

Stand-Alone Mass Media Campaigns to Increase Physical Activity

A Community Guide Updated Review

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Context: The goal of the systematic review described in this summary was to determine the effectiveness of stand-alone mass media campaigns to increase physical activity at the population level. This systematic review is an update of a *Community Guide* systematic review and Community Preventive Services Task Force recommendation completed in 2001.

Evidence acquisition: Updated searches for literature published from 1980 to 2008 were conducted in 11 databases. Of 267 articles resulting from the literature search, 16 were selected for full abstraction, including the three studies from the original 2001 review. Standard *Community Guide* methods were used to conduct the systematic evidence review.

Evidence synthesis: Physical activity outcomes were assessed using a variety of self-report measures with duration intervals ranging from 6 weeks to 4 years. Ten studies using comparable outcome measures documented a median absolute increase of 3.4 percentage points (interquartile interval: 2.4 to 4.2 percentage points), and a median relative increase of 6.7% (interquartile interval: 3.0% to 14.1%), in self-reported physical activity levels. The remaining six studies used alternative outcome measures: three evaluated changes in self-reported time spent in physical activity (median relative change, 4.4%; range of values, 3.1%–18.2%); two studies used a single outcome measure and found that participants reported being more active after the campaign than before it; and one study found that a mass media weight-loss program led to a self-reported increase in physical activity.

Conclusions: The findings of this updated systematic review show that intervention effects, based wholly on self-reported measures, were modest and inconsistent. These findings did not lead the Task Force to change its earlier conclusion of insufficient evidence to determine the effectiveness of stand-alone mass media campaigns to increase physical activity. This paper also discusses areas needing future research to strengthen the evidence base. Finally, studies published between 2009 and 2011, after the Task Force finding was reached, and briefly summarized here, are shown to support that finding.

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Context

The *Guide to Community Preventive Services (Community Guide)* serves as a respected source of information about effective community approaches and interventions to address many public health behaviors, including physical activity.^{1,2} The *Community Guide* systematic evidence review process is led by the Community Preventive Services Task Force (Task Force). The Task Force continues to develop, expand, and update the *Community Guide*, with support from DHHS, in collaboration with public and private partners.

Community Guide findings are developed through systematic reviews conducted by lead scientists at the CDC and numerous other federal and nonfederal content experts, on behalf of the Task Force. Based on these reviews, the Task Force determines whether adequate evidence exists to determine that an intervention is effective. The Task Force recommends interventions that have sufficient or strong evidence of effectiveness. The Task Force also may conclude that evidence is insufficient to determine the effectiveness of an intervention, indicating that additional research is needed. *Community Guide* methods are described elsewhere,¹ including methods related specifically to the previous reviews of interventions to increase population levels of physical activity³ (see also *The Community Guide*²; www.thecommunityguide.org).

Focus of This Review

This paper evaluates the effectiveness of stand-alone mass media campaigns to increase physical activity. Mass media campaigns have long been used as a tool for promoting public health by enhancing knowledge and awareness of health-related issues.^{4,5} Considerable resources have been devoted to mass media campaigns designed to encourage the general public to become more active.⁶

Previous Task Force reviews have recommended the following interventions on the basis of strong evidence of effectiveness²: (1) Community-wide campaigns and informational approaches to promote physical activity as part of highly visible, broad-based efforts (e.g., including individual and group physical activity counseling, risk-factor screening, and environmental changes such as creation of walking trails); (2) social support interventions used in a group or community setting; (3) enhanced school-based physical education classes; (4) individually adapted health behavior change programs; (5) creation of enhanced access to places for physical activity combined with informational outreach promoting their use; and (6) point-of-decision prompts to encourage use of stairs.² The Task Force also found sufficient evidence to recommend community- and street-scale urban design and land-use policies to increase physical activity.⁷

However, a previous Task Force review of literature published between 1980 and 2000 found insufficient evidence to determine whether mass media campaigns when used alone, rather than as part of a multicomponent intervention, were effective for increasing physical activity³ (see also Task Force on Community Preventive Services¹). This conclusion was based on three studies that met the inclusion criteria for the review. These studies had limitations in their design and execution, and yielded inconsistent findings.

The purpose of this paper is to describe an updated review of studies of stand-alone mass media physical activity campaigns that have been published since the initial Task Force review. This updated review includes the three studies from the original review of evidence published between 1980 and 2000, along with additional evidence from studies published from 2001 to 2008. This review also included one study released in 2009 in advance of its 2010 publication date because it reported findings on the most distal (4-year follow-up) primary outcomes of the U.S. longitudinal VERB™ campaign.⁸ One-year⁹ and 2-year¹⁰ primary outcomes from VERB have been reported, and a special supplement devoted to the VERB campaign was published in the *American Journal of Preventive Medicine* in 2008. These publications were reviewed, but the most-distal findings reported in the article by Huhman et al.⁸ were considered by the Task Force as representative of the overall VERB campaign.

