RESEARCH ARTICLE

A descriptive study of potential participant preferences for the design of an incentivised weight loss programme for people with type 2 diabetes mellitus attending a public hospital in Lima, Peru [version 1; referees: 1 approved with reservations]

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Abstract

Background: Weight loss is important for the control of type 2 diabetes mellitus but is difficult to achieve and sustain. Programmes employing financial incentives have been successful in areas such as smoking cessation. However, the optimum design for an incentivised programme for weight loss is undetermined, and may depend on social, cultural and demographic factors.

Methods: An original questionnaire was designed whose items addressed respondent personal and health characteristics, and preferences for a hypothetical incentivised weight loss programme. One hundred people with type 2 diabetes mellitus were recruited to complete the questionnaire from the endocrinology clinic of a public hospital in Lima, Peru. A descriptive analysis of responses was performed.

Results: Ninety-five percent of subjects who had previously attempted to lose weight had found this either ‘difficult’ or ‘very difficult’. Eighty-five percent of subjects would participate in an incentivised weight loss programme. Median suggested incentive for 1 kg weight loss every 2 weeks over 9 months was PEN 100 (~USD $30). Cash was preferred by 70% as payment method. Only 56% of subjects would participate in a deposit-contract scheme, and the median suggested deposit amount was PEN 20 (~USD $6). Eighty percent of subjects would share the incentive with a helper, and family members were the most common choice of helper.

Conclusions: The challenge of achieving and sustaining weight loss is confirmed in this setting. Direct cash payments of PEN 100 were generally preferred, with substantial scope for involving a co-participant with whom the
incentive could be shared. Employing direct financial incentives in future weight loss programmes appears to be widely acceptable among people with type 2 diabetes mellitus.

Keywords
Diabetes, Obesity, Motivation, Weight loss, Public health

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**Introduction**

Weight control is critical for both prevention and treatment of type 2 diabetes mellitus (T2DM)\(^\text{1-3}\). Self-management programmes for people with T2DM commonly include the promotion of lifestyle changes, such as dietary modifications and increasing physical activity, to reduce weight\(^\text{4-7}\). However, sustained weight loss is a challenge to both patients and providers\(^\text{8-10}\). Failure to sustain weight loss in formal diet programmes varies between 21–54%, and many people fail repeatedly\(^\text{11-12}\).

A major challenge in any lifestyle intervention programme is the willingness to join, and sustain, participation. Better understanding of what motivates people to engage with such programmes is therefore fundamental to their design\(^\text{13}\). Financial incentives have emerged as strategies which can initiate and sustain positive health behaviours during the incentive period and beyond. Sustained changes have been achieved through incentivization in the field of smoking cessation, although this remains a challenge to weight loss interventions\(^\text{14-16}\).

Social and cultural factors influence participants’ engagement with weight control\(^\text{17-19}\). Successful completion of both short- and long-term weight loss programmes has been associated with age, ethnicity, family structure, educational level and employment\(^\text{20-22}\). Additionally, a recent study testing a behavioural weight loss intervention for Latinos in the United States concluded that companionship for physical activity appears to support weight loss\(^\text{23}\). To direct the design of a future incentivised weight loss programme for people with T2DM in Lima, Peru, we performed a questionnaire study of potential participants with the aim of defining their demographic, social, cultural and health characteristics, and the optimal amount and delivery method for the incentive.

**Methods**

**Design and data collection**

We performed a cross-sectional exploratory study using an original questionnaire, consisting of 82 items (see *Supplementary Material* for the instrument in Spanish) addressing socioeconomic circumstances, health characteristics and preferences relating to a proposed incentivised weight loss programme. Items relating to the programme included a suggested incentive amount and identifying a threshold incentive amount. Two methods were employed to identify threshold incentive amounts for participation in a weight loss reduction programme: direct questioning and fixed-increment questioning (*Supplementary Table 1* and *Supplementary Table 2*).

For the first method, a hypothetical situation was explained to the participant, which consisted of inviting them to participate in a 9-month programme whose purpose was to pay a monetary incentive only if they lost 1 kilogram every two weeks, and that we were interested in knowing the exact amount of money that would motivate them to lose that kilogram. For the second method, amounts of money from 0 PEN to 250 PEN in fixed increments of 50 PEN were specified and the participant was asked whether each of these amounts would motivate them to lose 1 kilogram over two weeks.

