Less carrot more stick: promoting health behavior change with deposit contracts

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Chapter 5

CVD patients' views on financial incentives for health behavior change: are deposit contracts acceptable?

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Abstract

Background: There is an urgent need to find new approaches that improve long-term adherence to a healthy lifestyle for people with cardiovascular disease (CVD). Deposit contracts (a financial incentive in which the participant deposits own money) are inexpensive and effective, but acceptability among CVD patients is unclear. This study investigated the acceptability of a deposit contract intervention for physical activity among CVD patients.

Methods: We approached CVD patients through the Harteraad patient panel of the Dutch CVD patient organization and asked them to fill in an online survey. In total (N = 659) CVD patients with a mean age of 66.2 years completed the survey. The survey assessed acceptability of deposit contracts, responses to a concrete example of a deposit contract for physical activity behavior change, and suitable moments for implementation.

Results: Overall, half of the participants (45.6%) confirmed needing extra commitment to maintain lifestyle change. Yet, a small part of the sample was convinced by the idea that losing money could be motivating (18.8%) and indicated that they would be willing to deposit money themselves (13.2%). Responding to a concrete example of a deposit contract for physical activity, a quarter of the sample (26.2%) reported there was a chance they would participate. Furthermore, 27.1% of the participants found the deposit contract effective and 27.4% found it acceptable. Exploratory analyses showed that a subgroup of younger and lower educated participants responded more favorably. Opinions on when to start with a deposit contract were mixed.

Conclusions: Because acceptability was generally found to be low, future research should also investigate strategies to leverage commitment principles for CVD patients without a cash deposit requirement. When deposit contracts are offered to CVD patients in practice, we recommend offering them as an optional, additional element to existing interventions that patients can opt-in to.

Introduction

People with cardiovascular diseases (CVD) are often referred to cardiac rehabilitation (CR), a comprehensive 12-week program during which they receive psycho-education, support with lifestyle change and guided physical exercise training (Brouwers et al., 2021). At the same time, people with CVD are commonly advised to adhere to their medication, quit smoking, lose weight, eat more healthily and exercise more. While people often initiate lifestyle changes during CR (Long et al., 2019), many relapse when they return to their everyday life, and changes in lifestyle are often not sustained (Kotseva et al., 2019; Zullo et al., 2010). Therefore, there is an urgent need to find new approaches that could serve as a supplement to CR and improve long-term adherence to a healthy lifestyle for CVD patients (Peters, 2013).

The field of behavioral economics (a fusion of traditional economic theory and psychology) helps explain why adhering to lifestyle changes is difficult, even for people with CVD (Hare et al., 2021). Rather than making optimal decisions, people often fall for immediate temptations when decisions require short term sacrifice (e.g., exercising instead of relaxing on the couch with a spouse) to foster long-term goal achievement (e.g., preventing CVD related re-admission to the hospital)(Halpern et al., 2009). The finding that people tend to be most strongly driven by consequences in the here and now has been coined the present bias (Laibson, 1997). Present bias also helps explain why introducing immediate financial incentives is effective for promotion of (at least short term) health behavior change. Rather than having to wait for the long-term benefits of a healthy lifestyle to emerge, immediate financial incentives provide short term benefits in the here and now. Financial incentives require objective verification of behavior to avoid cheating and are therefore ideally combined with eHealth solutions. There is overwhelming evidence that adding financial incentives to existing interventions for health behavior change improves their efficacy (Giles et al., 2014; Kurti et al., 2016; Mantzari et al., 2015; Mitchell et al., 2019; Strohacker et al., 2014). However, financial incentive interventions are costly (US$ 1.5 /day/person)(Mitchell et al., 2019), and achieved intervention effects tend to disappear when incentives are withdrawn (Giles et al., 2014; Kurti et al., 2016; Mantzari et al., 2015; Strohacker et al., 2014). Deposit contracts, a form of incentive wherein people deposit their own money and risk losing it when not successful (Rogers et al., 2014), could be a solution to allow for large scale implementation without the need for external funding. Besides their implementation advantage, deposit contracts could have additional advantages over regular financial incentives, such as exploiting the mechanism of loss aversion (Tversky & Kahneman, 1992). Deposit contracts have proven to effectively support behavior change in various domains crucial to lifestyle change after a cardiovascular event: smoking cessation (Halpern et al., 2015), weight loss (Sykes-Muskett et al., 2015), and physical activity (Budworth et al., 2019; Donlin Washington et al.,

2016; Stedman-Falls & Dallery, 2020). Deposit contracts have also been applied specifically to a CVD population to increase medication adherence (Putt et al., 2019).