Definition of Mass Media Campaign

As depicted in *Figure 1*, stand-alone mass media campaigns are distinct from mass media employed as part of broader multicomponent interventions (e.g., broader community-wide campaigns) that also may incorporate individually oriented health behavior change programs and activities, social support networks, and environmental and/or policy changes. Updating the definition from the previous Task Force review,^{1,3} stand-alone mass media campaigns are defined as follows. Mass media campaigns when implemented alone are interventions that rely on mass media channels to deliver messages about physical activity to large and relatively undifferentiated audiences. These campaigns are designed to increase awareness and/or knowledge about benefits of physical ac-

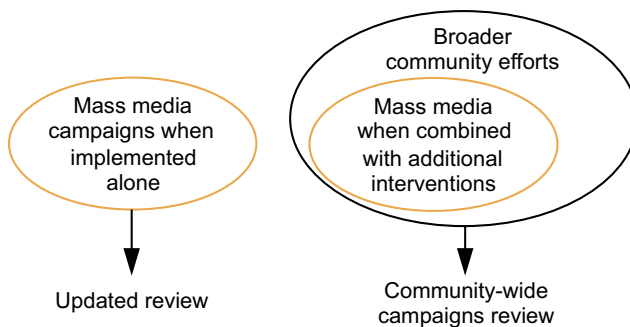


Figure 1. Illustration of this updated review of studies of mass media campaigns to increase physical activity, 1980–2008

Note: One study included in the review was published in 2010 (pre-released in 2009). The strength of the evidence for community-wide physical activity campaigns is not considered in the current review.

tivity, influence attitudes and beliefs about physical activity, and change physical activity behaviors within populations at community, state, or national levels. Messages are transmitted using channels such as newspapers, brochures, manuals, radio, TV, billboards, and websites either singly or in combination.

This definition of mass media campaigns reflects the growth in uses of electronic technology since the original review, in that three mass media campaigns reviewed for this update used Internet websites to deliver campaign messages. The use of websites was not incorporated in the definition of mass media campaigns in the original review.^{1,3} Studies in this review did not rely on the Internet as the primary intervention channel. Rather, these campaigns used an Internet website link as a tool for promoting the campaign brand name,^{8,11} and for tracking self-reported physical activity behaviors.¹² This review also did not include published studies that evaluated the use of other new media, such as cellular phones, mobile devices, and social network media (e.g., Facebook, MySpace, Twitter, blogs) as the sole or primary intervention channel. Such channels are expected to play a much larger role in future mass media and multicomponent physical activity promotion interventions.^{6,13}

The analytic framework applied to this review of stand-alone mass media interventions is presented in Figure 2. Mass media physical activity campaigns are hypothesized to produce changes in proximal variables, such as heightened awareness and knowledge of the benefits of regular physical activity; and/or more favorable intentions, attitudes, and beliefs about physical activity. These changes can influence improvements in more-distal outcomes, such as physical activity behaviors, fitness, and, ultimately, reduced morbidity and mortality.

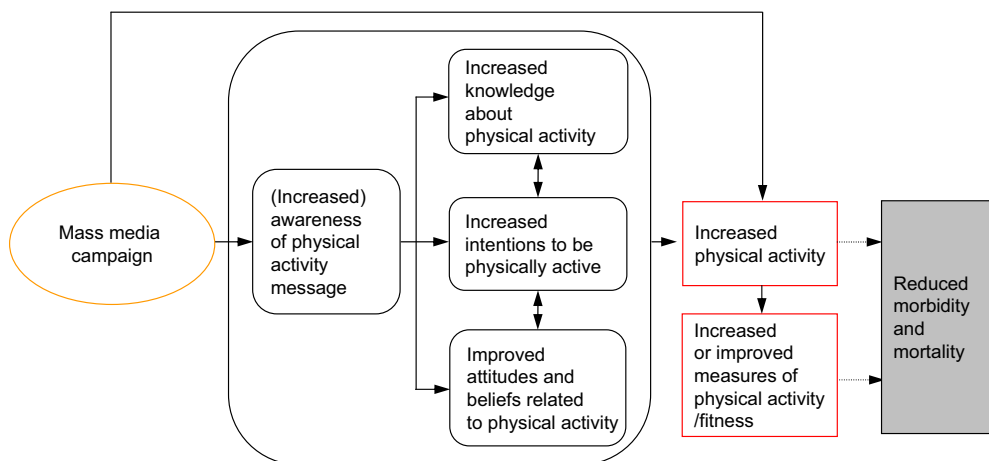


Figure 2. Analytic framework: stand-alone mass media campaign interventions to increase physical activity

