

# Economic Analysis of Physical Activity Interventions

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## Appendix A

### Summary of interventions included in the analysis

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
<b>Community-wide health education campaign</b>									
Bauman (2003), <sup>1</sup> pre-post, New Zealand	100,000 community adults; 50.2	Media-led, community-wide physical activity campaign	12 months; 12 months	% of people meeting guidelines	Subjects self-report number of days being active in past week	0.10; 361,350	456,300; 4,563	0.01	5
DeCocker (2007), <sup>2</sup> RCT/CT, Belgium	228,000 community adults; 47.2	Local media campaign, environmental approaches, the sale and loan of pedometers, and several local physical activity projects	12 months; 12 months	Pedometer counts/day	OBI and SUI: pedometers and self-report IPAQ questionnaire	0.44; 1,599,339	32,643; 1,432	0.001	6
Reger (2002), <sup>3</sup> (RCT/CT), U.S.	3142 community adults; 32.5	Community campaign including paid advertisement, public relations activities, worksite programs, website exposure, physician prescription for walking, and other public health education programs	2 months; 2 months	% of people meeting guidelines	SUI: telephone survey	0.48; 1,762,950	175,500; 3,351,369	1.90	4
Wen (2002), <sup>4</sup> pre-post, Australia	20,000 adults; 0	Community-based multi-strategic health promotion in collaboration with local government: including a local social-marketing campaign and physical capacity building	24 months; 24 months	Hours spent on walking in past 2 weeks	SUI: past 2-week self-report	0.01; 49,764	298,620; 74,655	1.50	2

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<b>Point of decision prompts</b>									
Andersen (1998), <sup>5</sup> pre-post, U.S.	5967 community residents; 40.9	Stair-use sign to encourage stair use (benefit sign)	1 month; 1 month	% change in stair use	OBI: Step-use direct observation	0.0019; 6813	58; 58	0.171	3
	5967 community residents; 40.4	Stair-use sign to encourage stair use (weight-control sign)	1 month; 1 month	% change in stair use	OBI: Step-use direct observation	0.0021; 7787	58; 58	0.149	3
Auweele (2005), <sup>6</sup> pre-post, Belgium	1475 employees; 0	Health sign that linked stair use to health and fitness	1 week; 1 week	% change in stair use	OBI: Step-use direct observation	0.0071; 14,222	152; 1032	2.903	3
	1475 employees, 0	Health sign followed by e-mail sent by doctor pointing out health benefits of stair use	1 week; 1 week	% change in stair use	OBI: Step-use direct observation	0.0142; 28,444	257; 1744	2.453	3
Blamey (1995), <sup>7</sup> pre-post, Scotland	61,867 community residents	Stair-use motivational sign	3 weeks; 3 weeks	% change in stair use	OBI: Step-use direct observation	0.0071; 14,222	58; 58	0.009	3
Boutelle (2004), <sup>8</sup> pre-post, U.S.	47,300 employees	Stair-use sign to encourage stair use	1 month; 1 month	% change in stair use	OBI: Step-use direct observation	0.0010; 1956	58; 58	0.062	3
	47,300 employees	Stair-use sign plus music and artwork	1 month; 1 month and 2 months	% change in stair use	OBI: Step-use direct observation	0.0017; 3300	688; 688	0.220	3
Coleman (2001), <sup>9</sup> pre-post, U.S.	40,216 community residents; 48.8	Culturally relevant individual health message to improve stair use in a bank setting	1 month; 1 month and 2 months	% change in stair use	OBI: Step-use direct observation	0.0025; 9219	58; 58	0.028	3
	511,920 community residents; 48.8	Culturally relevant individual health message to improve stair use in an airport setting	1 month; 1 month and 2 months	% change in stair use	OBI: Step-use direct observation	0.0008; 2769	58; 58	0.005	3

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	570,240 community residents; 48.8	Culturally relevant family health message to improve stair use in an airport setting	1 month; 1 month and 2 months	% change in stair use	OBI: Step-use direct observation	0.0020; 7384	79; 79	0.002	3
	60,293 community residents; 48.8	Culturally relevant family health message to improve stair use in a library setting	1 month; 1 month and 2 months	% change in stair use	OBI: Step-use direct observation	0.0008; 2806	79; 79	0.085	3
	16,095 community residents; 48.8	Culturally relevant family health message to improve stair use in an office building setting	1 month; 2 months	% change in stair use	OBI: Step-use direct observation	0.0008; 2962	79; 79	0.151	3
Kerr (2001), <sup>10</sup> pre-post, UK	155,301 community residents	Eight stair-promotion messages on alternate stair risers	1.5 months; 1.5 months	% change in stair use	OBI: Step-use direct observation	0.0091; 33,093	278; 278	0.004	3
Kerr (2001), <sup>11</sup> pre-post, UK	75,054 community residents	A-2 size poster	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.008; 2920	58; 58	0.063	3
	75,054 community residents	A-1 size poster	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0015; 5516	58; 58	0.033	3
	59,077 community residents	A-1 size poster that read “stay healthy, use the stairs”—in train station	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0034; 12,329	58; 58	0.019	3
	59,077 community residents	A-1 size poster that read “stay healthy, save time, use the stairs”—in train station	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0068; 24,658	58; 58	0.010	3
	29,372 community residents	A-1 size poster that read “stay healthy, use the stairs”—in shopping center	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0032; 11,680	58; 58	0.040	3
	29,372 community residents	A-1 size poster that read “stay healthy, save time, use the stairs”—in shopping center	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0026; 9409	58; 58	0.050	3