Besides evidence of effectiveness, for implementation in practice it is important to determine acceptability of deposit contracts. Others have outlined objections to using financial incentives and stated that they can be perceived as unfair, coercive, inequitable, inconsistent with shared social values and threaten privacy (Halpern et al., 2009). The available evidence on the acceptability of financial incentives and deposit contracts is mixed. Studies have shown that, for smoking cessation (Raiff et al., 2013; Stedman-Falls et al., 2018) and weight loss (Raiff et al., 2013) regular financial incentives and deposit contracts had similarly high levels of acceptability. On the other hand, a study on acceptability of financial incentives for weight loss showed that deposit contracts were about two times less acceptable compared to regular financial incentives (McGill et al., 2018). Furthermore, low support for any type of financial incentive was found, but especially for deposit contracts (McGill et al., 2018). More specifically, another study explored acceptability of financial incentives among a sample of cardiac rehabilitation patients (Mitchell et al., 2014). Results show that acceptability of cash-based incentives was highly divided and nearly all participants preferred voucher-based incentives over cash incentives (Mitchell et al., 2014). Although speculative, since deposit contracts are often operationalized as cash-based incentives, this might indicate low acceptability of deposit contracts among CVD patients.

The current study

To the best of our knowledge, it is currently unknown whether CVD patients find deposit contracts for lifestyle change acceptable. The available evidence implies that, despite their effectiveness in helping people achieve lifestyle goals, deposit contracts might not be acceptable to people with CVD. The primary aim of this study was to investigate the acceptability of a deposit contract for lifestyle change in CVD patients. Secondly, we evaluated responses to a concrete example of a deposit contract for physical activity and at what point in time during their patient journey CVD patients would like to start with a deposit contract.

Methods

Participants

Participants were recruited through an email sent to 2625 panel members of the Dutch Harteraad Patient Panel, the official national Dutch CVD patients' association. The panel consists of people who were diagnosed with cardiovascular disease or who were a close relative or caregiver to someone with cardiovascular disease. We included participants

who were 18 years and older and were diagnosed with heart disease (diseases related to the heart, e.g. coronary heart disease), vascular disease (diseases related to the blood vessels, e.g. peripheral artery disease), or both. We excluded participants who were a relative or caregiver to someone else with CVD. In total, 659 CVD patients completed the survey (for more detail on demographic information of the sample see *Table 1* below).

The survey

This cross-sectional survey study was approved by the Psychology Research Ethics Committee of Leiden University (2020-03-18-T. Reijnders-V1-2312). The survey was administered in Dutch and took about 15 minutes to fill in. The panel manager of the Harteraad Patient Panel shared a description of the study and a link to the survey with all members via email. After agreeing to the online consent form, participants were first asked to provide demographic information (gender, age, education, income, partner status, level of social support), and their disease status. Thereafter, the survey was separated into two parts. The first part belonged to a related research project and assessed preferences with regard to digital coaching. The latter half of the survey was analyzed for the current study and will be further explained below under section 2.3 Measures (see *appendix A* for the original items used in the current study). Responses to questions on education and income were categorised into low, middle and high (Nagelhout et al., 2012; *Opleidingsniveau*, n.d.; Reinwand et al., 2018). After completing the survey, participants were debriefed, thanked for their participation, and received a short summary of the results a few weeks later (see *appendix C*).

Measures

Here, we describe which items were used to measure responses to deposit contracts. For more detail on the survey items, see *appendix A*.