Evidence Acquisition

The systematic review and evaluation of stand-alone mass media campaigns to increase physical activity was conducted according to the *Community Guide* methodology described in detail elsewhere.^{3,14-16} Electronic literature searches were conducted in MEDLINE (Ovid), Embase, CINAHL, SPORTDiscus, PsycINFO, Campbell, Cochrane, NICE, Sociological Abstracts, AMED, and Enviroline databases. Also reviewed were references listed in all retrieved articles, as well as other identified review articles.

Only articles published in peer-reviewed scientific journals were included. To be included in this review, studies were required to (1) be published from 1998 through 2008 (with one, 2010 [pre-released in 2009] publication exception, to capture the most-distal outcomes of the U.S. VERB campaign longitudinal study); (2) present findings of original research published in English; (3) be conducted in a high-income economy; (4) be consistent with the systematic review development team's definition for a stand-alone mass media campaign; (5) provide information on one or more outcomes related to the analytic framework that included a measure of physical activity; and (6) compare a group or population exposed to the intervention with a group not exposed or less exposed (comparisons could be concurrent or in the same group over a period of time). Two abstractors independently read and collected information on each article using an electronic abstraction form (available on request). Any disagreements between the reviewers were reconciled by consensus of the two lead scientists of this systematic review.

Data Analysis

Each abstracted study was assessed as to suitability of design and quality of execution. Suitability of design for each study was coded as "greatest," "moderate," or "least," using the Task Force criteria described by Briss and colleagues.¹⁴ Based on the number of methodologic limitations identified, quality of execution was rated as "good" (0-1 limitations); "fair" (2-4); or "limited" (≥ 5).¹⁴ Limitations were counted in the following nine categories: (1) description of the study population and intervention, (2) sampling, (3) measurement of exposure, (4) measurement of outcome and independent variables, (5) confounding bias, (6) data analysis, (7) participation, (8) comparability and bias, and (9) other biases.¹⁶ Studies with good or fair quality of execution, and any level of design suitability, were included in the body of evidence for the purpose of assessing effectiveness.

Results reported for the physical activity outcomes for each study were abstracted and the net intervention effect was calculated. The formula for calculating the net effect

varied depending on the study design (with or without a control or comparison group and/or a pre-intervention outcome measurement) as reported by Kahn et al.³ The relative percentage-point changes were plotted and summarized with a median and interquartile interval.

Data from the assessments of design suitability, quality of execution, and net effect change were all synthesized according to *Community Guide* methodology¹⁶ to determine whether stand-alone mass media campaigns had strong, sufficient, or insufficient evidence of effectiveness for increasing physical activity as community-based or population-based interventions. In evaluating the body of evidence, size and consistency of reported effects were assessed, along with whether the body of evidence contained common threats to validity that either weakened or strengthened the conclusions. The strength of the body of evidence was summarized on the basis of the number of available studies, the quality of their design and execution, and the size and consistency of reported effects.

Outcome measures of effectiveness included changes in the proportion of people who self-reported physical activity (often using some combination of reported frequency, intensity, and/or duration of activity), changes in time spent in physical activity, and changes in single-item reports of whether respondents thought that they were more physically active as a result of a campaign. The assessment tools and definitions of physical activity varied by study (Table 1) and reflect much heterogeneity in tools and definitions across studies. Changes in fitness, including direct or estimated measures of aerobic capacity, were not assessed in any of the studies reviewed.

Evidence Synthesis

Of 267 potential articles resulting from the literature search, 16 eligible studies evaluating stand-alone mass media campaigns met review study-inclusion criteria, and were selected for full abstraction. Details of the 16 qualified studies are provided online (www.thecommunityguide.org/pa/campaigns/supportingmaterials/SETmassmedia.html), and select study characteristics are listed in Table 2. These characteristics show much heterogeneity among the studies' target populations, duration, and costs.

The studies included three controlled trials,^{20,23,26} five cohort studies,^{8,11,17,25,27} five cross-sectional studies,^{18,22,24,28,29} and three single-group studies using before–after designs.^{19,21,30} Of these, eight studies were rated as having greatest design suitability, including three with good^{18,17,20} and five with fair^{11,23,25–27} ratings of execution quality. The remaining eight studies were rated as having least-suitable design, including one with good²² and seven with fair^{18,19,21,24,28–30} ratings of execution quality.

