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Reaching Out to Promote Physical Activity in Australia: A Statewide Randomized Controlled Trial of a Stage-targeted Intervention

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Abstract

Purpose. This study examined the broader use of a print-media intervention, which was previously shown to be effective at promoting physical activity to participants recruited from a regional Australian community, as a strategy suitable for a more diverse statewide population sample.

Methods. Participants were randomly selected adults who responded to a telephone interview conducted by the New South Wales Health Department and consented to participate in a randomized controlled trial. Consenters were allocated to either intervention ($n = 361$) or control ($n = 358$) conditions. The intervention, a personalized letter plus stage-targeted booklets, was sent 1 week postbaseline. Data were collected via telephone interview at baseline and 2 and 8 months and were analyzed using repeated measures analysis of variance (ANOVA) and χ^2 statistics.

Results. The groups were similar at baseline (mean age 43 ± 3 years; 64% women). Process evaluation showed high intervention recall (76% at 2 months) and high follow-up response rates (>85% at 8 months) were achieved. Nonsignificant increases in physical activity were observed ($F_{1,719} = 2.18, p = .14$).

Discussion. A single mailing of stage-targeted print materials was not effective in promoting increases in physical activity among participants selected from the statewide population. Future research could examine how the effectiveness of print media might be enhanced, possibly by using supplementary media, community-based prompts, or other incentives. (*Am J Health Promot* 2004;18[4]:283-287.)

Key Words: Exercise, Community, Stages of Change, Environment, Prevention Research

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INTRODUCTION

It has been repeatedly shown that maximum health benefits accrue when the least active people become moderately active.¹ Yet despite the obvious health benefits of physical activity and promotional initiatives through mass media and community-based campaigns, participation levels have remained relatively unchanged in the United States over the past decade,² and have actually decreased in Australia.³ Consequently, the need for evidence-based approaches to large-scale physical activity promotion is escalating. Therefore, the replication and evaluation of previously successful physical activity promotion initiatives, which have had positive influences on physical activity in efficacy studies and may be suitable for population-based dissemination, is warranted.

Intervention trials comparing the efficacy of stage-targeted print materials as opposed to standard print materials have been shown to increase physical activity participation.^{4,5} However, these studies have been conducted using self-selected volunteer participants. Following their investigations in worksite⁴ and community⁶ settings, Marcus et al.^{4,6} recommended that future intervention studies should be conducted in different populations and settings before conclusive recommendations could be made. An Australian trial has since demonstrated significant increases in physical activity participation following a single mailing of

stage-targeted print materials to participants residing in a regional community. This study was unique in that the participants did not volunteer for the study; rather, they were proactively recruited from a random population sample of adults living in the regional coastal community.⁷ However, although this research is promising if future population-based physical activity objectives are to be met, effective large-scale interventions need to be established. The purpose of the present study was to evaluate the effectiveness of the stage-targeted print program, previously used to promote physical activity to residents in a regional Australian community,⁷ as a strategy to promote physical activity to a larger, more diverse sample of Australian adults. This study aimed to replicate the findings of the earlier study⁷ (which was conducted in a community where the local physical environment was conducive to being active^{8,9}) but in a more heterogeneous sample recruited from a diverse range of regional centers across the state of New South Wales. It was anticipated that if effective, this intervention could be incorporated into future initiatives to promote physical activity in whole populations.

METHODS

Study Design

In November 1997, a telephone survey was conducted by the New South Wales State Health Department to evaluate the impact of a national mass media campaign ($n = 2009$).¹⁰ Respondents to this survey were randomly selected from the electronic telephone directory. The eligible respondent in the household was the person aged between 18 and 75 years who was due to have the next birthday. The sample was shown to be representative of the state's population based on the most recently available census data.¹⁰ A random sample ($n = 1450$) of these respondents were recontacted in March 1998. Complete data were collected from 1185 (82%) and were used to assess the recall and impact of an earlier mass media campaign.¹⁰

Participants in this study were selected from the respondents to the

March 1998 survey, whereby 1097 respondents consented to participate in the present randomized controlled trial. Of these, 378 were excluded as they were already active and were in the maintenance stage of motivational readiness for physical activity both in November 1997 and March 1998. This left 719 participants to be stratified by stage of motivational readiness (see *Measures*) and randomly allocated to either an intervention ($n = 361$) or control ($n = 358$) condition. Participants were contacted by telephone at 2 and 8 months postbaseline by trained interviewers blinded to group allocation (Figure 1).

