

Redeeming Behaviours: The Influence of Incentive-Based Programs on Behaviour Change Updated June 2016

Executive Summary

This paper updates an earlier 2012 version to describe the most recent and relevant evidence of incentive-based health promotion programs for behaviour change. To locate this evidence, a scoping review was conducted in both scholarly and grey literatures for research completed 2012-2016 in North America and the U.K. where incentives were offered for at least six months related to behaviours associated with chronic disease prevention, workplace wellness, mental health and medication compliance. The studies included reflect the use of financial and in-kind gifts or vouchers/discounts, as well as varying incentive schemes (e.g., lotteries, deposit contracts, immediate and delayed payments). As well, the paper includes data from systematic reviews and commentaries where appropriate. Most of the research obtained discusses the effectiveness of incentives integrated into workplace wellness initiatives for physical activity and weight loss. Smoking cessation is also well represented. There is much less information concerning mental health and medication compliance. While the research methodologies and incentive schemes studied are scattered and diverse, a general narrative analysis of the findings suggest that success is more likely to be conferred when rewards are more immediate, more visible, and escalate over the duration of the program. Further, personalized rewards that are earned for participation/engagement in the process and/or performance of behaviour change, rather than solely for achieving health outcomes, appear to be more salient for individuals and more likely to sustain behaviour change.

Introduction

“One would think that if we informed people of their risks they would rush home and, in the interests of good health, change behaviours that caused the risk. Some people do, but most do not.”¹

Despite the unprecedented increase in and accessibility to health information, Leonard Syme's¹ observations over 14 years ago are more relevant than ever; indeed, many Canadians probably know that they *should* improve their health, even intend to, but find it difficult to shed old habits in circumstances that conspire against them. We live in an era in which chronic health issues are not exclusive to the elderly and the infirm and increasingly dominate our health care attention and resources: 51.6% of Canadians aged 20 and older live with at least one chronic condition, and almost 15% live with two or more,² contributing to two-thirds of all deaths.³ In 2000, the economic burden of six of the major conditions cost Canadians \$95 billion in direct and indirect costs.⁴ According to a 2014 economic analysis of risk factor burden on the Canadian health care system, the three most-costly habits foiling preventable chronic disease are smoking, excess weight and physical inactivity, totalling \$50.3 billion in 2012.⁵ Equally prevalent and urgent are

mental health issues. According to a 2010 study conducted by the Mental Health Commission of Canada,⁶ more than 6.7 million live with a mental health problem, the cumulative cost of which also amounts to \$50 billion each year.

While tobacco policies and health education over the last decade have successfully decreased the rate of smoking across the country, smoking tops the list as the most potent risk factor regarding preventable chronic disease burden.⁵ Its highly addictive nature demands that the 18% of current smokers in Canada⁷ make one to two quit attempts each year “*but they are almost universally unsuccessful. The majority of smokers already understand that smoking is harmful, so smokers require help and not lectures.*”⁸ Neither have initiatives directed toward Canadians struggling to maintain a healthy body weight, eat right, sit less and get enough physical activity successfully changed these health trajectories. In fact, recent information from the Canadian Health Measures survey reveals that we are the heaviest, with one out of every four Canadian adults classified as obese,² and the most sedentary (for approximately 10 hours a day), in our nation’s history.⁹ We also know that only 10% Canadian adults who do not meet the recommended levels of physical activity, as set out in Canada’s Physical Activity Guide, are more likely to self-report certain chronic conditions, such as type 2 diabetes, high blood pressure, and obesity, or to report fair/poor general health than Canadians meeting the recommendations.¹⁰

Although estimates of adherence to medical regimens vary in the literature, non-compliance is a common challenge, with one meta-analysis calculating an average nonadherence rate of almost 25% across a number of conditions, including diabetes, lung disease and cancer.¹¹ Among Canadian seniors starting a new drug therapy for cardiovascular disease, only 51.8% were defined as persistent and 59.0% as compliant.¹² According to researchers at the University of Saskatchewan, College of Pharmacy and Nutrition, patient non-adherence to drug therapy costs us about \$10 billion per year.¹³ The issue of non adherence is particularly relevant for persons living with chronic conditions compared to patients with more acute illnesses; adherence rates tend to drop after the first six months of therapy.¹⁴ Not surprisingly, increasing age also negatively influences adherence, thus contributing to worse health outcomes, increased hospitalization rates and increased health care costs.¹⁵⁻¹⁷ Identifying new interventions is critical to curbing low adherence rates and improving treatment outcomes,^{18,19} including the use of interactive internet-based, health communication applications that combine health information with behavioural strategies.²⁰

To turn the tide, layered and coordinated initiatives at the population level are needed that to educate, motivate and support individuals to embrace healthy living for both prevention and changes in risk behaviours²¹ “... so that Canadians can spend more years living productively and independently.”²² Achieving even a “modest” 1% lower prevalence of smoking, excess weight and physical inactivity would save an estimated \$8.5 billion toward the cost of preventable chronic disease in just 15 years.⁵ Describing the compelling neurobiological evidence of reinforcement and operant conditioning processes have in adopting and maintaining risk behaviours, Higgins et al.²¹ laud incentive programs for their potential “to leverage that very same reinforcement process that drives unhealthy risk behaviors to promote healthy behavior.”