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Kerr (2004), <sup>12</sup> pre-post, U.S.	664 employees; 25.8	Adding framed artwork on stair landings	38 months; 3 and 38 months	% change in stair use	OBI: Beam sensors count	0.0045; 8954	893; 13,441	1.876	3
	664 employees; 25.8	Displaying motivational signs throughout the building	27 months; 3 and 27 months	% change in stair use	OBI: Beam sensors count	0.0045; 8994	158; 2372	0.138	3
	664 employees; 25.8	Adding a stereo system and playing various types of music in the stairwell	4 months; 3 and 4 months	% change in stair use	OBI: Beam sensors count	0.0122; 24,366	578; 8697	0.992	3
Marshall (2002), <sup>13</sup> pre-post, Australia	26,391 community residents	Stair-use sign to encourage stair use	2 weeks; 2 weeks	% change in stair use	OBI: Direct observation by unobtrusive device	0.0007; 2596	58; 58	0.202	3
Russell (1999), <sup>14</sup> pre-post, U.S.	16,244 community residents; 57.0	Health-promotion sign to encourage stair use	11 weeks; 11 weeks	% change in stair use	OBI: Step-use direct observation	0.0020; 3911	58; 58	0.033	3
Russell (2000), <sup>15</sup> pre-post, U.S.	3370 community residents	Health-promotion sign to encourage stair use	1 week; 1 week	% change in stair use	OBI: Step-use direct observation	0.0059; 21,640	58; 58	0.380	3
	3370 community residents	Deterrent sign	1 week; 1 week	% change in stair use	OBI: Step-use direct observation	0.0055; 20,051	58; 58	0.624	3
Webb (2005), <sup>16</sup> pre-post, UK	96,060 community residents; 46.0	Single stair-use sign	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0064; 23,360	373; 373	0.040	3
	96,060 community residents; 46.0	Multiple stair-use signs	2 weeks; 2 weeks	% change in stair use	OBI: Step-use direct observation	0.0059; 21,413	278; 278	0.032	3

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<b>Individually adapted behavior change</b>									
Aittasalo (2006), <sup>17</sup> RCT/CT, Finland	62 adult patients; 23.0	Physical activity self-monitoring using pedometer and physical activity log for 5 consecutive days	1 week; 2 months	Minutes/ week of MVPA	SUI: Self-report short version of IPAQ Questionnaire	0.18; 664,821	3,427; 6,632,903	5.95	8
	130 adult patients; 25.0	Physician individual counseling (one time)	One time; 2 and 6 months	Minutes/ week of MVPA	SUI: Self-report short version of IPAQ Questionnaire	0.28; 1,016,786	8,334; 7,692,969	1.71	8
Arao (2007), <sup>18</sup> RCT/CT Japan	84 adults	Individual counseling for 15 minutes at the goal-setting session and 5 monthly sessions of individual consultations for 10 minutes, plus environmental and social support	6 months; 6 months	kcal/week on MVPA	SUI: Self-report. Assessed by Kuopio Ischemic Heart Disease Risk Factor Study, modified from Japanese	0.82; 2,984,061	8,073; 1,922,143	0.70	6
Bock (2001), <sup>19</sup> pre-post, U.S.	97 sedentary people; 23.7	Motivation-matched intervention with feedback reports that were individually tailored	6 months; 6 and 12 months	Minutes/ week of physical activity	SUI: Self-report 7-day PDPAR	1.26; 4,585,964	8,924; 1,840,000	0.32	5
	97 sedentary people; 23.7	Standard, print-based intervention using self-help booklets	6 months; 6 and 12 months	Minutes/ week of physical activity	SUI: Self-report 7-day PDPAR	0.78; 2,849,607	2,231; 460,000	0.13	5
Chan (2004), <sup>20</sup> pre-post, Canada	177 worksite workers; 13.2	Participants met in workplace-based groups with a facilitator for 30–60 minutes each week for 4 weeks to set goals and self-monitor steps, and continued self-monitoring for 8 weeks.	3 months; 3 months	Walking steps/day	OBI: Pedometer counts	1.47; 5,353,364	12,892; 2,913,333	0.91	2
Chen (1998), <sup>21</sup> pre-post, U.S.	62 sedentary, ethnic minority adults; 0	Behavioral condition: behavior change materials through mail and six structured telephone-counseling sessions	2 months; 2, 5, and 30 months	Minutes/ week of walking	SUI and OBI: Self-report past 2-week walking activity. Accelerometers were used in subsample, not effective.	0.22; 800,393	4,963; 4,802,845	0.40	3

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	63 sedentary, ethnic minority adults; 0	Educational condition: single 5-minute telephone call and educational information	One time; 2, 5, and 30 months	Minutes /week of walking	SUI and OBI: Self-report past 2-week walking activity. Accelerometers were used in subsample, not effective.	0.29; 1,061,107	581; 1,106,957	0.03	3
Croteau (2007), <sup>22</sup> RCT/CT, U.S.	95 community older residents	Self-monitored pedometer-based intervention: individuals met with a facilitator to set pedometer goals, select strategies, review pedometer usage, and discuss procedures for keeping a step calendar	3 months; 3 months	Walking steps/day	OBI: Pedometer counts	0.44; 1,600,890	3278; 1,380,000	1.01	5
Elley (2003), <sup>23</sup> RCT/CT, New Zealand	34,708 sedentary adults; 67.0	Clinician-based initiative in general practice that provides counseling on physical activity; exercise specialists continued support with at least three telephone calls and quarterly newsletters	12 months; 12 months	kcal/kg/week on leisure-time MVPA	SUI: Self-report. Last 3-month recall	0.38; 1,392,214	2,764,804; 796,590	0.57	6
Green (2007), <sup>24</sup> pre-post, U.S.	1157 worksite workers; 14.0	Active for Life intervention: goal-setting, self-monitoring using pedometers, incentives, and team competition	2.5 months; 2.5 months	MET hours/week	SUI: Self-report Godin Weekly Leisure-Time Exercise Questionnaire	0.34; 1,238,393	40,631; 1,685,653	2.79	4
Halbert (2000), <sup>25</sup> RCT/CT, Australia	149 seniors; 48.0	20-minute individualized physical activity advice by an exercise specialist in general practice, reinforced at 3 and 8 months	6 months; 3, 6, and 12 months	Median minutes spent on walking and VPA /week	SUI: Past 7-day physical activity log	0.79; 2,867,857	4771; 640,450	0.14	8
Harrison (2005), <sup>26</sup> post measure comparison, UK	275 sedentary adults; 32.7	Referral to a local-authority exercise referral scheme with free 12-week leisure pass and written information plus individual tailored counseling (1-hour session)	One time; 6 months	% people participating in ≥90 minutes of MVPA per week	SUI: 7-day PDPAR	0.09; 316,768	13,441; 5,865,000	5.05	5