Sample

The participants in this study ($n = 719$) were predominantly married (76%), middle-aged (mean age of 43 ± 3 years), mostly women (64%), of average height and weight (mean body mass index 25 ± 5 units), and mainly spoke English at home (96%). The study sample was representative of the cohort from which it was selected and compared with the recent census data representative of the state's population in general.

Measures

At baseline, measures of physical activity and stage of motivational readiness for physical activity were collected along with standard demographic data from each participant. The physical activity measure included validated recall questions,^{11,12} which have been frequently used in Australian national physical activity surveys.^{3,8,10} Six questions are used to collect data on the frequency and duration of three separate activity categories (walking, moderate-intensity, and vigorous-intensity activity) undertaken in the past 7 days.^{11,12} Data from each activity category were summed to give an estimate of overall total physical activity (min/wk). Total physical activity was then dichotomized into a "sufficient" or "insufficient" physical activity category based on the current public health recommendations for physical activity.¹⁻³ Sufficient physical activity was defined as participating in at least 150 minutes of physical activity (combined walking, moderate-, and vigor-

ous-intensity activity) per week on at least 5 separate occasions.^{3,7,10} To ensure those participants who mainly participated in vigorous-intensity physical activity were not disadvantaged by this criterion, time spent in vigorous-intensity physical activity was weighted by 2.^{3,7-10}

Stage of motivational readiness for physical activity—precontemplation (PC), contemplation (C), preparation (P), action (A), and maintenance (M)^{4,5}—was assessed using a combined measure of behavior and intention.⁷ Categorical changes from the inactive stages (PC, C, or P) to the more active stages (A, M) and forward progression through the stages of motivational readiness were examined as outcome measures.⁷

Follow-up data were collected at 2 and 8 months postbaseline using the same measures, but with the addition of questions pertaining to the receipt and usefulness of the intervention materials.

Intervention

The intervention consisted of four full-color booklets, one specific to each of the early stages of motivational readiness (PC, C, P), and one aimed at the combined A and M stages. The booklets were broadly based on the content of the stage-targeted materials previously evaluated in the United States¹ and were the same as those used in the previous Australian trial.²

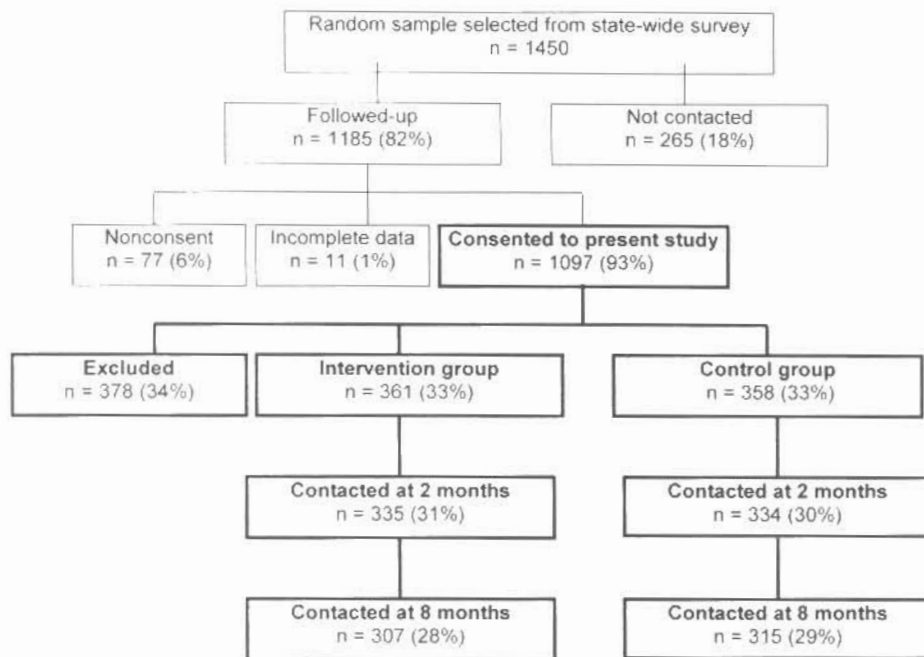
Like the previous trial,⁷ participants in this trial were sent the intervention approximately 1 week after the baseline survey. The intervention included a personally addressed letter of explanation about how to use the materials along with the booklet that specifically targeted their current stage of motivational readiness, plus any of the booklets relevant to the higher stages of motivational readiness. This enabled sequential progression through the relevant materials to be self-directed.⁶ The control group did not receive any information between the follow-up data collection telephone interviews.