BestLifeRewarded® (BLR – www.bestliferewarded.com) was the first rewards-based health behaviour change program in Canada and in this sense is the best example of how personalized incentives have been used to promote healthy living in Canada. Developed by Cookson James Loyalty Inc., the content of BLR is evidenced-based with expert advice from the Dietitians of Canada, Canadian Obesity Network, the Canadian Digestive Health Foundation, amongst many other leading health organizations. BLR leverages the success of recognized and established retail loyalty programs such as, travel reward miles, grocery store chain points cards, etc. but instead rewards healthy rather than purchasing behaviour, including healthier eating, being more physically active, quitting smoking, participating in healthy living challenges and using health trackers and wearable technology, such as FitBit devices. BLR members can exchange their accumulated points for tangible rewards, in the form of (for example), gift cards, healthy cookbooks, fitness equipment, ballots for grand prize draws, consultations with Registered Dietitians, or donations to selected health-related charities. Points are earned from engaging in one or more of their healthy practices, or for improving health education and literacy through the site, tracking their healthy behaviours, or signing up for daily reminders, such as drinking more water, taking the stairs instead of the elevator or taking medication as prescribed. Fusing extrinsic motivational cues (incentives) with other behaviour change strategies (tracking, goal setting, etc.), BLR is structured to offset the ‘present bias’ that can vex the uptake of healthy living and its belated positive outcomes, and in doing so, facilitate the development of intrinsic motivation. Theoretically grounded in both stages of change and behavioural economics theory, a notable attribute of BLR is its enduring nature: unlike many research interventions that test the sustainability of incentives on behaviour change once removed, BLR offers persistent, self-determined, customized and *both* process and outcome oriented reward incentives that can be ‘cashed in’

through existing retailers at various points along the change process. This design structure is more likely to foster genuinely meaningful and long-term change. To date, this distinctive structure of BLR's reward system is absent in the scholarly literature investigating the influence of incentives on behaviour change. Randomized controlled trials investigating the effectiveness of BLR with cardiac rehabilitation and hospital employee populations are currently underway.

The potential of incentives for modifying a variety of health behaviours is theoretically grounded in Behavioural Economics which posits that peoples' cognitive biases are the basis for making decisions regarding their behaviours, arguing that they do so irrationally and frequently succumb to the 'manana mindset when the inherent 'profit' from healthy living cannot be reaped immediately, and thus can be deferred until tomorrow. Since the landmark book by Thaler and Sustein,²² *Nudging Behaviours*, behavioural economics has garnered high profile attention by governments and researchers alike.²³⁻²⁵ Despite an initial reluctance that giving money or rewards in order to motivate change or enhance compliance is at first a very controversial thought (should we reward people to do things they should be doing anyway?), early investigations found financial and other incentives to be effective in increasing adherence in a range of health conditions, such as weight loss programs,²⁶ improved physical activity levels and a reduction in anthropometric factors among adults living with type 2 diabetes,²⁷ medication adherence for tuberculosis,²⁸ as well as to encourage parents to seek dental care²⁹ and immunizations³⁰ for their children. Over a decade ago, a review of 23 studies seeking to change behaviours related to exercise, smoking and/or body weight, Kane and colleagues³¹ observed a short-term positive effect of the use of incentives 72% of the time. The review also found minimal evidence to support a dose response: The higher the value of the incentive, the higher the behavioural response to the incentive.

In her 2012 commentary on the state of evidence for using incentives for health behaviour change, Ries³² notes that *"the use of sound theory and current evidence can help inform the development, implementation and evaluation of incentive programs as an addition to the health promotion toolkit for Canadian public and private sector organizations."* The purpose of this paper is to update the earlier 2012 version that described the potential of incentive-based initiatives as a motivational tool to facilitate the uptake and maintenance of health behaviour change. Here, our focus examines behaviours tied to chronic disease prevention (physical activity, weight loss/healthy eating, smoking cessation, as well as employee health and wellness programs), medical compliance, and mental health issues. In doing so, we also combed the literature to discern how 'keener participation' in incentivized initiatives may influence results;

these data are not always discussed in published studies and many address priority audiences only, but where available, such information is described in the following sections. Finally, we searched for evidence of the influence of incentives on presenteeism, absenteeism, short and long term disability claims, but we found little to include. A scoping review of current evidence (2012-2016) was conducted to identify the evidence in the literature on this issue. A scoping review is a comprehensive, documented, transparent and replicable identification and appraisal of a broadly defined issue in relevant literatures.³³ We exclude studies that provided financial payment to participants for completion of study measures only (a common practice to compensate research participants for their time and effort), rather than being an integral part of the intervention. Because of the gaps in the literature, the paper also draws on others' commentaries and reviews to support the evidence presented from our search findings. Before concluding, there are five recommendations we have gleaned from the literature pertaining to how best frame incentive structures.

Evidence of Incentive-Based Interventions for Behaviour Change

Perhaps the most recent and comprehensive analytical investigations of how personal financial incentives shape habitual health related behaviours – smoking, physical activity, healthy eating, weight loss and medical adherence – are the work of Mantzari et al.³⁴ and Hoff et al.³⁵ in their meta-analytical reviews. The first team sought to “*move beyond the question of whether incentives work, to elucidate the circumstances under which they are most effective in achieving and sustaining changes.*”³⁴ Their assessment of 34 studies with a total of 10,585 adult participants in incentivized and non-incentivized conditions across these health practices found rewards to effectively increase the realization of behaviour changes. Notably, one finding holds importance not previously identified: incentives' role in reducing health inequities. Participants classified as highly deprived experienced about twice the success at 6 and 12 months past the intervention launch compared to non-deprived participants. Hoff and colleagues' ³⁵ meta-analysis investigated how well participants in smoking cessation, weight loss and medication adherence

ⁱ A search was conducted in peer-reviewed databases of MEDLINE, Business Open Source, and Google/Google Scholar, as well as in the grey literature. Inclusion criteria included that the research was conducted in North America or the United Kingdom and published in English between 2012 – 2016, describing studies where incentives were offered for at least six months. Meta-analyses were included for the purpose of providing an overview to the knowledge base; searches were primarily limited to non-RCTs unless conducted directly in the settings for which they intended to examine. Keywords searched included a combination of the following: chronic disease prevention (modifiable risk factors), optimization of treatment, reduction for presenteeism, absenteeism, short and long-term liability claims and ability to drive engagement with health professionals; stress, anxiety, depression and financial health; personalized/tailored. Incentives reflected both financial and in-kind gifts or vouchers/discounts.