Three studies in this review summarize results from the longitudinal, national mass media campaign, brand-named VERB (www.cdc.gov/youthcampaign/), conducted from 2002 to 2006 to increase physical activity among “twens,” who were aged 9–13 years at baseline. However, the articles addressed different study research questions. Huhman and colleagues⁸ analyzed main

VERB outcomes among the original VERB cohort at the 4-year follow-up. As noted previously, two additional studies summarized findings related to VERB-campaign primary outcomes at 1-year⁹ and 2-year¹⁰ periods; however, the most-distal findings were evaluated in the present review.

Two studies evaluated aspects of VERB that were unrelated to primary outcomes. Berkowitz et al.²⁰ evaluated whether a heightened “dose” or “intensity” of VERB advertising in selected communities resulted in greater behavior change than the national “standard dose” among a cohort of youth at the time of the 2-year follow-up. Price and colleagues²⁹ evaluated the impact of the VERB campaign on parents' physical activity participation with their tweens using a cross-sectional analysis.

Ten studies^{8,11,17–22,27,30} used comparable outcome measures (i.e., the proportion of people self-reporting physical activity change). They documented a median absolute increase of 3.4 percentage points (interquartile interval: 2.4 to 4.2 percentage points; data plot not shown). Findings also showed a median relative increase of 6.7% (interquartile interval: 3.0% to 14.1%) in self-reported physical activity levels (Figure 3).

The remaining six studies used other outcome measures: three^{25,26,29} evaluated changes in self-reported time (e.g., minutes) spent in physical activity (median relative change, 4.4%; range of values: 3.1% to 18.2%; Figure 4). Two^{24,28} found that people reported that they were more active as a result of a campaign, based on a single-item measure (percentages of people reporting that they were more active were presented by the authors as descriptive findings). One study²³ found that a short-term mass media weight-loss program that promoted increased physical activity was accompanied by a self-reported increase in physical activity levels. This study was included in the review because it also was included as one of three studies in the original review.

Discussion

The purpose of this systematic review was to evaluate the effectiveness of stand-alone mass media campaigns to increase physical activity at the population level, to update the Task Force's previous review of this topic and its conclusion of “insufficient evidence to determine effectiveness.”^{1,3} Stand-alone mass media campaigns are distinct from mass media efforts employed as part of broader multicomponent interventions for which the Task Force previously has found strong evidence of effectiveness.²

Following *Community Guide* rules of evidence,¹⁴ two or more studies of greatest design suitability and good execution quality may be sufficient to result in a recommendation of effectiveness based on strong evidence, if

Table 1. Physical activity assessment tools and definitions of physical activity used in stand-alone mass media campaigns

Study	Self-report physical activity assessment tool	Definition of physical activity
Bauman (2001) ¹⁷	Self-reported hours and number of sessions of vigorous activity, moderate activity, and walking, in previous week (amount of total physical activity minutes/week)	% active past week for five sessions and 150 minutes
Bauman (2003) ¹⁸	Item asked respondents to report number of days in previous week that they were physically active for ≥ 30 minutes	% active reporting ≥ 5 days/week for ≥ 30 minutes per day
Beaudoin (2007) ¹⁹	Items assessed leisure walking for ≥ 10 minutes just for exercise or pleasure, including walking with a dog. A similar item asked about utilitarian walking.	% reporting participating in leisure walking in a usual week ≥ 10 minutes
Berkowitz ^a (2008) ²⁰ Same tool and definition used in Huhman (2010) ⁸	VERB campaign. Item asked tweens whether they had done any physical activities yesterday and, if response was yes, to name the activities. Free-time physical activity sessions and % of children participating in organized physical activity in past 7 days also assessed. Berkowitz et al. evaluated whether communities receiving a higher campaign dose differed from communities that did not.	Unit of measurement reported in this review is % reporting they were physically active yesterday.
Booth (1992) ²¹	Physical activity assessed by determining frequency of self-reported walking (for recreation or exercise) and participation in moderate or vigorous activity over the previous 2 weeks.	Unit of measurement reported in this review is % reporting any walking for exercise in the previous 2 weeks.
Craig (2007) ²²	Walking in past 7 days. Respondents reported number of days in previous week they walked for ≥ 10 minutes at a time and, if walking was reported, the total time spent walking per day	% walking ≥ 1 hour daily in the week prior to the survey (regardless of purpose—work, chores, leisure time, or transport)
Hillsdon (2001) ¹¹	Physical activity assessed by asking participants about frequency, duration, intensity, and type of physical activity they had performed in the previous 4 weeks. Types of activity were occupational, walking, heavy housework, gardening, and sport/recreation.	% meeting weekly recommendations for moderate-intensity (i.e., five occasions/30 minutes per occasion/week) and vigorous-intensity (i.e., three occasions/20 minutes per occasion/week) physical activity (based on non-occupational activity)
Huhman ^a (2010) ⁸ Same tool and definition used in Berkowitz (2008) ²⁰	VERB Campaign. Item asked respondents whether they had done any physical activities yesterday and, if response was yes, to name the activities. Free-time physical activity sessions and % of children participating in organized physical activity in past 7 days also assessed. Huhman et al. reports on the primary outcomes from VERB.	Unit of measurement reported in this review is % reporting they were physically active yesterday.
Jason (1991) ²³	Participants asked to report type and amount of exercise done in past 3 days.	This study had no activity definition using categoric data, such as inactive and active or meeting physical activity guidelines. Type (aerobic and anaerobic) and amount (minutes) of aerobic exercise done in past 3 days were assessed. Unit of measurement used in this review was minutes of aerobic exercise over a 3-day period.
John-Leader (2008) ²⁴	At postcampaign, using intercept surveys, people were asked if they had heard of the campaign Stay Active–Stay Independent and, if familiar with the campaign, did it increase their actual involvement in physical activity?	% of people reporting that they were aware of the campaign and as a result have become more active