Participants were also asked about their willingness to participate in a hypothetical ‘deposit-contract’ programme in which they would be required to deposit a certain amount of money in a saving account and such amount would be doubled if they lost 1 kilogram over a two-week period, but would lose the deposited amount if they failed to reach the weight loss goal.

Finally, participants were asked if they would be willing to share the money won in a weight loss programme with a co-participant, defined as a relative or friend selected by the participant to support their efforts to lose weight, their preferred co-participant, and the proportion of the incentive that the participant would be willing to share with this co-participant.

**Participants**

Patients were recruited by convenience sampling from the Hospital Nacional Arzobispo Loayza, a public tertiary hospital serving mostly low-income people from Lima, the capital city of Peru, whose endocrinology department provides over 2500 outpatient appointments annually to patients with T2DM\(^\text{24}\).

Inclusion criteria were age ≥18 years and self-reported diagnosis of T2DM. Incapacity to provide written informed consent was the only exclusion criterion. Due to the exploratory nature of the study, only 100 subjects were invited to participate. Participants were recruited in the waiting room of the Endocrinology Department during April 2016, and the questionnaires were administered by a trained fieldworker.

**Data analysis**

A descriptive analysis of questionnaire items was undertaken, employing 95% confidence intervals for selected items whose measurement was considered particularly important. For non-parametric continuous variables, a bootstrap confidence interval of the median was attempted. Hypothesis testing was not performed due to the large number of possible comparisons relative to the sample size and the consequently elevated risk of type 1 error. Statistical analysis was performed using R version 3.4.3\(^\text{25}\).

**Ethics**

This study was approved by the Institutional Review Boards of the Universidad Peruana Cayetano Heredia (SIDISI 64789) and the Hospital Nacional Arzobispo Loayza (Expediente 04974-2015), in Lima, Peru. Written informed consent for participation was obtained from all subjects.

**Results**

One hundred people with T2DM participated in the study. Two subjects did not respond to questions relating to incentives; the data were otherwise complete. Demographic and socioeconomic characteristics are presented in *Table 1*. Health-related responses are presented in *Table 2*. Measures previously taken to improve health are presented in *Table 3*.

Ninety-eight subjects (98%) responded to questions about financial incentives. Ninety-two subjects (94%; 95% CI 87 – 97%) responded that they would participate in an un incentivised
Table 1: Demographic and socioeconomic characteristics of patients with type 2 diabetes included in the study.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Count (%) or Mean (Standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex</td>
<td>67 (67%)</td>
</tr>
<tr>
<td>Age</td>
<td>55 years (11.8)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Primary completed</td>
<td>7 (7%)</td>
</tr>
<tr>
<td>Secondary incomplete</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Secondary completed</td>
<td>46 (46%)</td>
</tr>
<tr>
<td>Further non-university incomplete</td>
<td>19 (19%)</td>
</tr>
<tr>
<td>Further non-university completed</td>
<td>13 (13%)</td>
</tr>
<tr>
<td>University incomplete</td>
<td>9 (9%)</td>
</tr>
<tr>
<td>University completed</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Employed</td>
<td>55 (55%)</td>
</tr>
<tr>
<td>Household monthly income</td>
<td></td>
</tr>
<tr>
<td>&lt; PEN 750 (&lt; US $228)</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>PEN 751–1500 (US $228–456)</td>
<td>14 (14%)</td>
</tr>
<tr>
<td>PEN 1501–2000 (US $456–608)</td>
<td>22 (22%)</td>
</tr>
<tr>
<td>PEN 2001–2500 (US $608–760)</td>
<td>24 (24%)</td>
</tr>
<tr>
<td>&gt; PEN 2501 (&gt; US $760)</td>
<td>11 (11%)</td>
</tr>
<tr>
<td>Refused to answer</td>
<td>26 (26%)</td>
</tr>
<tr>
<td>Health insurance</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>34 (34%)</td>
</tr>
<tr>
<td>Sistema Integral de Salud (most basic insurance)</td>
<td>64 (64%)</td>
</tr>
<tr>
<td>Essalud (state-provided insurance for the employed)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Self-rated economic status</td>
<td></td>
</tr>
<tr>
<td>Very bad</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Bad</td>
<td>19 (19%)</td>
</tr>
<tr>
<td>Fair</td>
<td>47 (47%)</td>
</tr>
<tr>
<td>Good</td>
<td>33 (33%)</td>
</tr>
</tbody>
</table>

Eighty-three (85%; 95% CI 76 – 91%) would participate in a 9-month incentivised weight loss programme. Reasons given for not participating included: insufficient time to attend biweekly follow-up visits; because they thought 9 months was a long time to avoid “antojitos” (cravings); or because the participant did not think they needed to lose weight.