(anticoagulation) interventions responded specifically to financial incentives (educational and other intervention resources were provided to both intervention and control participants). **Pooling participant-level data from seven Randomized Controlled Trials with a total sample of 1,403 adults demonstrated that overall participants receiving incentives had almost four times greater likelihood of achieving their intended behaviour change than individuals not receiving incentives.** There was some evidence that the incentive schemes had greater impact on individuals with low income or who identified as black, but not with regards to other demographic characteristics. A unique contribution of this study is its examination of different incentive schemes, with the regret lottery, deposit contract and conditional payment designs each conferring greater success respectively, over the control (no incentive) conditions. Briefly, regret lottery formats offer participants a chance at receiving rewards but are contingent on meeting behaviour change goals; when goals are unmet, participants are informed of what they *would* have had a chance of winning if they have succeeded in reaching their goal. Deposit contracts ask participants to contribute a specific dollar amount that is to be returned and matched, often adding an additional payment, should behaviour change goals be met. The conditional payment design is a guaranteed reward earned for achieving behaviour change goal; these can take the structure of individualized payments or group payments which are split evenly among those members meeting their goals. Below, details related to studies investigating physical activity, weight loss/healthy eating and smoking cessation are described. Much of the physical activity and healthy eating/weight loss research takes place in worksite settings, and so such studies are included in their designated sections if the sole focus was on physical activity or weight loss rather than as part of a comprehensive workplace wellness initiative. Evidence concerning incentives as part of comprehensive wellness programs and addressing medical compliance and mental health follow.

Physical Activity. Research investigating the effects of financial and economically-related rewards for improving physical activity levels provides support for the use of such incentives. In a systematic review and meta-analysis focusing on the impact of incentives with a monetary value on individual-level exercise practices and outcomes, Mitchell and colleagues³⁶ found significant positive effects both over the short (less than six months) and long (more than six months) term, particularly among previously sedentary adults. Aspects of the successful interventions included objectively measured physical activity, offering assured – rather than lottery-based, indexed and escalating rewards. As well, 10 of the 11 studies included

in the review delivered rewards at the completion rather than throughout the duration of the initiative. Below, we describe individual studies encouraging physical activity through a variety of reward formats, from simple to more complex.

Assessing the effectiveness of self-monitoring physical activity alone and combined with redeeming points through retail vouchers in an Irish workplace (Physical Activity Loyalty Card), Hunter et al.³⁷ found no objective or self-reported differences in physical activity levels between the two conditions over the 12 week and 6-month intervention among 406 employees. Of those employees who were allocated to the incentive arm of the study, 63% exchanged their earned points for nominal goods/services (e.g., free exercise classes, personal training sessions, spa treatments), and 70% of these individuals indicated that the incentives were beneficial in helping them increase the level of activity. The authors note that the modest nature of the rewards may have tempered the difference between the Physical Activity Loyalty Card simply self-regulating physical activity and serving as a potent extrinsic motivation. In contrast, Fanous describes a pharmacist-led 12 week walking intervention that adds support for using modest non-monetary incentives.³⁸ Participants' use of a pedometer, combined with a goal-setting program and an end of program lottery raffle scheme for prizes (undisclosed by the authors), increased walking activity by 2,000-2,500 steps a day. In the next few studies, we see a more potent response to different incentive schemes offering higher value.

Examining the effects of an escalating reward format in a stair climbing initiative within a larger health and wellness employee program, employees were offered a modest reward (0.10 cents) for ascending or descending at least one flight of stairs for two minutes, with a maximum of .20 cents/day. Employees were able to earn bonus points when stairs were used twice a day consecutively for one, two, three and four weeks for a maximum of \$13.90/month. Six month pre- and post-observational data, using employees' electronic security cards swiped each time they took the stairs, demonstrated a statistically significant 66.4% increase in the number of new stair climbers and over a 600% increase in stair usage overall.³⁹

Zulman and colleagues' study⁴⁰ examined the impact of offering 20% reduced deductible and copayments on walking an average of 5,000 steps/ day for three months among obese employees. Over the initial year of implementation, 43% of eligible employees participated walking an average of over 6,500 steps/day, with only 3.3% failing to meet the required number of step counts. Qualitative data revealed that about half of the participating employees felt they valued the program for reducing their health care costs and for improving their health outcomes, and 17% admitted to joining purely for the financial inducements.

Notably almost a third felt coerced to participate by the financial implications of the program and fared less well in accumulating steps.

The University of Minnesota offers an innovative inducement for being physically active through its Fitness Rewards Program that deposits \$20/month into employees' bank accounts when they utilize a fitness centre (on or off campus) at least eight times/month. In their retrospective analysis of the program's impact since its launch in January 2008 over three years, Crespin et al.⁴¹ used employee administrative files and self-report surveys of 2,972 eligible employees to find a mean increase of 0.59 and 0.43 days/week of vigorous and strength training exercise among registered participants, respectively compared to non-participating employees. Because employee administrative files included self-reported exercise practices prior to the launch of the program, researchers were able to examine how it influenced behaviours of those already active versus inactive. Although less likely to register in the program, those who reported exercising infrequently prior to 2008, nevertheless reported the largest gains in vigorous and strength training activities. Examining the participant characteristics and experiences, Abraham et al.⁴² found that the program to attract more female, younger (18-35 yrs.), physically active and less obese employees, although the older and male participants actually engaged with the program longer, earning them more credits. Not surprisingly, employees who reported being vigorously active two or more days/week at the outset had both higher utilization and credit earning rates. Income levels were not a distinguishing factor. Interestingly, employees who admitted that they wanted to exercise more and change weight loss practices within six months were less attracted to, and took less advantage of, using the Fitness Reward Program compared to those who reported they had no plans to change or made changes six months ago. Reassuringly, employees who reported facing challenges with 'giving into temptation' were more likely to sign up for and earn more credits in the program, while those who described time barriers and difficulty staying committed were less likely to join and earned fewer credits. Finally, both utilization and credits waned over the three year of the study suggesting a ceiling effect of a stable incentive.