Data Analyses

All data were coded, cross-checked, and matched across serial

Figure 1

Participant Recruitment and Progress Through the Phases of the Trial



surveys. Data were analyzed by intention-to-treat.¹¹ In population-based research, intention-to-treat analysis ignores whether or not the participants are followed-up or whether they received the intended intervention or not. Participants lost to follow-up had their baseline values carried forward to replace their data at the 2- and/or 8-month follow-up, which was lost to follow-up. This method conservatively assumes that participants lost to follow-up would not have changed their behavior, but enables all the data of the participants who were initially enrolled into the study to be included in the final analyses.

To determine the "real" effectiveness of the intervention if received and used as intended, additional analyses were conducted based on reported exposure to the intervention. This subset of analyses included only data of those participants who recalled receiving the intervention materials ("intervention received") and who also reported they had read the materials ("intervention received and read"). This type of analysis has been used previously, whereby the intervention received analysis corroborated

and strengthened the conclusions drawn from the intention-to-treat analyses.⁷

Descriptive statistics for total physical activity (min/wk) were calculated and analyzed using repeated measures analysis of variance (ANOVA; because of the similarities between the two groups, no covariates were used in this analysis). Changes in proportions defined as sufficiently active were analyzed using the χ^2 statistic, as was forward progression through the stages of motivational readiness. To quantify relationships, odds ratios (ORs) and 95% confidence intervals (CI) were calculated. All analyses were conducted using SPSS version 10 for Windows, and α was set at .05 for significance.

RESULTS

Baseline Characteristics and Follow-up

Baseline physical activity levels were similar between groups ($t_{1,718} = 1.16$, $p = .24$). Sixty-eight percent of both groups were in PC, C, or P stages of motivational readiness at baseline (17% and 18% in PC, 25% each

in C, and 26% and 25% in P in intervention and control conditions, respectively). Overall, the study groups were similar to each other and the sample from which they were selected. Data from 307 and 315 intervention and control participants were collected at 8 months; an overall retention rate was more than 85%.

Receipt and Use of the Intervention Materials

Approximately 76% of the intervention group recalled receiving the intervention materials at 2 months ($n = 253$). Of those who recalled receiving them, 83% reported that they had read them ($n = 210$). These two subsets of intervention group participants form the basis of the intervention received and intervention received and read analyses, respectively. Fifty-three percent reported that they had kept the materials and knew where they were, and another 21% reported that they had kept the materials but could not recall where they were. The remaining participants had either "thrown them out" (14%), "given them to someone else" (5%), or could not recall (6%).

Change in Physical Activity

At the 2-month follow-up, mean total physical activity increased by 13 min/wk in the intervention group, but decreased by 14 min/wk in the control group. At the 8-month follow-up, the intervention group maintained the increase observed at 2 months, but the control group reported a 15-min/wk increase from their baseline level. These changes in mean physical activity levels were not statistically significant between groups at 2 or 8 months (repeated-measures ANOVA, $F_{1,719} = 2.18$, $p = .14$). Similar results were observed when the data were analyzed by intervention received and by intervention received and read.

Proportion of Participants Becoming Sufficiently Active

At baseline, only 27% of the intervention group and 28% of the control group were meeting the sufficient physical activity guideline. These proportions did not change at

Table 1

Physical Activity and Stage Changes Analyzed by Intention-to-Treat, Intervention Received, and Intervention Received and Read

	Intention-to-Treat			Intervention Received			Intervention Received and Read		
	n	%	OR (95% CI)*	n	%	OR (95% CI)*	n	%	OR (95% CI)*
Meeting "sufficient physical activity" criterion									
Baseline									
Control	358	28	1.0						
Intervention	361	27	0.95 (0.49-1.85)						
2 months									
Control	358	27	1.0	358	27	1.0	358	27	1.0
Intervention	361	26	0.99 (0.70-1.40)	253	25	0.94 (0.64-1.38)	210	26	0.96 (0.64-1.44)
8 months									
Control	358	32	1.0	358	32	1.0	358	32	1.0
Intervention	361	32	0.99 (0.71-1.37)	253	32	0.99 (0.69-1.42)	210	32	1.02 (0.70-1.50)
Stage progression									
2 months									
Control	358	39	1.0	358	39	1.0	358	39	1.0
Intervention	361	40	1.03 (0.76-1.41)	253	42	1.15 (0.82-1.62)	210	41	1.07 (0.75-1.54)
8 months									
Control	358	45	1.0	358	45	1.0	358	45	1.0
Intervention	361	41	0.86 (0.63-1.17)	253	44	0.97 (0.69-1.36)	210	44	0.97 (0.68-1.39)

* Odds ratio (OR) calculated from Yates-corrected χ^2 statistic; CI = confidence interval.

the 2-month follow-up (Table 1). At the 8-month follow-up, both groups had increased the proportion of participants who were sufficiently active, thus the difference between groups was not significant, regardless of intervention received or intervention received and read status.