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Jimmy (2005), <sup>27</sup> pre-post, Switzerland	92 sedentary adults; 42.0	Feedback group: given feedback from their physician concerning their physical activity level	One time; 7 weeks and 14 months	% of people meeting guidelines	SUI: 7-day PDPAR	0.71; 2,573,250	8,386; 10,938,000	0.36	5
	69 sedentary adults; 43.0	Feedback plus group: given feedback from their physician concerning their physical activity level and received further advice and stage-matched leaflets and were offered 45-minute counseling	3 months; 7 weeks and 14 months	% of people meeting guidelines	SUI: 7-day PDPAR	0.71; 2,573,250	15,732; 9,120,167	0.95	5
King (2007), <sup>28</sup> RCT/CT, U.S.	73 sedentary adults; 29.5	Human advice arm: telephone-assisted physical activity counseling by a trained health educator	12 months; 6 and 12 months	kcal/kg/day	SUI and OBI: 7-day PDPAR and CHAMPS supplemented by accelerometer. 7-day PAR is used here.	0.53; 1,934,500	20,294; 2,780,007	1.59	5
	75 sedentary adults; 30.3	Automated advice arm: telephone-assisted physical activity counseling by an automated telephone-linked computer system	12 months; 6 and 12 months	kcal/kg/day	SUI and OBI: 7-day PDPAR and CHAMPS supplemented by accelerometer. 7-day PAR is used here.	0.50; 1,825,000	5119; 682,500	0.46	5
Kolt (2007) <sup>29</sup> RCT/CT, New Zealand	93 sedentary seniors; 42.0	Eight telephone-counseling sessions on physical activity	3 months; 3, 6, and 12 months	Minutes/week of leisure-time MVPA	SUI: Self-report Auckland Heart Study Physical Activity Questionnaire.	0.59; 2,143,071	5,578; 2,398,925	0.31	8
Logue (2005) <sup>30</sup> pre-post, U.S.	336 obese adults; 33.0	Dietary and exercise advice, and three 24-hour dietary recalls every 6 months	24 months; 6, 12, 18, and 24 months	Minutes/week of exercise	SUI: Stanford 7-day recall	0.32; 1,173,214	13,179; 196,116	0.27	3

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	329 obese adults; 30.0	Dietary and exercise advice, three 24-hour dietary recalls every 6 months, plus stage-of-change assessments for five target behaviors every other month, workbooks, and monthly phone calls for weight-loss advice	24 months; 6, 12, 18, and 24 months	Minutes/week of exercise	SUI: Stanford 7-day recall	0.64; 2,346,429	45,322; 688,777	0.43	3
Marcus (1998), <sup>31</sup> pre-post, U.S.	97 sedentary adults; 23.7	Individual tailored intervention: computer expert system and self-help manuals	6 months; 6 months	Minutes/week of physical activity	SUI: 7-day PDPAR	1.04; 3,803,821	1124; 231,649	0.08	4
	97 sedentary adults; 23.7	Standard intervention: self-help booklets	6 months; 6 months	Minutes/week of physical activity	SUI: 7-day PDPAR	0.55; 2,023,143	1019; 210,000	0.14	4
Marcus (2007), <sup>32</sup> RCT/CT, U.S.	81 sedentary adults; 15.0	Telephone counseling (14 contacts over 12 months): receiving individual tailored messages, booklets, and physical activity tip sheets	12 months; 6 and 12 months	Minutes/week on physical activity	SUI: 7-day PDPAR	0.20; 714,879	34,181; 4,219,911	7.25	6
	80 sedentary adults; 24.7	Print feedback: receiving individual tailored messages, booklets, and physical activity tip sheets	12 months; 6 and 12 months	Minutes/week on physical activity	SUI: 7-day PDPAR	0.85; 3,113,711	21,977; 2,747,080	1.01	6
Marshall (2003), <sup>33</sup> RCT/CT, Australia	227 adults; 47.0	Mailed stage-targeted print intervention, consisted of a single mailing of a letter and full-color stage-targeted booklets	One time; 2 and 6 months	Hours/week of MVPA	SUI: 2-week PDPAR	0.21; 782,143	1192; 630,000	0.17	7
Mayer (1994), <sup>34</sup> RCT/CT, U.S.	899 sedentary seniors; 43.5	Goal-setting and 15-minute individualized face-to-face counseling session based on a health-risk appraisal and a series of 8-week educational sessions	2 months; 12 months	MET minutes/week	SUI : Self-report HRA questionnaire	0.20; 719,658	58,256; 3,888,070	0.90	8
Napolitano (2006), <sup>35</sup> pre-post, U.S.	95 adults; 0	Jumpstart: individual tailored feedback generated by expert system computer software and booklet targeted on stage of change	3 months; 3 and 12 months	Minutes/week of MVPA	SUI: 7-day PDPAR	1.07; 3,922,446	1604; 675,474	0.06	5
	93 adults; 0	Choose to move: mailing booklets and 12-week educational program	6 months; 3 and 12 months	Minutes/week of MVPA	SUI: 7-day PDPAR	1.11; 4,060,495	661; 142,204	0.02	5