Assessing the effectiveness of a tiered versus single threshold incentive design implemented over two successive years, Norman and colleagues⁴³ demonstrated significantly improved response in employees' physical activity levels when they were offered incremental step goals and rewards compared to a single goal of 500,000 steps/quarter and \$100 gift card. Relative participation in the program rose by 12.5% to engage almost three quarters of the employee population, a 42% increase in the number of

employees who achieved least one of the three tiers, and more than twice as many employees earned a total of four rewards over the year than in the previous incarnation.

With 281 employees at the University of Pennsylvania, Patel and colleagues⁴⁴ offered a 13-week intervention allocating participants to one of three financial incentive schemes and comparing their goal of 7,000 steps per day to a control group who only received daily feedback. Participants in the incentive groups were offered the identical financial reward for reaching the 7,000 step goal (\$1.40/day or \$9.80/week), but framed differently: (1) gain incentive of \$1.40 received individually; (2) lottery scheme to win either \$5 or \$50; (3) loss incentive where \$42 was allocated in advance each month, and \$1.40 removed each day the goal was not achieved. Follow-up occurred for another 13 weeks with daily performance feedback but no incentives offered. At the conclusion of the intervention, the loss-incentive group demonstrated a 50% relative increase in the mean proportion of time participants achieved the goal, and this was significantly greater than control participants, although the mean daily steps achieved was not significantly greater. In the following 13 weeks, daily steps decreased for all participants and were not different from control. Notably, participants assigned to the gain incentive, was no more effective than control participants in the amount of steps walked. The authors concluded that *“financial incentives might be more effective if their design moved beyond a mere transaction and instead reflected predictable opportunities to enhance behavior change.”*

To examine the longer term effects of incentives on employees' use of a Fortune 500 company's onsite gym facility, Royer, Stehr and Sydor⁴⁵ designed a study to investigate the influence of different incentive schemes. The study offered employees randomized to the incentive group \$10 each time they visited the gym, for a maximum of 3 days each week, in the first month of the study. After this initial month, half of the incentive group employees were randomly assigned to engage in a self-funded commitment contract to continue their use of the gym for an additional two months (with any unearned money donated to charity). At baseline, use of the corporate facility was similar across all three groups with about 20% visiting the gym at least once each week. The initial incentive month was effective at doubling the visits for the incentivized employees, and motivated 70% of new exercisers to participate compared to the control group of employees. Those who continued to self-fund their continued physical activity (averaging \$58 stake) accessed the gym 50% more often their colleagues not doing so, whose visits to the gym faded to baseline levels by the second month of follow-up, suggesting that there were no lasting effects from the initial short lived reward scheme. The incentive from the commitment contracts were found to be effective

for maintaining physical activity levels a year later at about 25% increase relative to control participants. Those employees taking up the contract commitment option were typically representative of the least active populations and more likely to be female, middle-age to older-age employees, and those who were overweight or obese. As the authors also describe, they found a similar adoption of the commitment contract among those employees who self-reported exercising frequently prior to the start of the study, who should – in theory – have little need for external mechanisms to keep them motivated.

The workplace wellness approach for public sector employees in Oregon called the Health Engagement Model incentives are tied participation in the program, rather than health outcomes, but also are framed as a 'stick' and not a 'carrot'. Employees select and track their own health goals as part of their overall health benefits program, but those who decline to partake pay an additional \$35 per month in health premiums. Examining the initial year of implementation,⁴⁶ patterns among a random sample of participating and non-participating employees (N = 2,353) in terms of who signed up and who changed behaviours were identified. In contrast to the experience of Royer et al.,⁴⁵ here the employees significantly less likely to opt into the program were those who might benefit the most: those with lower incomes, who smoked or were overweight. Among these individuals, reasons cited for not joining reflected that it felt coercive, too personal or may impact their job. Other demographic factors predicting engagement included being married and having an advanced educational degree. Forty-five percent of employees who participated in the program reported making changes, particularly those aged 51 years and older, who were obese or smoked.

In one of the few studies to actually measure intrinsic motivation during an incentive program, Pope and Harvey⁴⁷ recruited 117 healthy college students to participate in a study spanning their first fall and spring terms regarding their use of the campus fitness centre. With the shared goal of increasing attendance at the fitness centre from two to five days over the fall semester and remain at five days during the spring term, each student was allocated to receive one of three conditions: (1) a control group who received no incentives; (2) continued-incentive group who received escalating weekly payments for meeting attendance goals (\$5/visit in week with \$0.25 pay raises in subsequent weeks). This group worked on a reset schedule so that failure to meet weekly goals returned their payment back to the \$5 for two weeks. In the spring, a variable-interval reward schedule was implemented to address behavioural 'extinction:' payments were made randomly and less frequently (\$40 for achieving attendance goals). (3) Students assigned to the discontinued-incentive received the identical schedule as those in group 2 during the fall, but incentives were withdrawn during the spring term. Using student ID electronic swipes checking

in and out of the fitness centre captured attendance and students completed the Exercise Motivation Inventory at baseline, and end of fall and spring terms to measure their intrinsic and extrinsic motivation for attending the fitness centre. In the fall, groups two and three demonstrated significantly higher attendance rates than group one (62%, 64%, 13%, respectively). In the spring term, attendance levels for group two at 39% significantly outperformed groups one and three at 3% attendance. Despite these differences, intrinsic motivation did not change over the course of the two semesters for any groups of students, but one indicator of extrinsic motivation (weight management) fell significantly from the beginning of the fall term to the end, and then rose again slightly when measured at the end of the first year for all students. The authors suggest that incentives may not adversely impact intrinsic reasons for exercising as previously thought, and as physical activity became more entrenched in their lifestyle as a student, the extrinsic motivation to manage their weight faded over time.

Weight Loss. As noted in Mantzari and colleagues' systematic review,³⁴ no evidence supports long term weight loss (past 12 months) nor sustained loss when incentives were removed. Whether this is a function of past studies' small sample sizes or the failure of incentives to create lasting change remains unknown. Suggests Jeffery:⁴⁸ *"Given the popularity of games of chance, however, it is intriguing to speculate whether mixed incentive programs that combine personal financial commitments, chances for matching funds and cash prizes, and significantly improved odds of winning with weight loss, might have potential for creating an experience that many would find interesting enough to sustain efforts at weight control over longer periods."* More recent studies described here have larger samples, and varied incentive structures, but not are not extended beyond the one-year mark.

