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Small sustainable monetary incentives versus charitable donations to promote exercise: Rationale, design, and baseline data from a randomized pilot study

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ABSTRACT

Regular physical activity (PA) enhances weight-loss and reduces risk of chronic disease. However, as few as 10% of U.S. adults engage in regular PA. Incentive programs to promote PA have shown some promise, but have typically used incentives that are too large to sustain over time and have not demonstrated habit formation or been tested in community settings. This report presents the rationale and design of a randomized pilot study testing the feasibility and preliminary efficacy of small monetary incentives for PA (n = 25) versus charitable donations in the same amount (n = 25) versus control (n = 25) over 12 months among 75 low-active but otherwise healthy adults at a local YMCA. Incentives are based on YMCA attendance, which is verified by electronic swipe card data and is the primary study outcome, with self-reported minutes/week of PA assessed as a secondary outcome. Incentives are intentionally small enough—$1/session, maximum of $5/week—such that they could be indefinitely sustained by community organizations, privately-owned health clubs, healthcare organizations, or employers (e.g., employer fitness facilities). Costs of the incentive program for the sponsoring organization may be partially offset by increases in membership resulting from the appeal of the program. Moreover, if efficacious, the charitable donation incentive program may have the added benefit of building social capital for the sponsoring organization and potentially serving as a tax write-off, thus further offsetting the cost of the incentives. Findings will also have implications for the use of financially sustainable community-based incentive programs for other health-related behaviors (e.g., weight loss, smoking).

1. Introduction

Participation in regular physical activity (PA) has numerous health benefits including reduced risk of all-cause mortality [1–7], cardiovascular disease [8–12], diabetes [13–16], and cancers of the breast [17–19] and colon [20–23]. However, only 51.6% of U.S. adults meet national guidelines of expending ≥ 1000 kcals/week through PA [24], and estimates are as low as 10% meeting these guidelines when objective assessments of PA are used [25].

One promising approach to exercise promotion is the use of material incentives. In operant conditioning theory, an incentive is a stimulus that is presented contingent on performance of a specified behavior for the purposes of increasing the frequency of the behavior (aka, contingency management) [26,27]. In behavioral economics, conditional economic incentives (aka, conditional cash transfers) are used to "nudge" participants into adopting behaviors they want to pursue, but struggle to achieve because of departures from fully "rational" behavior [28,29]. For example, even though most of us recognize the benefits of exercise, we may be temporarily "myopic"—preferring to watch TV and delay exercising [30–33].

A recent systematic review of the use of material incentives in exercise promotion programs yielded 12 randomized controlled trials that, while heterogeneous regarding incentive type, structure, and sample population, supported the use of incentives to promote initial increases in exercise behavior [34]. However, there was no evidence of habit formation, meaning that patterns of exercise behavior tend to return to baseline following removal of the incentive program. Moreover, no RCTs tested the efficacy of incentive programs for exercise promotion in real-world community settings.

This paper presents the rationale and design of a randomized pilot study comparing two community-based (i.e., YMCA) exercise promotion incentive programs that are designed to be indefinitely financially

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sustainable and thus alleviate the need for removal of the incentives. In both incentive programs, participants pay the standard monthly YMCA membership fee of $49/month. In the Rebate incentive program, participants have the opportunity to earn $1/day for each day that they attend the YMCA (verified by objective swipe-card data), with a maximum of $5/week. In the Donation incentive program, participants have the opportunity to earn $1/day (using the same incentive schedule) in donations to a registered local charity of the participant's choice. The Rebate and Donation conditions are compared to a control condition that receives only feedback on their attendance.

Although this pilot study is not adequately powered to detect significant between-group differences, we expect that the average number of days per week of YMCA attendance will be greater for those in the Rebate and Donation conditions as compared to the Control condition. In addition to our primary hypotheses, we will explore the moderating effects altruism and hedonic and eudaimonic well-being on the efficacy of each incentive intervention. Specifically, we expect that the Rebate intervention will be more efficacious, relative to control, for those who score high on hedonic well-being, and the Donation intervention will be more efficacious, relative to control, for those who score high in eudaimonic well-being and altruism.