(Continued on next page)

Table 1. Physical activity assessment tools and definitions of physical activity used in stand-alone mass media campaigns (continued)

Study	Self-report physical activity assessment tool	Definition of physical activity
Merom (2005) ²⁵	Walking was assessed using two items: (1) Number of times during the past week the participant walked continuously for ≥10 minutes for exercise, recreation, or to get to or from places; and (2) total minutes spent participating in such walking (travel mode and moderate- and vigorous-intensity physical activity also were assessed).	Unit of measurement reported in this review is mean weekly minutes of walking in past week (for exercise, recreation, or to get to or from places). Primary focus was on walking since the campaign was promoting a “Walk to Work Day.”
Meyer (1980) ²⁶	Respondents asked to report weekly frequency and duration of leisure activities. The activities were assigned a MET value (intensity). For each activity, a leisure activity MET score was calculated, summed for each participant per activity over the week, and converted to a weekly mean value per respondent divided by 7 to obtain scores on a per-day basis.	Unit of measurement is average daily leisure activity MET score (i.e., mean MET minutes per day among comparison groups).
Miles (2001) ²⁷	Questionnaire items assessed frequency and duration of three types of exercise: brisk walking, moderate exercise, and vigorous exercise. Brisk walking was defined as walking at a brisk pace to get from place to place for recreation, pleasure, or exercise. Moderate activity was defined as doing activities that took moderate effort, such as easy cycling or swimming, raking, or sweeping (excluded walking). Vigorous activities required hard effort such as digging, jogging, fast cycling. On days activity was done, respondents were asked how long they had done each in minutes/hours.	% doing regular moderate exercise (including brisk walking) for five or more 30-minute sessions per week
Peterson (2008) ²⁸	Questionnaire: Single item asking adolescents, “As a result of the TV ads and billboards with the slogan ‘Get up and do something,’ have you become more active?”	% reporting they became more active
Price ^a (2008) ²⁹	VERB campaign. Single item asked parents for number of days a parent or other adult in household and their child were physically active together in the 7 days before the survey.	Average number of days in past 7 days parents and child were active together
Renger (2002) ³⁰	Item asked respondents if they participated in any activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise, during the past month.	% of sample reporting that they did not participate in leisure-time physical activity

^aVERB campaign-related articles address various research questions. Huhman et al.⁸ reports on the primary outcomes from VERB.

the findings are consistent in direction and size. Three studies in this review were of greatest design suitability and good execution quality, but the results were inconsistent. In addition, two of the three articles were from a single study—the VERB campaign—although the research questions were different.^{8,20}

The Task Force found that there was insufficient evidence to determine effectiveness for stand-alone mass media campaigns for increasing physical activity based on the 16 studies that met inclusion criteria for this review. This conclusion was based on multiple factors, including diversity or heterogeneity in methods and outcome measures that limited cross-study comparisons, primary reliance on self-report measures that were not validated, inconsistent patterns of findings, and evidence suggesting only modest behavior changes. Three of 16

qualifying studies reported decreases rather than increases in physical activity associated with the stand-alone mass media campaigns, and few studies systematically assessed campaign effects on both the proximal and distal outcomes (Figure 2).