Kullgren et al.⁴⁹ sought to explore how individual versus group based financial incentives may influence weight loss among obese 105 hospital employees. Participants were randomly assigned to receive either \$100/month for meeting or exceeding weight loss goals, or \$500/month that was to be divided among a group of five who met or exceeded their weight loss goals, or a control condition (only monthly weigh-ins). After 24 weeks, the group condition experienced significantly greater weight loss at the close of the intervention than both the individual incentive and the control groups, whereas the individual incentive condition did not fare significantly better than participants in the control condition. This offers new insight into the social aspect of incentivizing behaviour change but does not address the issue of when incentives are removed nor longer term maintenance.

In a comprehensive weight loss program that addressed healthy eating and physical activity behaviours through a number of different strategies including indexed financial incentives (i.e., \$1.00 for every 1% reduction in body weight), tailored emails and an integrated web platform offering educational resources, discussion forums, an electronic fitness advisor and self-monitoring features delivered for 1,000 employees in 14 different worksites over six months.⁵⁰ While almost 15% of employees lost 5% of their body weight, this was not a significant difference when compared to the weight lost by a group of employees at another 14 worksites receiving a minimal intervention. The authors only commented on the effectiveness of the intervention in its entirety, and did not draw any conclusions regarding the use of incentives.

In a longer duration intervention addressing obese employees,⁵¹ participants (N = 197) were randomly allocated to one of three intervention groups where an incentive valued at \$550 was offered if they achieved a weight loss goal equivalent to five percent of their baseline weight. In two of the incentive groups, employees' health insurance premiums were adjusted accordingly either delaying payment until the following year or receiving it immediately in the first pay period after achieving the goal. The third group was entered into a daily lottery incentive, which could result in a \$10 or \$100 winning (for a total equivalent of \$550), but participants were only eligible to be in the draw if they met their targeted weight loss goal the day previous to the lottery. A fourth control group was offered no incentive. One year later, with the incentives still accessible, no statistically significant differences were found in mean weight change either between the control group and any of the incentive groups, nor among the intervention groups.

Cawley and Price⁵² describe the results of a natural experiment of another year-long workplace weight loss incentivized program that engaged 2635 overweight employees over a number of worksites, each implementing the financial incentives in a different way. In the continuous payment scheme, quarterly payments to employees were made, calculated as a percentage of their baseline weight lost each quarter, up to a maximum of 30% of weight lost. The second scheme required each employee to pay \$9.95 per month to participate, all of which was refunded at the end of the year if they achieved at least 5% loss of their initial weight. For a 10% or greater weight loss an additional \$100 was awarded. A lottery design was also built into each quarter in this second option, where gift certificates were drawn for those who had lost weight since baseline. In the third iteration, employees posted the same amount of their own money as the second scheme, but were able to reclaim it quarterly when weight loss achieved ranged between 1-20%. A team competition was also available to these third group employees, where the team with the greatest

average percentage of weight loss since baseline each received \$50. In the final option, employees were not offered financial incentives, only \$20 to participate for the entire year. The actual weight loss program intervention components were identical for all employees (a physical activity program, daily emails with healthy eating and physical activity tips, call-in support, weigh-ins).

At the end of the year, 68% of participating employees had dropped out of the program; those who had achieved greater weight loss were more likely to remain in the program. Employees receiving the continuous payment incentives lost no more weight than those in the control group. Those in group two who completed the program, lost 9 pounds more than the control group but this fell to just 2 pounds when attrition was considered in the analysis. Moreover, most of the weight lost by all employees, regardless of group, occurred during the first six months. Calculations of the average dollar amounts paid per pound ranged from \$1.66 in group three, \$2.10 in group one to a negative \$19.42 for group two. The researchers are quick to note that the weight loss program focused on outcomes, not participation, and did not distinguish between fat or muscle weight loss, even with a physical activity component integrated into the worksite intervention. Further, the modest value and delayed payment of the incentives may have compromised employees' motivation to remain in the program.

Smoking Cessation. “Absence of evidence is not evidence of absence” caution Troxel and Volpp⁵³ in their review of incentives to establish efficacy toward smoking cessation. Examining the RCT data in this regard, the authors also lament the small sample sizes and insufficient power to detect “*anywhere near the minimum threshold of clinical significance,*” in addition to the variety of incentive structures used (i.e., monetary vs. nonmonetary; lottery vs. contract; payment vs. penalty) primarily to produce short term quit rates. Indeed, when investigating how well financial incentives promoted smoking cessation in community and worksite settings through a combination of monetary payments, competitions, entries into lotteries, and prizes of cash or merchandise, we see somewhat equivocal results⁵⁴ which may reflect diverse interventions, non-experimental designs and differing measures of quit rates.⁵⁵ Nevertheless, Sigmon and Patrick’s⁵⁶ review of incentives for smoking cessation found them to be effective across the general population of smokers as well as specific populations of substance abusers, adolescents, patients with pulmonary disease, and patients with serious mental illness.

In a more recent review by Mantzari et al.,³⁴ incentives were found to reap the most effective results for smoking cessation among other health behaviour changes, even once the incentive was

removed, continuing through 18-months post-intervention launch. With non-pregnant populations, a smoke-free lifestyle was maintained for about three months following the withdrawal of the reward, although large financial payments prolonged cessation for up to six months. The authors caution however, that the majority of studies following participants for this length of time included pregnant smokers for whom there is an additional and non-financial incentive to remain smoke-free during the gestational period. For example, among women pre-and post-partum, a contingent and scaled voucher incentive program (average value of \$450) was found to be effective in helping new mothers achieve a smoke-free lifestyle and reduce the severity post-partum depression, when added to usual care protocol for smoking cessation in U.S. obstetric clinics, relative to a comparison group who received the vouchers not conditional on changing their smoking patterns.⁵⁷ Higgins and Solomon⁵⁸ in a 2016 review of RCTs note the increasingly 'compelling' evidence confirming the efficacy and effectiveness of financial incentives to curb smoking during and immediately following pregnancy.