Acceptability of deposit contracts

People were explained what a deposit contract is and told they could use it to help them reach a concrete lifestyle change goal: *"Many people need extra commitment to sustain a long-term lifestyle change. With a lifestyle challenge, you set a concrete goal for lifestyle change and put your own money on the line. You can lose this money if you don't sustain the lifestyle change. Because you do not want to lose the money, you have an extra incentive to maintain a lifestyle change at difficult times."*. They were then asked to reply to the following three statements on a 5-point Likert scale (1 = totally disagree, till 5 = totally agree): *I need extra commitment to maintain my lifestyle change; I think the risk of losing money can motivate me to maintain my lifestyle change; I would be willing to deposit an*

amount of money for a lifestyle challenge. Furthermore, we asked "*What amount of money would you like to deposit in a lifestyle challenge?"*.

Responses to a concrete example for physical activity

Next, we provided a concrete example of a deposit contract for physical activity: *"Imagine you want to exercise more and therefore set the goal to take 1000 steps more per day than you normally do. For extra motivation, we now ask you to put in 10 euros of your own money as a challenge. Every day you will receive a message from us in which we tell you whether you succeeded in achieving your goal that day. Every day that you reach the goal, you earn back part of your own investment. The more goals you achieve, the more money you will get back."*. We then asked participants to reply to the following three questions on a 5-point Likert scale (1 = very small; totally not effective; totally not acceptable, 5 = very large; totally effective; totally acceptable): *How big is the chance that you would participate in this lifestyle challenge yourself; How effective do you think this lifestyle challenge is; How acceptable do you think this lifestyle challenge is?*

Suitable moments for implementation

Finally, to identify suitable moments for implementation, we used multiple choice questions, and asked participants at what time they would find starting with a deposit contract most appropriate. Firstly, on a general level, we asked *"What would be the right time for you to start a lifestyle challenge?"*. More specifically, we then asked *"Imagine that you are/have been admitted to the hospital for a problem with your heart. What would be the right time for you to start a lifestyle challenge?"*.

Design and analysis

We used 5-point Likert scales for items on deposit contract acceptability and responses to a concrete example for physical activity. We interpreted the percentage of participants that replied above the neutral midpoint of scale, thus indicating some or strong agreement (4 = agree or 5 = totally agree) with the presented statements. We used multiple choice questions to assess suitable moments for implementation. Data was analyzed using pairwise exclusion and no outliers were removed for the reported analyses. To analyze data and create graphs and tables, we used SPSS version 25 and Microsoft Word. In all tests, we used alpha = .05 for determining statistical significance.

Subgroup analysis

To explore whether subgroups within our patient population may differ in their responses to our outcome variables, we analyzed the relationship between the predictors age, social support, gender, education, income, disease and partner status and the outcome items. For continuous variable such as *age,* we used linear regressions to investigate the relationship with continuous outcome items, binary logistic regressions for binary outcome items, and multinomial logistic regressions for categorical outcome items. For categorical variables such as *education* (low/high) we ran MANOVAS to investigate the relationship with continuous items, and Chi Square tests for binary and categorical outcome items. For a full overview of all exploratory analyses. please see *appendix D*. Please note that although we performed multiple comparisons, due to the exploratory nature of these analyses, we did not apply any corrections. Therefore, we are very careful to interpretate the findings

Results

Descriptives

In total 659 (N = 659) CVD patients with a mean age of 66.2 (*SD* = 11.0) years old completed the survey (See *Table 1* on the next page). The sample consisted of a majority of males, with mostly medium or high incomes, educational level was spread evenly and most were living together with a partner. Furthermore, the majority of participants reported suffering from heart disease and scores for social support were relatively high.

Table 1. Demographic information (N = 659)

Age (N = 653)	
Years	66.18 (11.00) (minimum 22 years, maximum 94 years)
Gender (N = 659)	
Male	429 (65.1%)
Female	230 (34.9%)
Income (Monthly) (N = 659)	
Low (<€1500)	148 (22.5%)
Medium (€1500 – €2500)	278 (42.2%)
High (>€2500)	233 (35.4%)
Education (N = 643)	
Low	134 (20.3%)
Middle	196 (29.7%)
High	320 (49.8%)
Partner status (N = 659)	
No partner	143 (21.7%)
Partner not living together	19 (2.9%)
Partner living together	497 (75.4%)
Disease status (N = 659)	
Heart disease	343 (52.1%)
Vascular disease	149 (22.6%)
Heart and Vascular disease	167 (25.3%)
Social support score (N = 659)	
5-point Likert scale	4.09 (1.13)

*data are means (SD) or frequencies (%).