In addition, the studies varied greatly in terms of their campaign intensity (although intensity was often not reported); duration (i.e., 1 week to 4 years); media dose (ranging from use of two channels to seven channels); and population reach of the various media campaigns. This finding is problematic because campaign intensity, dose, reach, and duration contribute to message awareness and recall, which may influence behavior change. A dose-related analysis of channels used to deliver campaign messages, for example, is important to determine campaign impact of individual channels. The extent to

Table 2. Select characteristics of stand-alone mass media campaigns

Study	Campaign target behavior(s)	Population (sample size)	Duration	Cost, \$
Bauman (2001) ¹⁷	Physical activity	Adults (N=1185)	2 months	700,000
Bauman (2003) ¹⁸	Physical activity	Adults (N=1172)	4 years	3 million
Beaudoin (2007) ¹⁹	Walking, diet	Adults (N=1500)	5 months	Not reported
Booth (1992) ²¹	Physical activity, walking	Adults (N=4900)	1 week	Not reported
Craig (2007) ²²	Walking	Adults (N=9755)	6 months (12 months between pre- and final assessments)	Not reported
Hillsdon (2001) ¹¹	Physical activity	Adults (N=3189)	2-year results reported (total campaign was 3 years)	£2 million (currently about 3.1 million)
Huhman (2010) ^{8,a}	Physical activity	Tweens aged 9–13 years (N=1623)	4 years	339 million
Jason (1991) ²³	Weight, physical activity	Adults (N=74)	3 weeks	Not reported
John-Leader (2008) ²⁴	Physical activity	Older adults, mostly aged ≥60 years (N=639)	18 months	191,000
Merom (2005) ²⁵	Physical activity	Adults (N=1086)	3 weeks	350,000
Meyer (1980) ²⁶	Physical activity	Adults (N=212)	2 years core campaign with 1 additional year for maintenance activities	Not reported
Miles (2001) ²⁷	Physical activity, diet	Adults (N=2112)	6 months	£2 million (currently about 3.1 million)
Peterson (2008) ²⁸	Physical activity	Adolescents aged 12–17 years (N=2895)	6 weeks	325,000
Renger (2002) ³⁰	Physical activity	Adults (N=500)	2 years	Not reported

^aTo avoid duplication, only Huhman et al.⁸ is listed as one of three VERB campaign-related articles having different research questions. Huhman et al.⁸ reports on the primary outcomes from VERB.

which the above characteristics specifically relate to target-audience exposure to a campaign message and subsequent behavior change is unclear. More-precise measurement and control of these characteristics, and how they influence changes in physical activity, will help better indicate whether stand-alone mass media physical activity campaigns are effective.

The evidence to support stand-alone mass media campaigns to increase physical activity is modest overall, and inconsistent, confirming conclusions of other recent reviews of physical activity mass media interventions.^{6,13} On the other hand, these conclusions in no way challenge or undermine previous Task Force reviews and *Community Guide* recommendations^{1,3} for the effectiveness of mass media campaigns as part of broader multicomponent interventions to increase population-level physical activity. Similarly, Cavill and Bauman¹³ have proposed “that mass media campaigns have an important role to play as part of a sustained and coordinated multi-level strategy to initially change social norms towards inactivity, and then to increase population-level physical activity.” Huhman³¹ highlighted

the value of social norm marketing to change behavior, noting it is important to take into account the rewards and values important to the priority audience.

Additional Literature Review, 2009–2011

After the current review was completed, an additional search was conducted to assess new results for stand-alone mass media campaigns published between 2009 and 2011, using the same criteria and methods employed for the 1998–2008 Task Force review. Only four studies,^{32–34,36} two conducted among children and two among adults, met inclusion criteria. One study³² examined CDC VERB-campaign effects in a large sample of students in Grades 5–7 and found no effects in self-reported physical activity.

An uncontrolled pre-test/post-test study evaluating effects of Canada’s 2007 year-long *Live Long Kids* campaign among children aged 9–12 years showed higher self-reported physical activity during free time at post-test compared to pre-test.³³ Children in that study who

participated in free-time physical activity ≥ 3 days in the previous week, at baseline, had higher campaign recall compared to those participating in free-time physical activity ≤ 2 days in the previous week. The authors of that study correctly note that it may be that active youth at the outset of the campaign were more likely than less-active youth to notice the physical activity campaign messages.

