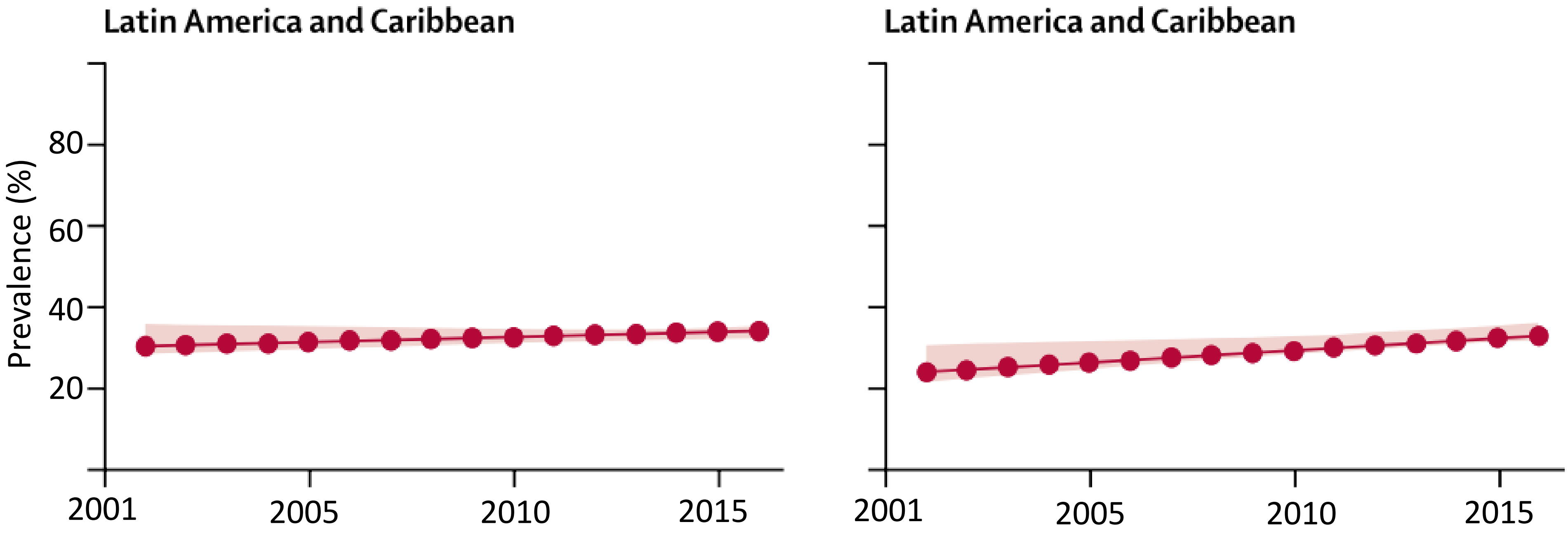


Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants

Regina Guthold, Gretchen A Stevens, Leanne M Riley, Fiona C Bull

Hombres

Mujeres



Inactividad Física

Cómo utilizar en vigilancia?

- Objetivo de la evaluación:
  - Contexto
  - Dimension
  - Nível (individual, pequeños grupos, comunário, vigilancia)
- Herramientas:
  - Objetivas vs subjetivas
  - Costo
  - Tiempo de evaluación

MUCHAS

Gracias!