In the largest UK study of its kind, the quit4u smoking cessation program targeting deprived smokers with the lowest quit rates in one area of Scotland, examined the inclusion of a \$23 weekly voucher redeemable at a popular grocery store chain, to the typical behavioural support and nicotine replacement therapy compared to other stop smoking services available through the Scottish National Health Service. Ormston et al.⁵⁹ found significantly higher quit rates at one, three and twelve months among the quit4u participants. In qualitative interviews with a smaller sample of quit4u participants, 71% described that they payments had been 'very' or 'quite useful' as a trigger to help them stop and remain smoke-free, and although not the primary motivating factor to quit, facilitated engagement with the program longer. An economic analysis determined that the average cost of the program per smoker at about \$350 CA was a "*highly cost cost-effective use of resources.*"

In the well cited Volpp et al. 2009 trial at General Electric,⁶⁰ employees were offered up to \$750 for completion of a smoking cessation programme, as well as to abstinence at 6 and 12 months, with the largest sum deliverable for 12 months' abstinence (\$400). This was the first trial to show that personal financial incentives can lead to significantly higher sustained quitting at one year. In a 2012 follow-up to this investigation, Kim et al.⁶¹ examined participant-specific and contextual factors associated with participation and success, including qualitative interviews to gather more in-depth understanding of how the incentive was received. GE employees opting to become involved in the program were heavy smokers, and more likely to be male, older, white and more educated than the general U.S. population of smokers. Participants

favourably recounted the financial incentive as a motivating factor, and recommended the addition of a support group to attract employees for whom financial incentives alone were insufficient motivation. Other employees described their stressful working conditions as the primary barrier to changing smoking habits; circumstances in which financial incentives held little potency.

In another well designed smoking cessation study, CVS Caremark employees, relatives and friends (N = 2538) were randomly assigned to one of four incentive programs or to usual care (information and free nicotine replacement therapy).⁶² For being smoke free at each of the three measurement points, incentivized participants could receive \$200, as well as a bonus of \$200 at the 6-month conclusion, for a total of \$800. In a second group, participants were required to make a \$150 deposit, and the remaining \$650 was added to their deposit which they could claim if smoke-free at six months. There was also a team component added: group three collaborated so that payments to successful group members at each time point increased with increasing group success rates. The fourth team competed for the \$150 deposits from each of six group members, plus a \$450 matching reward per member that was redistributed among members who quit at each time point. There was a much higher uptake of the reward-based options compared to the deposit plus reward options (90% vs. 13.7%), but all four incentivized group participants were significantly more successful than usual care at the six month close of the study. There was little difference between individual and team participants at six months. At the 12-month mark, abstinence only for participants in the reward-based incentive programs remained superior to those receiving usual care. When individual and team variations were considered together, participants in both the reward-based programs produced higher abstinence rates than those in the combined individual and team deposit-based programs.

Worksite Health & Wellness Programs. A national U.S. study of workplace wellness programs conducted by the RAND corporation⁶³ revealed that 69% of companies with greater than 50 employees offered some form of wellness program, 75% of which included incentives, resulting in a 20% increase in participation over worksites that did not offer incentives.ⁱⁱ The value of incentives appeared to influence

ⁱⁱ This is likely to increase with the launch of the 2014 Patient and Affordable Care Act in the U.S when employee insurance premiums that can be used as outcome-based wellness incentives increases to 30% (Patel et al., 2016b).

employees' motivation to engage in the programs: When rewards exceeded \$100, employers reported participation rates of 51% compared to 36% with incentives of smaller amounts.

In a Health Pledge employee wellness program that included offering discounted and free vouchers to access sport and gymnasium centres (the only form of incentive), Siddiqui and Shahid⁶⁴ found significant changes not only to employees' physical activity, but also their healthy eating, and smoking cessation practices at the end of the 12 month intervention compared to a control group. As well, this was the sole study that we found to include a measure of absenteeism: those employees who pledged to address their mental and emotional wellbeing as part of the program demonstrated a 70% reduction in absences from work. The distinct contribution of the incentive aspect of the intervention was not examined by the authors, but was seen as an important component of a comprehensive, multi-risk factor strategy to create a supportive environment for making complex behaviour changes.

Examining the characteristics of over 40,000 employees enrolled in their company's wellness program prior to and following the implementation a financial incentive scheme (\$20/month reduction in health insurance premiums) compared to an earlier and more modest enticement of a \$50 gift card, Fronstin and Roebuck⁶⁵ were able to help distinguish between the 'keener' employee from those who are more motivated by incentives. Employees enrolling in the program when they could take advantage of a reduction in their health insurance premiums were significantly more likely to be male, older, higher wage earners, in poorer health (that is, have higher prevalence rates of diabetes, obesity, hypertension and high cholesterol), and less likely to take part in disease prevention screening. While it appeared that the younger and relatively healthier employees were disproportionately attracted to the program with the relatively less inducement of \$50, "... *the employees who had abstained from participating in the workplace wellness programs were likely the ones in need of them most*" until the more robust health insurance premium incentive was implemented.

In Salt Lake City Utah, the Healthy Lifestyle Incentive program offers government employees health screenings/risk appraisals, health education and financial incentives for changing risk behaviours associated with chronic disease.⁶⁶ Employees monitor select health behaviours and submit logs that are translated into points accumulated each month. Points can also be earned for participation in health promotion worksite events or disease prevention screening. Annually, employees can redeem their points for cash at the exchange of \$1.00 for every 5 points, resulting in typical awards of \$75-250 per person. Citing earlier investigations about the impact of the program to significantly improve eating and exercise

behaviours, smoking and several risk factors (blood pressure, cholesterol, body fat), Merrill and colleagues⁶⁶ used health care claims data to examine the frequency and cost of prescription drug and medical claims among government employees enrolled and not enrolled in this incentive initiative. Employees more likely to be engaged in the program had an older age distribution, never smoked, were in sedentary jobs, more physically active, and who reported excellent or very good health. There were no differences found based on race/ethnicity, absenteeism, body mass index or prevalence of high blood pressure, arthritis, asthma, high triglycerides, diabetes, heart disease or cancer. Both men and women cited the financial incentives as a primary reason for their participation, and for women, to improve their health. There was a significant greater number of prescription drug and medical claims made by non-participating employees, women and older employees. While the average cost of prescription drug claims was not different between participating and non-participating employees, it was for medical claim costs. The researchers estimated the program to generate a cost savings of over \$3.5 million over the year study period, 2004-2008.