Seventy-eight subjects (78%) answered the question “how much money would motivate you to lose 1 kg every 2 weeks?”. Responses were positively skewed with median PEN 100 (= USD $30) and range PEN 50 to 250 (= USD $15 to 150) (Figure 1). Bootstrap confidence intervals could not be constructed because all resampled medians = PEN 100 (10,000 simulations).

Subjects were then asked whether they would participate in an incentivised weight loss programme with incentive amounts from PEN 50 to 250 in PEN 50 increments. Six subjects (6%) would not participate for any amount, while 91 (93%) would participate for all amounts. One subject changed from a positive to negative response at the PEN 200 threshold.

Asked about their preferred method of payment, 69 subjects preferred (70%) cash, 24 (25%) deposit into a bank account, 3 (3%) as vouchers and the remainder not responding.

Fifty-five subjects (56%; 95% CI 46 – 66%) would participate in a deposit-contract scheme whereby their deposit would be doubled if they succeeded but lost if their failed to lose weight. Ninety-seven (97%) subjects answered a question on preferred deposit amount. Preferred deposit amount was positively skewed with median PEN 20 (= USD $6) and range PEN 0 to 50 (= USD $0 to 15) (Figure 2). Again, equality of all resampled median precluded construction of bootstrap confidence intervals.
Table 2. Health characteristics of patients with type 2 diabetes included in the study.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Count (%) or Mean (standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-rated health status</td>
<td></td>
</tr>
<tr>
<td>Very bad</td>
<td>11 (11%)</td>
</tr>
<tr>
<td>Bad</td>
<td>52 (52%)</td>
</tr>
<tr>
<td>Fair</td>
<td>37 (37%)</td>
</tr>
<tr>
<td>Time since diagnosis of diabetes</td>
<td>6.9 years (5 years)</td>
</tr>
<tr>
<td>Most recent blood glucose measurement (self-reported)</td>
<td>Reported (n = 94) 151 mg/dL (49 mg/dL)</td>
</tr>
<tr>
<td>Did not know</td>
<td>6 (6%)</td>
</tr>
<tr>
<td>Most recent HbA1c measurement (self-reported)</td>
<td>Reported (n = 59) 8.9% (1.6%)</td>
</tr>
<tr>
<td>Did not know</td>
<td>41 (41%)</td>
</tr>
<tr>
<td>Current medical treatment for diabetes</td>
<td>Any 95 (95%)</td>
</tr>
<tr>
<td></td>
<td>Insulin 10 (10%)</td>
</tr>
<tr>
<td></td>
<td>Metformin 71 (71%)</td>
</tr>
<tr>
<td></td>
<td>Glibenclamide 32 (32%)</td>
</tr>
<tr>
<td></td>
<td>Glimepiride 1 (1%)</td>
</tr>
<tr>
<td></td>
<td>Weight loss tablets 1 (1%)</td>
</tr>
<tr>
<td>Monthly expenditure on medical treatment for diabetes</td>
<td>PEN US $ 63 (44) 19 (14)</td>
</tr>
</tbody>
</table>

Table 3. Measures previously taken to control health of patients with type 2 diabetes included in the study.