Main findings

Acceptability of deposit contracts

Almost half of the sample reported needing extra commitment to maintain their lifestyle change (45.6%). However, a smaller part of the sample was convinced by the idea that losing money could be motivating (18.8%) or reported to be willing to deposit money themselves (13.2%). When asked what amount they would deposit, more than half responded with 'nothing' (57.8%) and the rest (42.2%) responded they would be willing to deposit some of their own money. See *Figure 1* below for more detail. Descriptives are reported in more detail in *appendix B.*

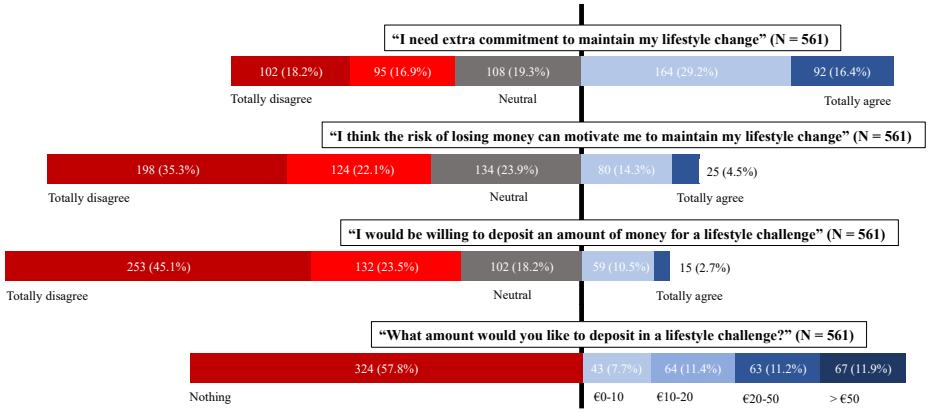

Figure 1. Results on acceptability of deposit contracts
*data are frequencies (%).

Responses to a concrete example for physical activity

Responding to a concrete example of a deposit contract for physical activity, around a quarter of the sample (26.2%) reported there was a chance they would participate. Furthermore, around a quarter of the sample found the deposit contract effective (27.1%) and acceptable (27.4%). See *Figure 2* below for more detail.

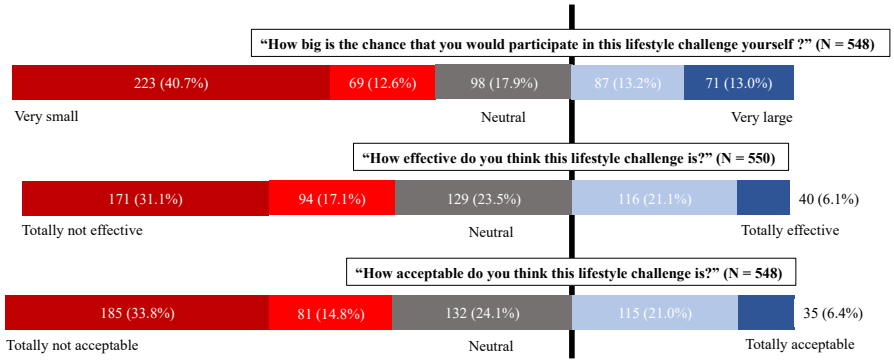

Figure 2. Results on a concrete example for physical activity
*data are frequencies (%).

Suitable moments for implementation

About half of the participants would start a deposit contract directly when they started with lifestyle change (50.1%), and the other half would like to start a deposit contract only when they would experience difficulties maintaining their lifestyle change (49.9%).

When asked when to start a deposit contract after a cardiac incident occurred, answers were spread across the answer options with no clear preference emerging. See *Figure 3* below for more detail.