Evidence of Incentive-Based Interventions for Medication Compliance. We did not locate much recent evidence concerning the use of incentives and medical compliance for behaviour related to chronic disease prevention; there exists data on this topic related to antipsychotics⁶⁷ sleep apnea,⁶⁸ or incentives directed at physicians or health care systems⁶⁹ as well as earlier studies for substance dependence,⁷⁰ warfarin compliance⁷¹ and Hep B vaccines.⁷² Commentaries about the promise of incentives and other behavioural economic strategies are also available (e.g., Mogler).⁷³

To help 118 African American veterans control their blood sugar levels,⁷⁴ they were assigned to receive peer mentoring, usual care or a financial incentive. Those randomly allocated to the latter group were eligible to earn \$100 or \$200 if they exhibited changes by 1% and 2% respectively, at the end 6 months. Compared to the usual care participants, those who had been peer mentored had a significant 1% improvement in blood sugar, double that of those who were in the incentivized group. The researchers speculated that the lack of feedback over the 6-month duration for those in the incentive group may have contributed to the differing results, as peers regularly checked in with participants who were mentored.

One novel addition to the literature is the work of Blondon.⁷⁵ Research seeking to understand incentivized behaviour change rarely includes asking individuals directly about their perspectives of how different types of incentives might help them change behaviours. Blondon's survey of 153 adults queried

them expressly about their expectations regarding incentives (financial, non-financial and self-rewards) to help improve their self-management of diabetes. The clear majority (96%) favoured financial incentives, followed by self-rewards (72%) and non-financial rewards (60%). Participants' ratings of the challenges of dealing with their diabetes tempered their enthusiasm for incentives somewhat: those who reported experiencing more difficulty self-managing their behaviours expected to respond less well to financial incentives but more so to non-financial incentives, suggesting that a combination of incentives is necessary to motivate behaviour change for self management of type 1 and 2 diabetes.

Evidence of Incentive-based Interventions for Mental Health. There is little to no research related documentation examining incentives for addressing mental health in the workplace. Indeed, much of the evidence concerns reactive, rather than proactive, approaches to depression, anxiety, burnout etc., and reducing the stigma associated with seeking help, but the interventions concern counselling, education, mindfulness cognitive behavioural techniques etc. Two tangentially related studies that concerned mental health and incentives targeting specific populations are described below.

In a mixed-methods study,⁷⁶ the barriers and facilitators to accessing mental health care among 42 low income pregnant women with depressive symptoms were first identified to inform a very modest incentive-based intervention that offered participants \$10 gift card/visit – up to a maximum of \$50 – each time they consulted a mental health provider during their pregnancy. Compared to the control group of pregnant participants who received no such incentive, six to eight weeks after delivery there was no difference in the number of mental health visits. Qualitative follow-up interviews revealed that the value of the financial motivation was ineffective in either their seeking or refraining from seeking help.

In a unique study comparing the effectiveness of three different incentives (all totalling \$5/day), Shoefield et al.⁷⁷ tested the effects of individually-oriented, purely altruistic (where the money is paid to a partner rather than the individual completing the exercise) and blended competitive/cooperative (based on one's team performance and compared to another team's performance) monetary rewards on older adults' completion of online cognitive exercises and cognitive function. For six weeks, all three types were found to double the number of exercises completed during the study period compared to a control group, as well improvement on their performance in the exercises. Interestingly, the altruistic and competitive/cooperative formats produced notable differences in patterns of participation once the incentives were removed, hinting

at a social influence carry-over that produced a “*less crowding out, or crowding-in of intrinsic motivation*” although this advantage faded after two months.

Framing Incentives for Success

It is important to point out that most incentive programs studied adhere to a one-size-fits-all approach⁷⁸ which when applied in the context of health behaviour change is somewhat antithetical given our understanding that health behaviour change works best when it is tailored, customized and personalized to respect individual choices, chances and circumstances. Since the 1970s when financial incentives for weight loss were first studied, and then for smoking in the 1980s, the empirical literature has expanded greatly to include a variety of health behaviours, types of incentives and settings, and populations. Despite these 40-50 years of work, there remains a great deal unknown.⁴⁶

Nonetheless, there are several recommendations for sculpting incentive programs that serve to both stimulate and sustain health behaviours.^{47-48,52,56,78-80} Specifically, it appears from the evidence that successful initiatives offer incentives that are:

1. More immediate (not delayed, premium reimbursements), more visible (not rolled into pay checks), larger (\$5-10 per week depending on behaviour/outcome targeted) and escalate over the duration of the program.
2. Personalized, salient and linked to longer term gains, as well as shorter term objectives.
3. Earned for participation/engagement in the *process and/or performance* of behaviour change rather than solely for achieving health outcomes. This has emerged from criticisms that the lures of incentivized programs may be trifling given the “*strong forces of the obesogenic environment*,”⁸¹ and broader social determinants of health, resuming the emphasis on the *effects* of individual behaviour change with little regard for the larger context within which people make life decisions. Indeed, one of the rare workplace initiatives to demonstrate long term success for smoking cessation offered employees incentives for attending a smoking cessation program in addition to successfully kicking the habit.⁶¹ Further, incentives may be awarded for employees who make changes to policy, environmental or social conditions to support individual efforts. As such, Kullgren, Williams and An⁸² call for more patient-centred (“*respectful of and responsive to individual patient preferences, needs, and values*”) incentive programs that may serve to address more fully the capacity, opportunity and motivation for health behaviour change. Such reward schemes would

empower employees to select the behaviours they would like to change, the goals to achieve, and the rewards for achieving those goals.