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	92 adults; 0	One-time mailing information	One time; 3 and 12 months	Minutes/week of MVPA	SUI: 7-day PDPAR	1.13; 4,142,229	529; 690,000	0.02	5
Nies (2003), <sup>36</sup> RCT/CT, U.S.	67 sedentary women; 0	Telephone physical activity counseling once a week for the first 8 weeks and every other week for the remaining 16 weeks	6 months; 6 months	Minutes/day of walking	SUI: Self-report average minutes walking per day	0.23; 834,025	7849; 2,342,910	3.49	3
Nies (2006), <sup>37</sup> pre-post, U.S.	90 sedentary women; 0	Telephone calls with counseling (one call every week for 8 weeks and every other week for next 16 weeks for a total of 16 calls, 15 minutes each time)	6 months; 6 and 12 months	Minutes/week of walking	SUI: 7-day PDPAR	0.20; 734,693	6463; 1,436,222	1.21	5
	80 sedentary women; 0	Brief telephone calls (16 calls over 24 weeks, 2-5 minutes each time) without counseling	6 months; 6 and 12 months	Minutes/week of walking	SUI: 7-day PDPAR	0.18; 646,050	1725; 431,250	0.41	5
	83 sedentary women; 0	20-minute video education	One time; 6 and 12 months	Minutes/week of walking	SUI: 7-day PDPAR	0.23; 851,232	115; 166,265	0.02	5
Ortega-Sanchez (2004), <sup>38</sup> RCT/CT, Spain	222 adolescents; 58.3	Physician advice on physical activity provided in office 5-11 minutes (at the beginning of study and 1 year after)	12 months; 6 and 12 months	Minutes/week of any physical activity	SUI: Self-report in physician office. Physical education class and exercise duration and frequency were asked	0.61; 2,213,464	9689; 436,430	0.22	5
Patrick (2006), <sup>39</sup> RCT/CT, U.S.	224 adolescents; 100	Primary care, office-based, computer-assisted diet and physical activity assessment and stage-based goal-setting followed by brief healthcare provider counseling and 12 months of monthly mail and telephone counseling	12 months; 12 months	Active days (at least 3.0 MET hours) per week	SUI and OBI: 7-day PDPAR is used. Accelerometer is a secondary measure because of large amounts of missing data	0.13; 469,286	36,570; 1,632,589	5.13	6

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Prochaska (2008), <sup>40</sup> RCT/CT, U.S.	433 worksite employees; 21.0	Three motivational interviewing in-person or telephone sessions	6 months; 6 months	% people meeting guidelines	SUI: Godin Leisure Time Exercise Questionnaire (adapted to reflect guideline requirements)	0.18; 673,425	27,063; 1,250,000	1.86	6
	503 worksite employees; 19.0	Recommended three online sessions	6 months; 6 months	% people meeting guidelines	SUI: Godin Leisure Time Exercise Questionnaire (adapted to reflect guideline requirements)	0.15; 558,450	125; 4970	0.01	6
Proper (2003), <sup>41</sup> RCT/CT, Netherlands	131 worksite workers; 74.4	Written information about lifestyle, seven 20-minute individual counseling sessions on physical activity fitness and health	9 months; 9 months	kcal/day on all activities	SUI: 7-day PDPAR	2.76; 10,084,429	49,522; 5,040,356	0.95	4
Purath (2004), <sup>42</sup> pre-post, U.S.	134 sedentary employees; 0	3–5 minutes brief, tailored counseling on physical activity plus a booster phone call by nurse	2 weeks; 6 weeks	Minutes/week of walking	SUI: PACE walking questionnaire	0.74; 2,687,964	811; 1,452,090	0.20	3
	153 sedentary employees; 0	3–5 minute brief counseling on physical activity	One time; 6 weeks	Minutes/week of walking	SUI: PACE walking questionnaire	0.54; 1,986,643	259; 202,941	0.07	3
Rhudy (2007), <sup>43</sup> RCT/CT, U.S.	70 older veteran primary care patients	20 personal phone calls from a nurse	12 months; 6 and 12 months	Minutes/week of walking	SUI: Last 7-day recall on walking	0.21; 762,068	5,336; 762,286	1.17	7
	70 older veteran primary care patients	10 randomly interspersed personal and 10 automated telephone calls	12 months; 6 and 12 months	Minutes/week of walking	SUI: Last 7-day recall on walking	0.21; 758,418	3,818; 545,429	0.84	7