Berry et al.³⁴ evaluated the effects of an 8-week “Healthy U” TV campaign in Alberta, Canada, in 2007 designed to increase physical activity and fruit and vegetable consumption among adults aged 55–70 years. A cross-sectional survey administered at the end of the campaign found that physical activity behavior, measured in METs per week using the Godin Leisure Time Exercise Questionnaire,³⁵ did not differ by recall of the physical activity advertisements. A nonrandomized control trial conducted in Sumter County, SC³⁶ to evaluate a year-long media campaign, *Step Up, Step Out!*, promoting increases in moderate-intensity physical activity among sedentary women aged 35–54 years, found no pre-test to post-test differences in physical activity and walking behaviors among those who received mass media messages only, without corresponding behavior change tools and supports.

Thus, these four studies showed modest and inconsistent findings. When coupled with research design and measurement limitations, this served to reinforce the Task Force’s finding of insufficient evidence to determine effectiveness of stand-alone mass media campaigns to promote physical activity.

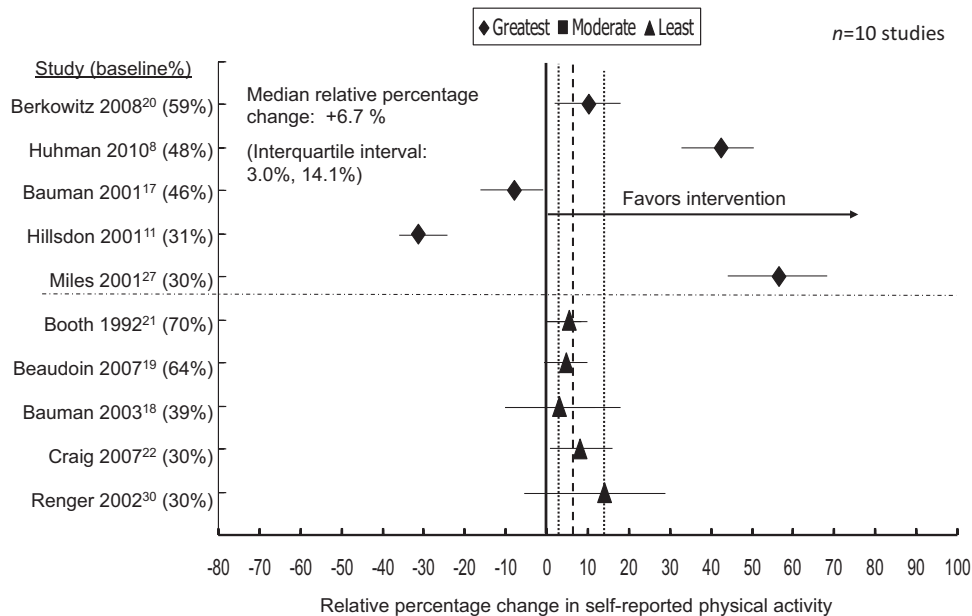


Figure 3. Relative percentage change in self-reported physical activity by study design

This result also bolstered the Task Force’s recommendations for stronger future research methods.

Knowledge Gaps

This updated Task Force review of stand-alone mass media campaigns to increase physical activity sought information on other important outcomes related to benefits, harms, cost effectiveness, and applicability of findings.

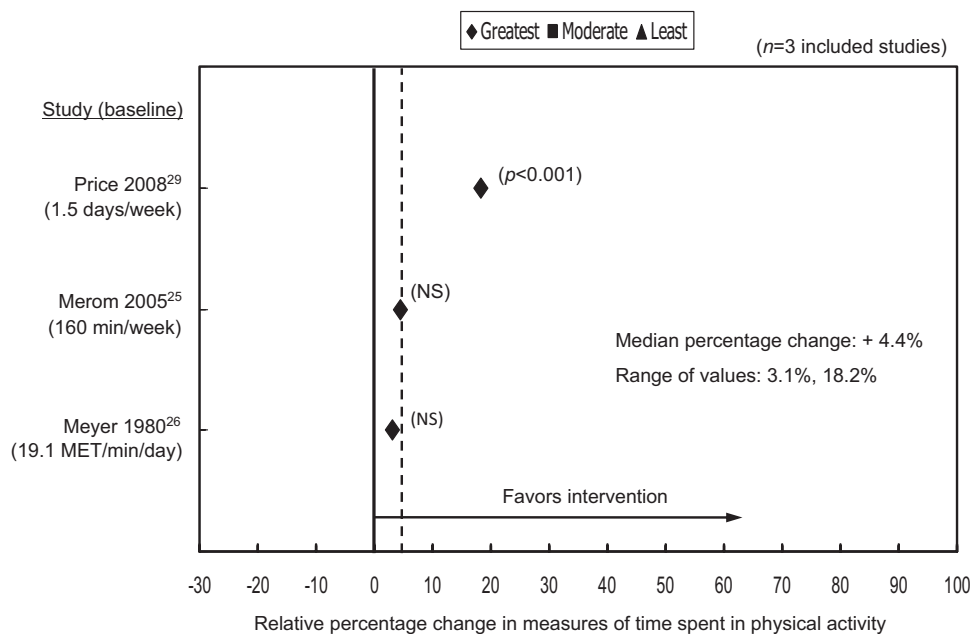


Figure 4. Relative percentage change in measures of time spent in physical activity min, minutes