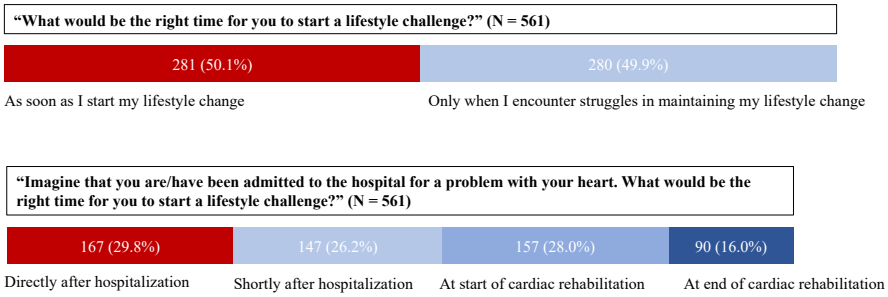

Figure 3. Results on suitable moments for implementation
*data are frequencies (%).

Subgroup analyses

Generally, most of the predictor variables we explored were barely related to our outcome variables, with the exception of *age* and *education*. With regards to age, older participants reported a lower need for extra commitment (β = -.181), lower willingness to deposit money (β = -.103) and less preference to deposit something rather than nothing into a deposit contract (β = -.023). Furthermore, older participants reported that they found the deposit contract example less acceptable (β = - .089). These effects however were small. With regards to education, participants with lower education reported a higher need for extra commitment than participants with higher education (M = 3.28, SD = 1.35 versus M = 2.92, SD = 1.33). Also, participants with lower education reported that losing money could motivate them more than participants with higher education (M = 2.46, SD = 1.28 versus M = 2.18, SD = 1.14). Furthermore, participants with lower education reported that they found the deposit contract example more effective than participants with higher education (M = 2.71, SD = 1.29 versus M = 2.44, SD = 1.31), and there was a trend towards significance where participants with lower education had a higher odd of participating than participants with higher education (M = 2.59, SD = 1.45 versus M = 2.35, SD = 1.48). Interestingly, regarding suitable moments for implementation preferences reversed according to educational level. For participants with lower education, the majority (n = 157) would start a deposit contract only when they would experience troubles with maintaining lifestyle change, while among participants with higher education, the majority (n = 150) would start a deposit contract directly. For the full overview of all exploratory analyses see *Appendix D.*

Discussion

We studied acceptability of deposit contracts for lifestyle change among CVD patients and found that, although participants often reported to need extra commitment, opinions on acceptability were divided. A large part of the sample was not convinced that depositing some of their own money - and possibly losing that - would be a suitable tool to support maintenance of lifestyle change. At the same time there was a small part of the sample that reported higher acceptability. This pattern of results was also found when participants responded to a concrete example of a deposit contract for improving physical activity. Most participants rejected the deposit contract in the example, while a minority responded positively. Exploratory subgroup analyses showed that a subgroup of younger and lower educated participants responded more favorably. Finally, opinions on suitable moments for implementation of a deposit contract were split across the answer options.

Deposit contracts did not appear acceptable to a large part of the sample. This finding is consistent with the two studies that indicated low or divided acceptability of cash deposit contracts (McGill et al., 2018; Mitchell et al., 2014). Possibly, CVD patients have ethical objections to deposit contracts and do not want to risk losing their own money. At the same time, our finding is in contrast with the two studies that indicated high acceptability (Raiff et al., 2013; Stedman-Falls et al., 2018). Importantly, these studies (Raiff et al., 2013; Stedman-Falls et al., 2018) that show high acceptability studied samples with a mean age of around 41 years, whereas the two studies that showed lower acceptability studied samples with a mean age of 64 years (McGill et al., 2018) or that ranged between 54 and 84 years (Mitchell et al., 2014). The mean age of our sample was 66 years and we suspect this might explain why our results are more in line with work that showed lower acceptability. Further support for the idea that age is related to acceptability comes from our subgroup analyses which showed that, within our sample, younger participants reported higher acceptability of deposit contracts. Possibly, because younger participants are more risk prone (Albert & Duffy, 2012), they show higher acceptability of an intervention that involves risking some of their own money. Whether risk proneness indeed explains why younger CVD patients report higher acceptability of deposit contracts should be further studied.