4. In some instances, deposit contracts (where individuals “wager” their own money) and team or group-based contracts may be more effective than individual contracts, but take-up is often low. One option is for programs to allow (but not require) such bonds or deposit contracts. To create an extra incentive for adherence, any forfeited monies can be sent to an organization that the participant dislikes and would not want to support in a charitable way. For example, the website stickK.com lets users identify their “anti-charity” as the recipient of their deposit should they not accomplish their goal. Further, lottery schemes that offer frequent feedback may function to withstand participants’ loss of interest over time.
5. In settings where health insurance premium reductions are an option, they can act as a permanent incentive schedule when the timing of the reward is more frequent than annual adjustments. These may be easier to implement⁸³ although they are relevant only to large worksites that offer such human resource benefits, and may not be feasible for small employers or businesses. In these cases, BLR can provide data to foster a system for cash incentives to employees that commit to their health, e.g. employees who earn over 5,000 points annually (however they chose) may qualify for a \$500 reward of their choice.

Although there are scant data to specifically inform how to best incentivize hard-to-reach populations, drawing on the insights from the studies in this paper suggests that these five recommendations may be effective. Recent work by Harris and colleagues⁸⁴ exploring how to recruit not-ready-to-quit smokers into an cessation program revealed that the financial incentive (\$120-150) offered for completing the 26-week program was the top motivation for enrolling, cited by almost 45% of participants, the majority of whom were low income. Finally, we can look to the larger knowledge base of health promotion theory and evidence for counsel in this regard: successful initiatives for health behaviour change ideally both inform *and* empower individuals to take control over their own health decisions where possible. This means providing people with: choice (self-selecting their goals, terms of engagement, and defining success), opportunities to enhance their competence (knowledge, skills) for change, regular feedback, and support for dealing with and overcoming obstacles. These attributes need to be embedded within a persistent structure that is convenient to access, easy to understand, culturally, socially and economically appropriate, and fun to use.⁸⁵

Conclusion

We do not always act in ways that, with hindsight, we most prefer. So, for example, most people would prefer to eat more healthily and to be more physically active than they actually are. Similarly, most smokers would prefer not to be smokers. This gap ... reflects two strong forces: the power of immediate rewards and the automatic cueing of much of our behaviour by environments. Offering a reward can help people to align their actions more closely with their true preferences. From such a perspective, incentives operate to enhance rather than to restrict autonomy.⁸⁶

In their comprehensive review of the literature on incentives and behaviour change, Sutherland and colleagues⁸⁷ conclude that “... ***incentives, even rather small ones, can influence health behaviours***,” including both improving patients’ adherence and facilitating voluntary behaviour change. This is especially true when studies for behaviour are incentivized over the longer term rather than for shorter timelines, particularly when long-term outcomes – such as body weight or physiological changes - are being assessed.⁸⁸ For the behaviour to persist, the incentives either need to be continued or reinforced through intermittent rewards. Of course, this phenomenon is not exclusive to the use of incentives as an intervention strategy: intervention effects overall for behaviour change are known to decline after the intervention is completed “... *suggesting the need for innovative techniques to help participants maintain changes*”.⁸⁹

This conclusion is supported by behavioural economics and learning theory principles that propose our behaviour depends on stimuli or cues that elicit certain responses, and on the rewards that reinforce behaviour. The behaviour may be learned by gradual shaping, and maintenance of the desired behaviour can be facilitated by an environment that elicits responses and provides for immediate rewards rather than waiting for health gains to accrue over the longer term.⁸⁶ Because practices such as being active, eating healthfully and giving up smoking rarely bestow immediate, inherently enjoyable activities that are intrinsically motivated,⁹⁰ “... *even highly motivated individuals often have difficulty in making decisions in the short term that favor their long-term interests.*”⁹¹ Thus, **offering rewards or incentives as extrinsic motivators may bridge the time needed to internalize the values and benefits of healthy living,⁹¹ and combining rewards with tested behavioural change strategies, make “ *it easier for people to choose short-term actions that are consistent with their long-term interests.*”⁴³**

There is evidence however that extrinsic rewards may serve to ‘crowd out’ the development of intrinsic motivation and autonomy in decision making,^{36,37,83} and when removed leave individuals with little genuine impetus to sustain the new behaviours. A strategy to address this flaw can be found in self-

determination theory where individuals self-monitor their own goals and progress, and are provided choices about which rewards they wish to pursue.³⁷ Yet as noted in their systematic review of studies using incentives for exercise, Strohacker et al.⁸³ found none to actually measure intrinsic motivation noting that they were unable to determine if it was incentives that undermine intrinsic motivation or other aspects related to behaviour change. However, the recent evidence from Pope and Harvey⁴⁷ investigating physical activity incentives for college students, where intrinsic motivation was measured, disputes the allegations that incentives undermine intrinsic motivation. Indeed, Promberger and Marteau⁹² argue convincingly that because health behaviour change is challenged by issues of self-control, ***rewards that are perceived to enhance a sense of competence and freedom of choice, rather than as seen as coercive or controlling, in essence ‘crowd in’⁹³ and foster intrinsic motivation.***⁴⁷ Moreover, commenting specifically on worksite nutrition initiatives, although the sentiment is applicable to behavioural interventions in multiple settings, Mooney and colleagues⁹⁴ decry the lack of stimulating incentives offered to kick start behaviour change beyond the promise of, one day – perhaps – better health. Given our best understanding of the evidence, it appears that **the most promising scaffold of incentives to attract and engage people is one characterized as indexed, escalating, self-determined, tailored and structured as a self-monitoring tool.** Doing so means that incentive programs are designed to connect, realize and appreciate participants’ intrinsic motivators to help them sustain lifelong health practices.⁹⁵ This is exactly the premise behind and infrastructure for behaviour change that BestLifeRewarded® offers its members.

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