<table>
<thead>
<tr>
<th>Health control measures attempted since diagnosis of diabetes</th>
<th>Count (%) or Mean (standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular exercise</td>
<td>53 (53%)</td>
</tr>
<tr>
<td>Difficulty of attempt to regularly exercise</td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Difficult</td>
<td>12 (35%)</td>
</tr>
<tr>
<td>Very difficult</td>
<td>21 (62%)</td>
</tr>
<tr>
<td>Reduction of sugar intake</td>
<td>75 (75%)</td>
</tr>
<tr>
<td>Difficulty of attempt to reduce sugar intake</td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Difficult</td>
<td>32 (49%)</td>
</tr>
<tr>
<td>Very difficult</td>
<td>32 (49%)</td>
</tr>
<tr>
<td>Quit alcohol</td>
<td>31 (31%)</td>
</tr>
<tr>
<td>Difficulty of attempt to quit alcohol</td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Difficult</td>
<td>9 (31%)</td>
</tr>
<tr>
<td>Very difficult</td>
<td>19 (66%)</td>
</tr>
<tr>
<td>Reduce fat intake</td>
<td>77 (77%)</td>
</tr>
<tr>
<td>Difficulty of attempt to reduce fat intake</td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>0</td>
</tr>
<tr>
<td>Difficult</td>
<td>38 (58%)</td>
</tr>
<tr>
<td>Very difficult</td>
<td>27 (42%)</td>
</tr>
<tr>
<td>Increase vegetable intake</td>
<td>57 (57%)</td>
</tr>
<tr>
<td>Difficulty of attempt to increase vegetable intake</td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>17 (30%)</td>
</tr>
<tr>
<td>Difficult</td>
<td>8 (14%)</td>
</tr>
<tr>
<td>Very difficult</td>
<td>32 (56%)</td>
</tr>
</tbody>
</table>

Health control measures attempted since diagnosis of diabetes

<table>
<thead>
<tr>
<th>Count (%) or Mean (standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss</td>
</tr>
<tr>
<td>Difficulty of attempt to lose weight</td>
</tr>
<tr>
<td>Easy</td>
</tr>
<tr>
<td>Difficult</td>
</tr>
<tr>
<td>Very difficult</td>
</tr>
<tr>
<td>Methods for weight loss control (all participants asked to name three)</td>
</tr>
<tr>
<td>Alternative medication</td>
</tr>
<tr>
<td>Attend appointments</td>
</tr>
<tr>
<td>Avoid appointments</td>
</tr>
<tr>
<td>Exercise</td>
</tr>
<tr>
<td>Foot care</td>
</tr>
<tr>
<td>Glycaemic control</td>
</tr>
<tr>
<td>Healthy diet</td>
</tr>
<tr>
<td>Intake control</td>
</tr>
<tr>
<td>Medications</td>
</tr>
<tr>
<td>Obey doctors</td>
</tr>
<tr>
<td>Reduce alcohol</td>
</tr>
<tr>
<td>Reduce carbohydrate</td>
</tr>
<tr>
<td>Reduce fat</td>
</tr>
<tr>
<td>Reduce protein</td>
</tr>
<tr>
<td>Relaxation</td>
</tr>
</tbody>
</table>
Figure 1. Suggested simple incentive amounts.

Figure 2. Suggested deposit amounts.
Subjects were then asked whether they would participate in a deposit-contract scheme with deposit amount in increments between PEN 25 – 250. Forty-three subjects would participate with any deposit amount (43%); 32 would not participate with any deposit amount (32%); and 22 identified a threshold deposit amount for participation (22%). Among subjects who identified a threshold deposit amount above which they would not participate, the maximum acceptable amount was positively skewed with median PEN 25 (range PEN 25 to 100).

Regardless of their answers to the previous questions, subjects were also asked for their views of participating in such a program. Out of the 73 who responded, 14 (19%) considered that it was not good to receive money for taking care of their own health, with one saying that this would be “like selling yourself”, since people should lose weight for their own sake and not for money. Sixteen (22%) said it was a good idea and were even excited at the prospect of participating in the program. Six (8%) found it amusing that such a program was even possible, and five (7%) were concerned that such a program will achieve only short-term results that would not be sustained after the program ended. Other answers revolved about the doubts they had about the program, or they did not understand the idea behind receiving money, that it was a good idea for “poor” people but not for everybody or that it might not work since not all diabetics needed to lose weight.

Subjects were asked who they would choose to help them to lose weight. Five (5%) chose a friend; 42 chose a partner (42%); 23 chose a child (23%); 1 chose a neighbour (1%); 4 chose a sibling (4%); and 12 would not choose a helper (12%). Eighty subjects would share the incentive with a helper (80%). Eight (10%) of these would share less than half, 71 (89%) half exactly, and 1 (1%) more than half of the incentive.

**Discussion**

This pilot study aimed to characterise people with T2DM attending a public hospital in Lima, Peru, and their preferred amount and delivery method for a financial incentive to be used in a future incentivised weight loss programme.