2. Proof-of-concept study

Prior to conducting the pilot study that is the focus of the present paper, we conducted an initial 10-week study to determine proof-of-concept for the use of small monetary incentives among a sample of 22 sedentary or low active university students (20 ± 1.6 years, body mass index 24 ± 3.5 kg/m^2, 69% women, 41% non-Hispanic white) [35]. Participants were randomized to either a control condition (non-incentivized, n = 11) or an experimental condition (n = 11) to earn $0.01 per every 4 kcal expended through aerobic exercise performed at the university fitness center. Incentives were capped at $5.00 per week, equivalent to a caloric expenditure of 2000 kcal as this value represents the upper end of national recommendations for aerobic activity [36]. Caloric expenditure data were collected two ways: a) participants in the first cohort downloaded exercise session data using USB drives which were then uploaded to an equipment-specific website, and b) participants in the second cohort took photos of exercise session summaries displayed on equipment monitors using smartphones and emailed photos to the study staff. All reported sessions were verified using electronic swipe card data from the university fitness center. Participants in the control and experimental conditions were provided with weekly emails highlighting his or her weekly total regarding caloric expenditure and caloric expenditure plus cash earned, respectively. All earned incentives were provided upon study completion. While this initial study was underpowered (62%), we observed a medium interaction effect (Cohen's d = 0.69) in favor of the incentivized condition regarding caloric expenditure over time ($F_{(1,171)} = 2.25$, $p = 0.06$), thus providing proof-of-concept for the larger pilot study.

3. Methods

3.1. Recruitment and screening

The study was conducted at the Kent County YMCA in Warwick, Rhode Island, USA. Recruitment targeted adults (≥ 18 years) who either joined the YMCA within the past week (hereafter referred to as new members) or were previous YMCA members with low attendance, defined as attending the YMCA fewer than 4 times per month in the last 6 months as verified through the YMCA database. Recruitment channels included YMCA new-member orientation, word of mouth by participants and YMCA staff, flyers in the YMCA and local community, and targeted postcards, emails, and phone calls from both the YMCA staff and research staff.

Regardless of recruitment channel, participants were required to express interest in the study by sending an email to the study email address. Study staff then checked the YMCA database to ensure the participant was ≥ 18 years, had an active YMCA membership ($49/month plus a $49 joiners fee; rates are reduced for those ≤ 23 or ≥ 62 years-old, as well as for those who can verify need for financial assistance) [37], and was either a new member or met the low attendance criteria. Those who met these initial screening criterion were directed to an online consent form, followed by an additional screen for eligibility. Additional eligibility criteria included engaging in fewer than 150 min/week of structured moderate intensity exercise, 75 min/week of vigorous intensity exercise or an equivalent combination of moderate and vigorous intensity exercise; plans to reside in the geographical region for the next 12 months; and no enrolled/participating family members.

3.2. Baseline assessments and randomization

Participants who were eligible after the screening completed a baseline survey assessing demographic characteristics, height, weight, altruism, and hedonic and eudaimonic well-being. Upon completion of the baseline survey, participants were randomized into Rebate (n = 25), Donation (n = 25), or Control (n = 25) using a stratified permuted blocks randomization procedure, with respect to the strata of overweight/obesity status, such that a roughly equal number of participants in each condition with BMI < 25.0, 25.0 ≤ BMI < 30.0, and BMI ≥ 30. Participants were asked to not reveal to YMCA staff which experimental condition they were randomized to.

3.3. Experimental conditions

3.3.1. Rebate

Participants in the Rebate condition have the opportunity to earn $1/day in monetary incentives over a 12-month period in the form of Amazon.com credits for each day that they attend the YMCA (verified by objective swipe-card data), with a maximum of $5/week. Notice of these incentives is provided to participants on a weekly basis via email such that participants will be able to track their total incentives for the week and year-to-date. The incentive for the previous week is made available to participants at the beginning of the following week. Additionally, upon study enrollment participants receive an initial priming incentive of $5.

3.3.2. Donation incentive condition

Participants in the Donation condition have the opportunity to earn $1/day in donations to a registered local charity of their choice for each day that they attend the YMCA over a 12-month period. As with the rebate condition, notice of donations are sent to participants each week via email and participants receive an initial priming incentive of $5 upon study enrollment.

3.3.3. Control condition

Participants in the Control condition are provided with weekly emails about their YMCA attendance over a 12-month period, but do not receive incentives.

3.4. Exercise prescription

As part of the normal YMCA orientation process, and prior to study enrollment, participants in all three experimental conditions received exercise prescriptions for achieving at least 30 min/day of moderate-intensity exercise, with moderate intensity based on 64–76% of age-predicted maximal heart-rate (i.e., $HR_{max} = 206.9 - (0.67 \times age)$) or Rated Perceived Exertion of 13–15 [36]. Participants were instructed via YMCA staff that exercise prescriptions can be met through use of the treadmills, ellipticals, and stationary cycles available at the YMCA as well as through swimming or participation in YMCA structured exercise