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Shirazi (2007), <sup>44</sup> RCT/CT, Iran	61 Iranian adults; 0	Home-based exercise prescription consisting of strength and balance training that was progressive, individually tailored, and included a walking program	3 months; 3 months	Minutes/ week of physical activity	SUI : Self-report IPAQ questionnaire	0.95; 3,449,250	4,962; 3,253,934	0.94	7
Spittaels (2007), <sup>45</sup> pre-post, Belgium	174 worksite workers; 67.2	Online tailored physical activity advice plus stage-based reinforcement e-mails	2 months; 6 months	Minutes/ week of MVPA	SUI and OBI: IPAQ Questionnaire and accelerometer.	0.39; 1,425,238	210; 72,414	0.03	4
	175 worksite workers; 68.0	Online tailored physical activity advice only	One time; 6 months	Minutes/ week of MVPA	SUI and OBI: IPAQ Questionnaire and accelerometer.	0.33; 1,216,667	105; 72,000	0.01	4
	177 worksite workers; 73.0	Online nontailored standard physical activity advice	One time; 6 months	Minutes/ week of MVPA	SUI and OBI: IPAQ Questionnaire and accelerometer.	0.50; 1,807,619	105; 71,186	0.01	4
Stewart (2001), <sup>46</sup> RCT/CT, U.S.	85 sedentary seniors; 30.9	Inclusive, choice-based, individually tailored physical promotion program, including staff assistance in developing a physical activity regimen, encouraging exercise participation, and informational support	12 months; 12 months	kcal/week of MVPA	SUI: Self-report CHAMPS Physical Activity Questionnaire for Older Adults	0.98; 3,590,408	30,969; 3,643,382	1.07	6
Wilcox (2006), <sup>47</sup> pre-post, U.S.	384 community older residents; 21.7	6-month telephone-based individually tailored program delivered through one face-to-face meeting followed by one-on-one telephone counseling (up to eight calls)	6 months; 6 months	Hours/ week of MVPA	SUI: Self-report CHAMPS Physical Activity Questionnaire for Older Adults	1.57; 5,725,286	22,400; 1,166,667	0.30	2
	454 community older residents; 17.4	20-week group-based program	5 months; 5 months	Hours/ week of MVPA	SUI: Self-report CHAMPS Physical Activity Questionnaire for Older Adults	1.70; 6,218,036	15,000; 792,952	0.18	2

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
<b>School-based physical activity intervention</b>									
van Beurden, (2003), <sup>48</sup> RCT/CT, Australia	523 children; 53.0	School project teams, project website, funding for purchase of equipment	1 school year; 1 year	% physical education class time spent on VPA	OBI: Direct observation on four selected students (SOFIT)	0.06; 126,000	41,009; 1,045,475	6.91	6
Haerens (2006), <sup>49</sup> RCT/CT, Belgium	2232 children; 100	Intervention combining environmental changes with computer-tailored feedback (plus parental involvement)	2 school years; 2 school years	Minutes/day in school physical activity	0 and SUI: Self-report FPAQ and accelerometer. Here we use self-report measure because small sample in accelerometer data	0.29; 570,000	11,006; 32,872	0.11	7
Haerens (2007), <sup>50</sup> RCT/CT, Belgium	139 adolescents; 46.8	Computer-tailored intervention to increase physical activity provided by CDs	One time; 3 months	Minutes/day on school-related physical activity	SUI: Self-report FPAQ	0.23; 465,000	525; 453,237	0.27	7
Harrison (2006), <sup>51</sup> RCT/CT, Ireland	182 children; 56.0	Teacher-led physical activity education	4 months; 4 months	30-minute blocks of MVPA per day	SUI: 1-day PDPAR	0.47; 1,724,625	10,097; 1,664,341	1.06	6
Hill (2007), <sup>52</sup> RCT/CT, UK	157 younger adults; 49.0	Leaflet only: leaflet was designed to target intentions, behavioral control, attitudes, and normative beliefs in relation to physical activity outside of physical education class	One time; 3 weeks	Frequency of exercise for at least 30 minutes per week	SUI: Self-report past 3-week recall: number of times exercised at least 30 minutes per week	0.12; 434,089	165; 126,000 METS	0.48	6

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
	162 younger adults; 49.0	Leaflet plus motivational quiz	One time; 3 weeks	Frequency of exercise for at least 30 minutes per week	SUI: Self-report last 3-week recall: number of times exercised at least 30 minutes per week	0.27; 973,768	259; 192,111	0.33	6
	144 younger adults; 49.0	Leaflet plus implementation-intention prompt	One time; 3 weeks	Frequency of exercise for at least 30 minutes per week	SUI: Self-report last 3-week recall: number of times exercised at least 30 minutes per week	0.22; 797,786	151; 126,000	0.26	6
Luepker (1996), <sup>53</sup> RCT/CT, UK	3651 children; 51.4	School-based program consisting of school food-service modifications, physical education interventions, and classroom health curricula plus family-based program (home curricula, family fun nights)	3 school years; 2 and 3 school years	Minutes/day of VPA	SUI and OBI: Self-report physical activity checklist (SAPAC) 1-day recall, SOFIT. We use SAPAC here	1.21; 2,420,000	74,510; 90,703	0.03	6
Manios (1999, 2005 and 2006), <sup>54-56</sup> RCT/CT, Greece	4171 children; 52.9	Health education, parental involvement	6 school years; 3, 6, and 10 years	Minutes/week of leisure-time MVPA	SUI: Parental or students' reporting	1.25; 4,559,893	534,300; 284,664	0.05	6, 7, 7
Mahar (2006), <sup>57</sup> post-measure comparison, U.S.	135 children	Classroom-based physical activity led by teachers	1 month; 1 month	Pedometer counts/day in school	OBI: Pedometer counts	0.33; 664,700	522; 464,089	0.58	5