In response to a concrete example of a deposit contract for physical activity, again we found that for the majority of the sample acceptability was low. When asked about the chance that they would participate, the effectiveness and the acceptability of this deposit contract, consistently around 75% of participants rejected the deposit contract while 25% responded positively. Again, this result is in line with other studies (McGill et al., 2018; Mitchell et al., 2014) and shows that a cash deposit contract for physical activity will not appeal to the majority of CVD patients. Importantly, there appears to be a subgroup

of patients to whom deposit contracts do have an appeal and it is this subgroup that should be targeted when implementation of deposit contracts is considered. Future research should investigate what characterizes the subgroup of CVD patients who are open to using deposit contracts to maintain their lifestyle change.

Finally, with regards to when participants would like to start with a deposit contract, we found that answers were split across the answer options. To intervention providers, offering a deposit contract at the end of cardiac rehabilitation might make intuitive sense to help patients bridge the gap between cardiac rehabilitation and the 'unsupported' home environment. However, starting a deposit contract at the end of cardiac rehabilitation was the least preferred option among our sample. Most CVD patients indicated preference for starting a deposit contract either directly after hospitalization, shortly after hospitalization or at the start of cardiac rehabilitation. Perhaps patients believe that it is best to start a deposit contract early, because motivation to commit to lifestyle change (with a deposit contract) might then be at its peak. Based on these findings we recommend offering a deposit contract to CVD patients earlier rather than later in their rehabilitation process.

Interestingly, lower educated participants more often reported needing extra commitment, and were more accepting of deposit contracts. This finding is promising since CVD patients with lower socio-economic position (SEP), of which educational level is an indicator, are much less likely to make lifestyle changes after myocardial infarction (Gaalema et al., 2017). Therefore, others have argued that increasing lower SEP groups' participation in CR and other secondary prevention programs should be a priority (Gaalema et al., 2017). It is possible that lower educated participants are aware that they will experience more issues in maintaining their lifestyle changes and therefore are more open to receive support in the form of a deposit contract. Future work should further investigate whether and why lower educated people are indeed an appropriate target group for deposit contracts.

A limitation of the current study is that we asked participants to respond to hypothetical deposit contracts. While this setup allowed us to gain first insight in acceptability, actually offering them in practice would provide more realistic insights. Also, this study did not assess acceptability of other types of financial incentives or commitment strategies. Therefore, no direct comparison can be made between the acceptability of deposit contracts and other strategies that might support maintenance of physical activity behavior change among CVD patients. Another limitation is that the external validity of our findings is limited because the sample consisted of patient panel members. CVD patients who decide to participate in a patient panel might not be representative of the entire population of CVD patients. For example, our sample appeared to have a relatively high income and high level of education. This sample might have more active coping with their cardiovascular condition and could also be

more motivated to change their lifestyle. Future research should actually offer a deposit contract to CVD patients and investigate the real-world uptake, effects and acceptability. Since only a subgroup of CVD patients responded positively to deposit contracts, we recommend that intervention providers offer them as an additional element to existing interventions that CVD patients can opt-in to. Implementing deposit contracts in this way avoids issues with acceptability among those who refuse them, but allows uptake by those who are interested. Furthermore, future research should investigate strategies to leverage commitment principles for CVD patients that do not have a cash deposit requirement. For example, perhaps one could similarly capitalize on the principle of loss aversion by having CVD patients commit to a bet with some level of social discomfort (e.g., bad hair day picture will be spread on social media if challenge is failed).

Conclusion

This study in a large sample of CVD patients showed that opinions on acceptability of deposit contracts for lifestyle change were divided. The majority of CVD patients did not find deposit contracts acceptable. Only a subgroup of CVD patients found deposit contracts for lifestyle change acceptable. When deposit contracts are offered to CVD patients in practice, we recommend offering them as an optional, additional element to existing interventions that patients can opt-in to.

Authors' Contributions

Study design (DB, TR); data acquisition (DB, TC, IDB); data analysis and interpretation (DB, TR, AE); drafting the manuscript (DB, TR, AE); manuscript revision (DB, TR, TC, VJ, RK, HK, AE). All authors gave final approval and agreed to be accountable for all aspects of the work ensuring integrity and accuracy.

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