Movement Through Stages of Motivational Readiness

There was no significant difference between groups in terms of forward progression through the stages of motivational readiness (Table 1) when analyzed by intention-to-treat. Similar nonsignificant findings were observed when the data were also analyzed by intervention received and by intervention received and read. Furthermore, when only those participants in the intervention and control groups who were in PC, C, or P at baseline were examined separately for movement into A or M at either 2 or 8 months, the nonsignificant findings prevailed (2-month OR = 1.02, 95% CI = .64-1.61; 8-month OR = .69, 95% CI = .44-1.08).

DISCUSSION

Summary

Previous research has shown that sequential mailings of stage-targeted print materials can be effective in prompting short-term (up to 3 months) increases in physical activity in worksites,⁴ and in community settings.⁵⁻⁶ This study aimed to replicate the findings of an earlier Australian trial,⁷ whereby a single mailing of stage-targeted print materials produced significant gains in participation at 3 months, but on a much larger scale. The previous trial was conducted in a regional community,⁷ whereas this study was conducted with participants sampled from the statewide population. The results of this population-based randomized controlled trial were not consistent with previous findings.⁷

The two trials used the same intervention materials, which were theoretically based on the previously successful stage-targeted print materials used in the United States.^{4,5} The print materials used here were for-

matively evaluated prior to dissemination in the earlier trial.⁷ The same method of dissemination was used in both trials, and yet despite similar rates of recall and use of the stage-targeted print materials observed in both trials, there were no significant findings in this study in terms of change in total physical activity participation or movement through the stages of motivational readiness. Furthermore, this study had similarly high retention rates comparable with other community-based studies,^{6,7} and used valid and reliable measurement tools.^{8,9,10-12}

The main difference between the two studies was that this study was conducted in a larger, more diverse population-based sample, which was representative of the statewide adult population as opposed to the confined regional community used in the previous study.⁷ Increasingly the literature is now focusing on specific environmental attributes associated with being physically active.^{8,9} New South Wales, the state in which this study was conducted, has 17 different

regions that range from coastal reaches to the mountains to the outback. Consequently, many of these regions may not have environments that are as conducive to physical activity, as was the coastal environment of the earlier trial.⁷

Another difference between the two trials that may account for some variation in the results was that this study was conducted over the Australian autumn (fall) to winter, whereas the previous trial⁷ was conducted over the spring and summer. Physical activity levels of participants have been shown to be influenced by the changes in seasonal and climatic conditions.¹⁴ The other main difference between the two trials was that the earlier trial⁷ also included one additional telephone contact between baseline and first follow-up evaluation, which may have prompted more use of the program materials. However, evidence from that trial suggested that the additional telephone contact did not prompt increased recall or use of the program materials.⁷

This study was a novel attempt at promoting physical activity to a large and diverse population sample selected from a variety of community settings. Although this stage-targeted print intervention was not effective as a statewide promotional strategy, the previous Australian trial suggests it has some merit when disseminated at a regional level.⁷ Sequential as opposed to a one-time mailing of materials may be a more effective strategy.¹⁵ There is a need to examine how more specific community-based prompts and supports,^{8,9} supplement-

ary media, or incentives might be used to enhance the effectiveness of physical activity promotion initiatives.

Limitations

Data were collected via self-report telephone interviews, which can introduce social desirability bias and retrospective recall bias. However, due to the lack of intervention effects, it is unlikely the participants felt compelled to report changes that were not real. Furthermore, interviewers were blinded to participant group allocation, thus reducing the potential for differential influence on one group over the other. The diversity of the sample, which was selected from a variety of community settings, is as much a limitation as it is a strength, as the sample used in this study was representative of the entire state's population in terms of socio-demographic profile.

Significance

The lack of intervention effect observed in the present study is informative, particularly considering significant effects were previously demonstrated using identical materials and delivery in a regional community. Dissemination of stage-targeted print materials alone may not be an effective statewide method of promoting physical activity, but may potentially be useful for smaller regional community-based promotional programs.

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