Median suggested incentive amount was PEN 100. Based on a national disposable income of USD $175.7bn and population of 30,565,431 in 2013, a maximum reward of PEN 100 every 2 weeks for 9 months would represent 10% of personal disposable income (PDI). Previous interventions have employed a broad range of incentive sizes (from 0.2% to 10.2% of PDI), and experimental evidence suggests that insufficient incentives may paradoxically produce less motivation than no incentive at all. The suggested amount therefore appears adequate and appropriate for an intervention in this setting.

The second method employed to identify a suitable incentive amount (asking whether the participant would accept amounts of increasing PEN 50 increments) was not successful. Sixty-two percent of participants in a previous study felt that financial incentives undermined individual responsibility for health, and participants may have been reluctant to engage with these questions to avoid weighing a moral position against financial advantage.

Fewer respondents would participate in a deposit-contract scheme. Because such schemes weigh a certain short-term price against a possible long-term advantage, they fail to take advantage of the established health economic principle that individuals overvalue present relative to future costs. In contrast, an approach described as asymmetric paternalism, which aims to assist individuals with health-improving behaviours without limiting freedom, might produce in an intervention in which individuals commit to future behaviours without present costs, such as receiving up-front an incentive which would be returned or doubled depending on achievement of a future weight goal. Cash or bank transfer were generally preferred over vouchers. This is in accordance with the finding that rewards are more motivating when separated from larger payments, such as household shopping (in the case of vouchers) and insurance premiums (in the case of discounts).

Our findings show that most participants had found it challenging to adopt health-improving behaviours. In particular, 42% of participants had previously attempted to lose weight but 95% found this “difficult” or “very difficult”, suggesting that people with failed previous weight loss attempts will constitute a substantial subgroup of this population. The question of what makes behavioural change difficult has been addressed by Kelly & Barker, who note the mistakes which policy-makers commonly make in understanding the drivers of behaviour. One of these mistakes is the economic utility theory which presumes that individuals make rational choices to maximise gain and minimise loss. The theory behind the use of financial incentives is essentially an extension of this. However, health behaviours are frequently automatic responses to social and environmental cues, not subject to particular conscious reflection, and often in spite of adequate understanding of health implications. These findings inform interventions that target ‘choice architecture’, comprising the “interaction between individual human agency and both the immediate and broader environment that make up the social structure”. Financial incentives are much more likely to achieve persistent behavioural change in synergy with such interventions.

Asked about who they would choose to help them to lose weight, most selected a family member. In prospective studies, family support was associated with reduced HbA1c in males, but increased HbA1c in females. Informal support seeking is often different in males and females. Females seek and receive more support from friends and extended family, while males often seek and receive more support from their spouse. Other studies found that seeing friends more frequently, having a well-functioning social network and a sense of good social support from the social network was associated with higher patient activation levels, less diabetes-related emotional distress and more health-promoting self-management behaviours among patients with T2DM. When providers felt more emotionally engaged, their support exerted a large, positive effect on their well-being, as well as on recipients’ well-being. These findings imply that the
incorporation of social support into an intervention may be crucial for its success, but also that its precise form may need to adapt to the sex (and potentially other characteristics) of the participant.

The novelty of the proposed approach was highlighted by several participants and although many appeared interested and excited about the possibility of enrolling, a small proportion were sceptical. This confirms the need to have a better understanding of the role that incentives have in behavioural change, and in particular which ones are appropriate in resource-limited contexts such as Peru.

Limitations

The sampling approach employed may have exposed the study to participation bias. Most participants were female, middle-aged, and had at least completed secondary education. Although most rated their economic status as at least ‘fair’, almost all had either the most basic or no health insurance at all. Although the prevalence of T2DM is greater in males than females worldwide, the higher proportion in our study may be explained by the fact that females are more likely than males to engage with healthcare seeking behaviours and respond to questionnaires.

The study setting in a Peruvian public hospital is likely to have determined participants’ socioeconomic profile, which should not be interpreted as representative of people with diabetes in Peru more generally. However, the prevalence of T2DM is inversely proportional to socioeconomic status and therefore the majority of people with T2DM in Peru will fall into the low-income group surveyed in this pilot and targeted by our planned intervention. Higher-educated subjects have previously been found to make more attempts to lose weight, which may imply a greater need for intervention in this low-income group.

