**accepted abstract**

**Title: Less carrot more stick: investigating deposit contract financial incentives for physical activity behavior change in a smartphone application**

**Authors:**

David de Buisonjé¹, Thomas Reijnders¹,⁸, Talia Cohen Rodrigues¹, Mike Keesman¹,
Prabhakaran Santhanam⁶, Tobias Kowatsch⁶,⁷, Veronica Janssen¹,⁴, Roderik Kraaijenhagen³, Hareld Kemps² & Andrea Evers¹,⁵

¹Health, Medical and Neuropsychology Unit, Institute of Psychology, Leiden, University, Leiden, The Netherlands
²Department of Cardiology, Máxima Medical Center Veldhoven, The Netherlands
³Hearts4People foundation, Amsterdam, The Netherlands
⁴Department of Cardiology, Leiden University Medical Center, Leiden, The Netherlands
⁵Department of Psychiatry, Leiden University Medical Center, Leiden, The Netherlands
⁶Centre for Digital Health Interventions, Department of Management, Technology, and Economics, ETH Zurich, Zurich, Switzerland
⁷Centre for Digital Health Interventions, Institute of Technology Management, University of St.Gallen, St.Gallen, Switzerland
⁸Department of Human-Centered Design, Faculty of Industrial Design Engineering, TU Delft, Delft, The Netherlands

**Abstract**

**Background:** Deposit contracts, a form of financial incentives in which participants deposit their own money, are an inexpensive intervention with possibly beneficial effects on behavior by utilizing the power of loss aversion. However, uptake might be limited and literature suggests that merely framing an incentive as a loss is more effective than framing it as a gain. This study investigated whether (1) deposit contracts have lower uptake but higher effectiveness compared to traditional rewards, (2) loss framing leads to higher effectiveness, and (3) if these factors interact.

**Methods:** We used a 2 (incentive type; deposit vs reward) x 2 (feedback frame; gain vs loss) experimental between-subjects design with participant days step goal achieved as primary outcome. Ninety-one respondents were randomized to either deposit 10 euro or receive 10
euro as a reward via a digital bank transfer and received daily feedback for 20 days that was either loss or gain framed.

**Results:** Uptake of deposit contracts was lower than that of rewards ($\chi^2=8.07$, $p=.005$). Furthermore, a two-way ANOVA showed no main effect of incentive type ($p=.159$, $\eta^2=.048$), but gain framed feedback was more effective than loss framed feedback ($p=.014$, $\eta^2=.14$). We did not find an interaction effect ($p=.797$).

**Discussion:** The finding that deposit contracts had lower uptake but were equally effective as reward incentives is important since deposit contracts have implementation benefits. Unexpectedly, gain framed feedback was more effective than loss framed feedback. More research into this unexpected framing effect and how to increase uptake of deposit contracts is needed.