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
McKenzie (1996), <sup>58</sup> RCT/CT, and Nader (1999), <sup>59</sup> post-measure comparison, U.S.	5352 children; 50	The total CATCH intervention included a food-service intervention, a physical education program, classroom curriculum promoting cardiovascular health, a tobacco curriculum and school policy, and a home/family component	22.5 school months; 30, 36, 48, 60, and 72 months	Minutes/day of VPA	SUI: 1-day recall, self-administered physical activity checklist (SAPAC)	1.37; 2,740,000	400,113; 398,717	0.33	7, 5
McKenzie (2004), <sup>60</sup> RCT/CT, U.S.	13,308 adolescents	School-based physical education class	2 school years; 2 years	Minutes/physical education class on MVPA	OBI: Direct observation of PE lessons using SOFIT system	0.19; 375,000	144,600; 72,438	0.17	6
Pate (2005), <sup>61</sup> RCT/CT, U.S.	4557 adolescents; 0	Physical education, health education, school environment, school health services, faculty/staff health promotion, family/community involvement	1 school year; 1 year	% ≥1 30-minute block of VPA/all day	SUI: 3-day PDPAR (Tuesday, Monday, and Sunday)	0.28; 1,018,350	1,205,781; 3,527,996	7.78	6
Pangrazi (2003), <sup>62</sup> pre-post, U.S.	185 children; 50.8	PLAY + physical education: physical activity teaching at 15-minute activity break during school day plus physical education on physical activity lifestyle habits	3 months; 3 months	Pedometer counts/day	OBI: Pedometer counts	0.67; 1,345,550	874; 188,973	0.12	4
	178 children; 47.7	Physical education only: physical education on physical activity lifestyle habits	3 months; 3 months	Pedometer counts/day	OBI: Pedometer counts	0.52; 1,037,850	0; 0	0	4
	150 children; 50.0	PLAY only: physical activity teaching at 15-minute activity break during school day	3 months; 3 months	Pedometer counts/day	OBI: Pedometer counts	0.60; 1,205,300	759; 202,400	0.14	4
Sallis (2003), <sup>63</sup> RCT/CT, U.S.	13,308 adolescents; 100	School-based physical education intervention, nutrition intervention (provide low-fat foods) and environmental, policy, and social marketing interventions	2 school years; 2 years	kcal/school day on MVPA	OBI: Direct observation (SOFIT)	0.42; 840,857	508,913; 254,941	0.50	7

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
Salmon (2008), <sup>64</sup> RCT/CT, Australia	66 children; 49.3	Behavioral modification group: consists of 19 lessons (40–50 minutes each) delivered by qualified physical education teacher in addition to regular physical education and sports classes. The behavioral modification classes were delivered in classroom.	1 school year; 9 and 12 months	MET minutes/day of MVPA	OBI: Accelerometer	0.50; 990,000	62,500; 12,626,263	8.77	6
	74 children; 47.4	Fundamental movement skills group: consists of 19 lessons (40–50 minutes each) delivered by qualified physical education teacher in addition to regular physical education and sports classes. The fundamental movement skills classes were delivered at indoor or outdoor physical activity facilities at school	1 school year; 9 and 12 months	MET minutes/day of MVPA	OBI: Accelerometer	1.25; 2,490,000	625,000; 11,261,261	3.03	6
Simons-Morton (1991), <sup>65</sup> RCT/CT, U.S.	171 children	Three components: go for health curriculum (training, consultation, technical support); children's active physical education (teach knowledge and skills of diet and physical activity, encourage physical activity); and new school lunch (provide low-fat and low-sodium lunch)	18 school months; 18 and 36 months	Minutes/session of MVPA	OBI: Observers reported minute-by-minute basis activity using CPAOF (Children's Physical Activity Observation Form)	0.73; 1,452,000	92,000; 3,586,745	4.23	6
Verstraete (2007), <sup>66</sup> RCT/CT, Belgium	405 children; 49.2	A health-related physical education program, classroom-based health education lessons, and an extracurricular physical activity–promotion program	2 school years; 2 years	Minutes/school day of MVPA	OBI and SUI: Accelerometer and leisure time self-report physical activity. Accelerometer data are used here.	1.41; 2,815,167	192,500; 3,168,724	0.94	6

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
<b>Social support in community context</b>									
Aldana (2005, 2006), <sup>67, 68</sup> RCT/CT, U.S.	174 adults; 27	40-hour educational course	1 month; 1.5 and 6 months	Steps/ week of walking	OBI: Pedometer count	0.41; 1,487,206	13,179; 9,088,966	1.16	6
Dunn (1999), <sup>69</sup> pre-post, U.S.	121 sedentary adults; 50	Lifestyle physical activity group: meetings on cognitive and behavioral skills in the format of small groups that met for 1 hour per week for the first 16 weeks, then biweekly until Week 24	24 months; 24 months	kcal/kg/ day	SUI: 7-day PDPAR	0.06; 206,174	60,317; 2,492,437	14.64	3
	114 sedentary adults; 49.1	Traditional structured exercise group: supervised group exercise 5 days per week for 6 months	24 months; 24 months	kcal/kg/ day	SUI: 7-day PDPAR	0.05; 169,357	183,479; 8,047,303	60.22	3
Clarke (2007), <sup>70</sup> pre-post, U.S.	124 low-income mothers; 0	Eight weekly class physical activity discussions plus pedometer use	2 months; 2 months	Pedometer counts/ day	OBI: Pedometer counts/day	1.61; 3,219,800	10,626; 5,141,613	1.17	3
Issacs (2007), <sup>71</sup> pre-post, UK	315 sedentary older adults; 31.7	Advice-only group who received tailored advice and information on physical activity including information on local exercise facilities	One time; 2.5 and 6 months	Minutes/ week of MVPA	SUI: 7-day PDPAR	0.33; 1,203,718	1654; 630,000	0.21	4
	317 sedentary older adults; 35.0	10-week program of supervised exercise classes, two to three times per week in a local leisure center	2.5 months; 2.5, 6, and 12 months	Minutes/ week of MVPA	SUI: 7-day PDPAR	0.20; 718,529	111,823; 16,932,192	9.32	4
	311 sedentary older adults; 31.2	10-week instructor-led walking program, two to three times per week	2.5 months; 2.5, 6, and 12 months	Minutes/ week of MVPA	SUI: 7-day PDPAR	0.52; 1,884,182	95,767; 14,780,784	3.32	4
Jancey (2008), <sup>72</sup> RCT/CT, Australia	260 seniors; 35.1	Supervised walking program meeting twice per week for 6 months	6 months; 6 months	Hours/ week of walking and MPA	SUI: Self-report IPAQ	0.96; 3,504,000	28,497; 2,192,077	0.92	5



Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
Jancy (2008), <sup>73</sup> pre-post, Australia	260 seniors; 33.0	Neighborhood-based walking program meeting twice per week for 26 weeks led by volunteer leaders	6 months; 6 and 12 months	Hours/week of walking	SUI: Self-report IPAQ	0.65; 2,362,071	123,550; 9,503,846	4.63	5
Jeffery (2003), <sup>74</sup> pre-post, U.S.	93 obese adults; 42.0	Standard behavior therapy (group instructions) for obesity with an energy expenditure goal of 1000 kcal/week	18 months; 6, 12, and 18 months	kcal/week of MVPA	SUI: Self-report last week recall Paffenbarger Physical Activity Questionnaire	0.70; 2,555,000	9738; 698,029	0.32	3
		Standard behavior therapy plus high physical activity treatment with an energy expenditure goal of 2500 kcal/week, including group instructions, exercise partners recruitment, personal counseling, and small monetary incentives	18 months; 6, 12, and 18 months	kcal/week of MVPA	SUI: Self-report last week recall Paffenbarger Physical Activity Questionnaire	2.12; 7,739,490	67,738; 4,142,966	0.69	3
Kanders (1994), <sup>75</sup> pre-post, U.S.	61 obese African-American women; 0	Weight-loss program: women were placed on a culturally appropriate, low-fat, nutrient-balanced, 1200-kcal diet, in which two meals were consumed as meal-replacement shakes or Lactaid capsules. They also participated in group educational sessions and received monetary incentives	2.5 months; 2.5 months	Minutes/week of walking	SUI: Self-reported	0.49; 1,772,857	14,847; 11,682,492	6.59	2
Latimer (2007), <sup>76</sup> pre-post, U.S.	101 sedentary adults; 10.9	Pedometer plus gain-framed information printouts	1 month; 2 and 10 weeks	MET minutes/week	SUI: Self-report IPAQ	2.39; 8,714,810	2121; 2,520,000	0.23	3
	106 sedentary adults; 11.3	Pedometer plus loss-framed information printouts	1 month; 2 and 10 weeks	MET minutes/week	SUI: Self-report IPAQ	1.47; 5,372,018	2226; 2,520,000	0.39	3
	115 sedentary adults; 16.5	Pedometer plus mixed-framed information printouts	1 month; 2 and 10 weeks	MET minutes/week	SUI: Self-report IPAQ	1.16; 4,243,212	2,415; 2,520,000	0.54	3
Martinson (2007), <sup>77</sup> RCT/CT, U.S.	523 older adults; 27.1	Interactive telephone- and mail-based physical activity support program with main component a 7-session course delivered by activity coaches	6 months; 6 months	kcal/week on MVPA	SUI: Self-report CHAMPS questionnaire	1.14; 4,178,878	84,036; 3,213,623	0.81	6

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
Miller (2002), <sup>78</sup> RCT/CT, Australia	199 mothers of preschool children; 0	Providing print information about overcoming physical activity barriers, and inviting participants to discuss the development of local strategies for physical activity promotion	2 months; 2 months	% people meeting guidelines for adequate physical activity	SUI: Last 7-day recall questionnaire modified from the Active Australia evaluation	0.12; 443,475	45,822; 13,815,603	40.81	7
Mutrie (2002), <sup>79</sup> RCT/CT, UK	145 community residents; 36.0	Written interactive materials based on the transtheoretical model of behavior change, local information about distances and routes, and safety information	One time; 6 months	Minutes/week of walking	SUI: 7-day PDPAR	0.11; 393,621	6,825; 5,648,276	3.40	6
Opdenacker (2008), <sup>80, 81</sup> RCT/CT, Belgium	60 seniors; 50	Structured exercise program: three weekly sessions of 60–90 minutes in a fitness center including endurance, strength, flexibility, and balance training	11 months; 11 months	Steps/day of walking	OBI and SUI: Self-report questionnaire (Flemish Physical Activity Computerized Questionnaire), pedometer and accelerometer. Step counts used here	0.12; 452,965	71,760; 13,047,273	29.81	6
	60 seniors; 50	Lifestyle program: individualized home-based program (information brochure, pedometer use, training) supported by phone calls	11 months; 11 and 23 months	Steps/day of walking	OBI and SUI: Self-report questionnaire (Flemish Physical Activity Computerized Questionnaire), pedometer and accelerometer. Step counts used here	0.91; 3,321,226	8,777; 1,595,886	0.52	6