Important parameters for an incentivised weight loss programme were not explored in our questionnaire. A ‘lottery’ form for payments, in which successful weight loss would allow entry into a regular lottery for a larger payment (which is anticipated to be more motivating than direct payments because people tend to over-value small odds of large rewards) was not proposed to participants. Participants were also not asked about their preferred frequency of payment. Higher-frequency payment have been shown to be more effective in the drug-abstinence setting, and the finding that experimental subjects prefer to segregate than to integrate gains has been used to support the argument for direct rewards over insurance premium adjustment. These factors are important for the planning of any intervention and the preferences of potential participants should be the subject of future investigation. Although multivariate associations could not be investigated due to insufficiency of sample size and sampling design, the study was not designed to investigate these, but rather to develop an improved understanding of the potential use of incentives in this setting.

Conclusion

Employing direct financial incentives in future weight loss programmes appears to be widely acceptable among people with T2DM in Lima, Peru.

Data availability

Original and translated data files are available on Open Science Framework: [Link](http://doi.org/10.17605/OSF.IO/8NQVVW).

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

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Supplementary material

Supplementary Table 1: Questions asked to identify the maximum amount participants would accept as a financial incentive for weight loss [English translation].

Click here to access the data.

Supplementary Table 2: Questions asked to identify the maximum amount participants would be willing to invest, in order to double their money upon meeting the weight loss target [English translation].

Click here to access the data.
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The present report deals with a patient survey on potential monetary incentives to increase adherence in future weight loss programs to address type 2 diabetic in poorer section of the population in Peru. To address the topic is thoughtful as well as important and it clearly deserves publication.

Nevertheless, the survey itself leads to no clear solution. On one hand it shows clear results on the missing attractiveness of the deposit-contract scheme and that cash/bank transfer is preferred over vouchers. But on the other hand it offers also important insights into the prejudices towards monetary incentives as well as it potential benefits. Interestingly, the participants themselves addressed the potential short-lived nature of monetary incentives during the weight loss without addressing incentives to maintain weight afterwards. These results, therefore, are ambiguous and not disputed in the discussion section. The discussion and conclusion parts do not sufficiently address major points of the result section. In hindsight the authors might have designed the questionnaire differently, offering more options, possibly also ones that address intrinsic motivation and not only extrinsic motivation, as shown in this report.

Major points:

Ad 2) Study design:
- Anthropometric data of the participants are missing. What was the mean BMI (standard deviation)? As BMI was not an inclusion criterion: How many respondents were in the normal weight, overweight, obese I, II and III range?
- There was a bias in the selection of participants, which was addressed in the discussion section. Apparently those who intended to lose weight agreed more often to participate in the survey as seen by the 94 %age who agreed to the uncinentivised weight loss program and the skewed, high percentage of participating women. The selection bias might be unavoidable but means, that the researchers addressed “the converted” in the survey and not those who do not want to lose weight but, nevertheless, might motivated by the monetary payment. It might also mean, that motivation to participate in a weight loss program might not be achieved by alone by “money for kilos”. We miss the dispute on this issue in the discussion part. It there a way to reach the so far unreachable group and can it be achieved by monetary incentives at all?
• Weight loss is not linear but more at the beginning and less later on. The main weight loss is expected to happen in the first 3 months. Therefore, the rationale for the bi-weekly payment for 1 kg weight loss is not self-explanatory. It might demotivate at the beginning (when more than 1 kg is lost in the 2-week period) and at the end of the program (when weight loss slows down). Participants with higher BMI and more kg of potential meaningful weight loss can “earn” more money than participants in the overweight range, in whom a weight loss of 5-10 kg is adequate and this should be achieved in max. 20 weeks = 5 months according to the suggesting scheme (which is in line with international guidelines). Meaning that it is achieved prior to the program end. Is this motivating? We miss the discussion about these issues in the discussion part.

• Results mention that 85% would participate in an incentivized weight loss program, but even more (92%) responded that they would participate in a UNincentivised weight loss program anyway (page 3, right column, last two lines). This result should be mentioned in the abstract (and discussed in the discussion part).

• Who is going to provide the monetary incentive? Is it realistic that the money will be available in long-term? Also this should be mentioned somewhere in the manuscript.