The review identified several gaps in current knowledge that would strengthen future research. It is important to consider and address these gaps, highlighted below, if mass media campaigns are used as part of multicomponent community-wide interventions, as recommended by the Task Force.^{1,3}

Additional benefits and measures of physical activity. Twelve of 16 studies reported data on campaign awareness. Given that awareness is a critical component of media campaigns, it is very important to use standard measures to document campaign dose, intensity, duration, and reach, as these variables influence message awareness and can affect other distal outcomes. Data for proximal outcomes other than awareness listed in the analytic framework (Figure 2) were reported rarely. Six studies provided information about knowledge, intentions, or attitudes and beliefs related to physical activity.^{11,18,19,21,24,26} Measuring proximal outcomes of mass media campaigns is important also for determining success or failure to achieve desired increases in physical activity outcomes.

A related issue is the measurement method. All studies in this review used a self-report physical activity measure, and in many studies the measure was used with no evidence indicating that it was a valid or reliable measure of physical activity behavior. Future research, at a minimum, should use valid and reliable self-report measures, but ideally, more-objective measures of physical activity if feasible and appropriate for the research questions being asked.

This issue is a complex one for the field. Research with children and adolescents³⁷ found that validation and reliability studies comparing the correlations among four self-report physical activity questionnaires with doubly-labeled water and accelerometry as criterion measures varied by age group. In addition, self-reported physical activity estimates were found to be invalid for tracking individual behavior change that could occur as the result of an intervention.

This research has raised the question of whether there can be a single best measure of reported physical activity.³⁸ This question is especially relevant to mass media studies that assess physical activity behavior among populations varying widely by age, gender, and other important demographics. Use of measures that have undergone validation and reliability testing that best match the population groups (e.g., tweens versus older adults) and research questions being addressed is critical.

Harms. No study reported information related to injuries or deaths associated with physical activity stand-alone mass media campaigns. Either there were no adverse events related to physical activity, or these data were not collected. It is important to assess both harms and

benefits associated with physical activity interventions (mass media as well as other types of interventions) to evaluate their safety, and also to evaluate cost effectiveness that includes benefits gained and adverse events encountered.

Cost effectiveness. Several studies reported costs of mass media campaigns, which ranged from \$191,000 for a 1-year campaign²⁴ to \$339 million for a 4-year campaign.⁸ In one study, costs were evaluated in conjunction with various media and their impact on physical activity behavior.²⁸ A systematic cost-effectiveness analysis was not conducted in the studies reviewed. Future research should evaluate the relationship between campaign dose and costs per media channel by outcomes among the target audience(s).

Applicability. Mass media campaigns by their very nature deliver messages about physical activity to large and relatively undifferentiated audiences. Without evidence, it is unclear to what extent a mass media campaign reaches those population groups most in need, or what specific dose and channels of a media campaign (e.g., Internet, billboards) are most effective for specific target audiences. Several studies tailored messages to various audiences that included adolescents and tweens,^{8,28} older adults,²⁴ and African-American¹⁹ and Hispanic³⁰ populations. Audience segmentation also should be considered when planning multicomponent mass media campaigns, and efforts to evaluate the impact of targeting messages to select audiences, as well as broadly to the general population, will advance knowledge in this field.

Conclusion

This updated systematic review evaluated stand-alone mass media campaigns that varied in their intensity and duration, population targeted, control and comparison conditions, and reliance on varied and self-reported physical activity outcome measures. As a group, the studies found modest and inconsistent effects. Based on overall results of the current review, the effectiveness of stand-alone mass media campaigns to increase physical activity at the population level is unclear. A review of the research published between 2009 and 2011 (discussed above) reinforces this conclusion. Without stronger evidence for their effectiveness, such campaigns may be better used as part of a broader multicomponent community-wide intervention to increase awareness and knowledge about the benefits of physical activity and to change attitudes and norms—to create a broader social environment supporting population behavior change.

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