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
Pazoki (2007), <sup>82</sup> RCT/CT, Iran	179 adults; 0	Community-based lifestyle modification: audio-taped activity instructions with music and practical usage of the educational package were given in weekly home-visits	2 months; 2 months	Minutes/week of MVPA (mostly MPA)	SUI: 7-day PDPAR	0.76; 2,768,525	1,919; 643,156	0.24	7
Renaud (2008), <sup>83</sup> pre-post, Canada	656 worksite workers	Six educational modules delivered over 3 years plus telephone follow-up	36 months; 36 months	% of people meeting guidelines	SUI: Self-report	0.17; 629,625	625,000; 317,581	1.96	2
Sherman (2007), <sup>84</sup> pre-post, U.S.	75 adults; 0	Pedometer, exercise videotape, and exercise counseling	6 months; 6 months	Pedometer counts/day	OBI: Pedometer counts/day	1.09; 3,991,366	4,060; 1,082,533	0.33	3
Simkin-Silverman (2003), <sup>85</sup> RCT/CT, U.S.	260 adults; 0	Lifestyle intervention: including 15 group meetings (20 women per group) on behavioral, dietary, or physical activity topic; additional behavioral skills, support, and motivation support were provided after group meeting. Mail, telephone follow-up, and incentives/ group competitions were provided.	54 months; 30, 42, and 54 months	kcal/week on physical activity	SUI: Paffenbarger Activity Questionnaire	0.79; 2,891,694	48,438; 414,000	0.15	5
Steele (2007), <sup>86</sup> pre-post, Australia	65 adults; 10.8	1-hour weekly group-based sessions	3 months; 3, 5, and 8 months	Minutes/week of MVPA	SUI: Active Australia Questionnaire	2.89; 10,562,839	8746; 5,382,000	0.25	4
		Weekly Internet module plus two additional 1-hour face-to-face sessions	3 months; 3, 5, and 8 months	Minutes/week of MVPA	SUI: Active Australia Questionnaire	1.90; 6,921,964	2,806; 1,726,769	0.13	4
		Weekly Internet module	3 months; 3, 5, and 8 months	Minutes/week of MVPA	SUI: Active Australia Questionnaire	1.82; 6,659,946	1,541; 994,194	0.07	4
Thomas (2006), <sup>87</sup> pre-post, Australia	1195 worksite workers; 24.5	Pedometer-based workplace promotion program	1 month; 1 month	Pedometer counts/weekday	OBI: Pedometer counts/day	0.37; 1,354,241	16,618; 1,668,703	2.61	3

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / year in 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
Whitt-Glover (2008), <sup>88</sup> pre-post, U.S.	87 sedentary blacks; 11.0	Eight group sessions that included discussion of physical activity-related topics, an instructor-led physical activity session, and weekly incentives to promote physical activity	3 months; 1 and 3 months	Pedometer counts/day	OBI and SUI: Pedometer counts and self-report international physical activity questionnaire last 7-day recall supplemented	0.58; 2,129,866	4313; 1,982,759	1.14	3
Wilbur (2008), <sup>89</sup> pre-post, U.S.	156 sedentary African Americans; 0	Individualized orientation including a tailored walking prescription, health information, and goal-setting; received heart rate monitor to wear during walking; four weekly targeted workshops lasting 60 minutes followed by tailored staff telephone calls; reported walking frequencies through automated telephone response system	12 months; 4 and 12 months	% of people meeting guidelines	SUI: Self-report	0.33; 1,209,975	44,735; 2,867,628	3.66	2
	125 sedentary African Americans; 0	Individualized orientation including a tailored walking prescription, health information, and goal-setting; received heart rate monitor to wear during walking; reported walking frequencies through automated telephone response system or reminder calls	12 months; 4 and 12 months	% of people meeting guidelines	SUI: Self-report	0.17; 635,100	20,988; 1,679,000	5.17	2
<b>Creating or improving access to places for physical activity</b>									
Ridgers (2007), <sup>90</sup> RCT/CT, UK	4271 children; 50.8	Received funding to redesign the playground environment to make it multicolored, based on the sports playground zonal design	One time; 1.5 and 6 months	% time spent on MVPA during school recess	OBI: heart rate telemetry and accelerometer	0.26; 513,000	587,100; 458,207	4.47	7
Stratton (2005), <sup>91</sup> RCT/CT, UK	1139 children; 50.0	Paint playgrounds with multicolored markings	One time; 1 month	Minutes/school day spent on MVPA in school playground	OBI: Sportstester heart rate telemeters	0.98; 3,558,750	5,779; 16,914	0.17	7

Study, design, country	Number and type of population reached /observed; % male	Intervention description	Intervention duration; follow-up length	Reported measure	Measurement instrument	MET hours gained per person per day; total population benefit in a year in a population of 10,000 (METs)	Total estimated intervention cost (\$2006); total cost / 10,000 population (\$)	Cost-effective-ness ratio (estimated \$/MET hour gained)	Study quality rating total score <sup>a</sup>
Verstraete (2006), <sup>92</sup> RCT/CT, Belgium	122 children; 61.5	Provide game equipment	3 months; 3 months	% time spent on MVPA in morning recess and lunch recess	OBI: accelerometers	0.62; 1,246,050	1840; 50,273	0.40	7

CATCH, The Child and Adolescent Trial for Cardiovascular Health; CHAMPS, Community Healthy Activities Model Program for Seniors; CT, controlled trial; FPAQ, Flemish Physical Activity Questionnaire; IPAQ, International Physical Activity Questionnaire; MPA, moderate physical activity; MVPA, moderate-to-vigorous physical activity; OBI, objective instrument; PDPAR, past physical activity recall; SUI, subjective instrument; UK, United Kingdom; VPA, vigorous physical activity

<sup>a</sup>Study quality score:

Control group: Is there a control group?

Representativeness: Were study samples randomly recruited from study population with response rate of at least 60%?

Comparability: Were baseline characteristics of intervention and control groups, populations, or areas comparable, or if there were important differences in potential confounders at baseline, appropriate adjustments made in analysis?

Attrition rate: Were outcomes studied in cohort or panel of respondents with attrition rate of less than 30%?

Period of assessment: Was quantity of physical activity assessed capturing a period of >1 day? And was measurement capturing all kinds of physical activity?

Long-term follow-up: Did study do follow-up longer than 6 months after intervention ended?

Objective instrument: Were physical activity measurement instruments objective?

Instrument validity: Was instrument used to assess physical activity appropriate to research question(s) of the study—that is, capable of measuring outcome under consideration and either shown to be a valid and reliable measure in published research or in pilot study or recognized as acceptable measure?

Baseline validity: Was baseline measure already below physical activity national guidelines?

Total validity score: Sum of above criteria

## References for Appendix A

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