Ad 3) Methods – details:
• The main questionnaire is only available in the Spanish language – translation to the English language would be helpful
• The structure of the method section should be improved, for example there should be an extra bullet point for the questionnaire development
• The explanations about the questionnaire are sometimes confusing, maybe an overview/figure about the questioning techniques (direct and fixed increment) and the related issues could be helpful.
• Who conducted the interviews or were parts of the questionnaire completed by the participants themselves?
• Inclusions criteria: Why self-reported T2DM? The recruitment took place in the endocrinology department, so blood values could have been recorded (e.g. HbA1c)
• The body height and body weight was not documented and not asked?

Ad 6) discussion
The discussion does not address all major results,. E.g. Results mention that 85% would participate in an incentivized weight loss program, but even more (92%) responded that they would participate in an unincentivised weight loss program (page 3, right column, last two lines). 14 participants (19%) further considered that it was not good to receive money for taking care of their own health and one explained that it was like “selling ourself” (page 7, left col, para 2, L3-109). Especially for women, being poor and “selling yourself” implies critical and serious connotations. Surprisingly, only 16 participants thought that payment was a good idea. We think these are rather unexpected and important results, which were not addressed in the discussion part. Furthermore, five participants addressed that payment will achieve only short-term results and this was also not mention in the discussion section. It is opening an important discussion if “payment per kilo” or incremental payment DURING weight loss is indeed a promising solution or if other models might be more promising (payment AFTER achieving weight loss goals or payment (or reduction /or extra money for health care costs) during the maintenance period and on long-term. We miss discussions and critical reflections on these issues in the discussion part.

Also the conclusion is irritating and does not reflect the results.
Minor comments:

Abstract:
- The exact formulation of objectives is missing.
- Result on the 92% that responded that they would participate in an unincentivised weight loss program (page 3, right column, last two lines) should be added.
- Add “each” between “incentive for” and “1 kg”, otherwise it is unclear if the incentives incremental and paid every 2 weeks and not as one payment after 9 months.
- Conclusion is irritating and does not reflect results (see also above ad 6.)

Introduction:
- First paragraph focusses mainly on sustainability of weight loss, which is not addressed by the survey.
- At the beginning or rather in the rationale, it is initially not clear that the questionnaire deals with financial incentives
- You quoted an interesting systematic review about the financial incentive in treatment of obesity and overweight (John KL, et al., J Gen Intern Med 2011). Which results or conclusions were reached by the review?
- You say social and cultural factors influence the participant’s engagement with weight control, what exactly are the consequences?
- It would also be interesting to know how the T2DM patients are normally cared for in Peru in addition to medical treatment. Are there any dietetic interventions by dietitians? Are there accompanying weight loss programs common? What does basic health insurance cover and what have patients normally pay by themselves?
- Reading the title and the manuscript as a whole, the main aim as to our understanding was to investigate the attractiveness of monetary incentives in weight loss programs, whereas defining the demographic, social, cultural and health characteristics was secondary and only accessory (and therefore rather rough). Therefore, the phrasing of the aims is irritating to us.
- It is unclear if the incentivized weight loss program is intended for research purposes first and for integration in a regular health care program later on OR is it intended for research purposes only OR is it intended to start straight with a regular health care program? Information on this would be helpful.

Results:
- As already mentioned in major comment 1) we miss the BMI/body weight data of the participants.
- Page 4, left col, L4-5: wording “because they thought 9 months was a long time to avoid craving” is unclear
- Table 2: Why weren't the laboratory values taken from the hospital patient records?
- Table 3: it would have been also interesting to know the reason WHY the participants found it difficult to implement the health control measures, if they tried and even if they have not yet tried. We miss this point in the limitation section of the discussion. We also wondered about some answers on the methods for weight loss control. Why are “avoid appointment” and “foot care” listed? A short explanation would be helpful

Discussion:
- See also major point 6. Major issues are not discussed and the conclusion is irritating.
- Page 7, left col, last para: What is meant by “the second method”?

The discussion remains vague, for example it is nice to read about the different theories about behavior change, but where is the link to the results or the conclusion?
Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
No

**Competing Interests:** No competing interests were disclosed.

**Referee Expertise:** Human Nutrition, Nutrition Assessment, Clinical Nutrition, Nutritional and Metabolic Diseases, Clinical Trials, Malnutrition, Applied Nutrition, Cardiovascular Risk Nutritional Status, Functional Food, Nutrition Therapy, Functional Foods

**We have read this submission. We believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.**