Preventive Medicine 75 (2015) 75–85

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Review

Personal financial incentives for changing habitual health-related behaviors: A systematic review and meta-analysis

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ARTICLE INFO

Available online 2 April 2015

Keywords:
Financial incentives
Health-related behavior
Systematic review
Meta-analysis
Health promotion

ABSTRACT

Objectives. Uncertainty remains about whether personal financial incentives could achieve sustained changes in health-related behaviors that would reduce the fast-growing global non-communicable disease burden. This review aims to estimate whether: i. financial incentives achieve sustained changes in smoking, eating, alcohol consumption and physical activity; ii. effectiveness is modified by (a) the target behavior, (b) incentive value and attainment certainty, (c) recipients' deprivation level.

Methods. Multiple sources were searched for trials offering adults financial incentives and assessing outcomes relating to pre-specified behaviors at a minimum of six months from baseline. Analyses included random-effects meta-analyses and meta-regressions grouped by timed endpoints.

Results. Of 24,265 unique identified articles, 34 were included in the analysis. Financial incentives increased behavior-change, with effects sustained until 18 months from baseline (OR: 1.53, 95% CI 1.05–2.23) and three months post-incentive removal (OR: 2.11, 95% CI 1.21–3.67). High deprivation increased incentive effects (OR: 2.17; 95% CI 1.22–3.85), but only at >6–12 months from baseline. Other assessed variables did not independently modify effects at any time-point.

Conclusions. Personal financial incentives can change habitual health-related behaviors and help reduce health inequalities. However, their role in reducing disease burden is potentially limited given current evidence that effects dissipate beyond three months post-incentive removal.

Contents

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http://dx.doi.org/10.1016/j.ypmed.2015.03.001

Introduction

Smoking, poor diet-related behaviors, excessive alcohol consumption, and physical inactivity contribute to the development of major non-communicable diseases, i.e. cardiovascular diseases, type 2 diabetes, cancer and chronic respiratory diseases (Andersen et al., 2000; Batty et al., 2008; Batty et al., 2001; Cox et al., 2000; He et al., 2007; Heidemann et al., 2008; Teo et al., 2006), which together account for more than 50% of preventable premature deaths worldwide (3four50.com, 2011; WHO, 2012). The World Health Assembly has recently pledged to reduce non-communicable diseases by 25% by 2025 (WHO, 2013). Offering individuals personal financial incentives to change their health-related behavior could contribute to attaining this ambitious target, but uncertainty remains about the effectiveness of such schemes.

Personal financial incentives have been shown to be effective in changing several non-habitual health-related behaviors, including undergoing vaccinations, attending screening, and adhering to healthcare treatments (Jochelson, 2007; Kane et al., 2004; Sutherland et al., 2008). Whilst evidence indicates that incentive schemes can change the habitual health-related behaviors that contribute to non-communicable diseases (Jochelson, 2007; Sutherland et al., 2008), uncertainties remain about the conditions under which change is achieved and sustained after incentive removal (Jochelson, 2007; Marteau et al., 2009).

Authors of relevant existing systematic reviews (Jochelson, 2007; Kane et al., 2004; Sutherland et al., 2008; Cahill and Perera, 2011; Paul-Ebhohimhen and Avenell, 2008) have concluded that achieved changes to habitual health-related behaviors are not sustained after removal of financial incentives. However, these reviews have assessed effects over time, without explicitly focusing on or systematically analysing impacts after incentive removal. This distinction is important since in some studies payment of the final incentive has coincided with the final follow-up assessment (Donatelle et al., 2000a,b; Gallagher et al., 2007; Jeffery et al., 1990; Klesges et al., 1987; Rand et al., 1989). Furthermore, most existing systematic reviews have not investigated factors that may modify behavioral responses to incentives, such as the target behavior (Jochelson, 2007; Sutherland et al., 2008), incentive value (Sutherland et al., 2008; Paul-Ebhohimhen and Avenell, 2008; Lussier et al., 2006), certainty of incentive attainment (certain — e.g. vouchers — vs. uncertain — e.g. lottery) (Leung et al., 2002) and recipients' deprivation level (Sutherland et al., 2008). Some evidence suggests that under the right conditions financial incentives could lead to sustained changes (Cahill and Perera, 2011; Troxel and Volpp, 2012; Volpp et al., 2009), highlighting the need for research to move beyond the question of whether incentives work, to elucidate the circumstances under which they are most effective in achieving and sustaining changes (Marteau et al., 2009).

The present systematic review aims to provide a more complete assessment of the effects of personal financial incentives on habitual health-related behaviors in adults by investigating:

i. the effectiveness of incentives for smoking cessation, healthier eating, reduced alcohol consumption, and increased physical activity,
   a. regardless of whether incentives are still offered, and
   b. when incentives have been removed;
ii. whether the effectiveness of financial incentives is modified by
   a. the target behavior,
   b. incentive value and attainment certainty, and
   c. recipients' deprivation level.

Methods

Further information on the review methods are presented in the protocol registered on PROSPERO, record ID CRD42012002675 (available here: http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42012002675).

Study eligibility criteria

Studies eligible for consideration in this review were randomized controlled trials assessing outcomes relating to target behaviors at a minimum of six months from baseline and allocating adults to the offer of financial incentives or i) no treatment; ii) the same treatment as those incentivized, without the offer of incentives; or iii) incentives differing in attainment certainty or amount. Studies assessing multi-component interventions precluding assessment of the independent effects of incentives, and studies offering incentives of symbolic or no monetary value or not contingent on achievement of target outcomes, were not eligible.

Literature searches

A detailed search strategy (Appendix A, Text S1) was used to search the following electronic databases for records of eligible studies from inception to July 2012: MEDLINE, EMBASE, PsycINFO, CINAHL, SCOPUS, EconLit, the Cochrane Central Register of Controlled Trials and the Cochrane Database of Systematic Reviews. Searches were limited to studies of adults. No language restrictions were applied. Reference lists of relevant papers and grey literature resources (HMIC, online clinical trials registers, Google Scholar and websites of key organizations) were also searched.

Study selection and data extraction

The titles and abstracts of identified records were screened by one author (EM). The full-text reports of potentially eligible studies were independently assessed by one author (EM) and one trained research assistant (JT). Disagreements were resolved by consensus.

One author (EM) and one trained research assistant (LSR) independently extracted all data.

Dichotomous outcome data were extracted as measures of effectiveness in terms of the attainment or non-attainment of pre-specified target levels of behavior-change, to allow for overall estimates of behavior-change across target behaviors. If outcome data were unavailable or not presented in dichotomous form, study authors were contacted and requested to provide these. Where these data were unavailable, continuous data were extracted and later re-expressed as odds ratios (see Data analysis). Relevant existing systematic reviews were also checked for missing data.

During the data extraction process, incentives were classified according to their overall value as either 'low' (<$400) or 'high' (≥$400). Judgments regarding the classification of value for the only study included in the review which was conducted in a low income country (Giné et al., 2010) were made based on information reported by the study authors that incentives constituted