Data Observer

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Data from a Randomized Experiment: Financial Incentives on Weight Loss (RWI-Obesity)

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1 Introduction

Rapidly increasing obesity rates and associated health effects for individuals concern almost all industrialized countries and a number of emerging economies as shown by recent studies. In more than 70 countries the prevalence of obesity doubled since 1980, going along with increasing cases of diseases related to high body mass index (BMI) (GBD 2015 Obesity Collaborators 2017).

Overweight and obesity are defined on the basis of the BMI, calculated by the bodyweight (in kg) divided by the squared body height (in meter). According to the World Health Organization (WHO),[1] excess body weight is defined as having a BMI $\geq 25\,kg/m^2$ for adults. Obesity is defined as a BMI $\geq 30\,kg/m^2$; pre-obese refers to an adult with a BMI of $25–29.9\,kg/m^2$.

Besides the increasing age of the population, the global increase of obesity is considered to be one of the toughest challenges confronting healthcare systems worldwide. The majority of health costs can be linked to obesity: overweight or obese persons have a higher risk of getting type 2 diabetes, a heart disease, a hypertensive disease, a stroke, cancer, and osteoarthritis. In addition to these impairments to health, overweight may diminish psychological health and personal quality of life (Paloyo et al. 2015).

This article describes individual-level data of a randomized experiment to examine whether obese people are more likely to reduce weight when

1 See: http://www.euro.who.int/__data/assets/pdf_file/0008/98243/E89858.pdf?ua=1.

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receiving financial incentives. The experiment, conducted between March 2010 and July 2013, comprises 700 obese medical rehabilitation patients who were randomly assigned to one of three experimental groups for achieving an individual target weight within four months after staying in a rehabilitation clinic. Participants in the two treatment groups were paid premiums of different amounts for achieving their individual target weight, while individuals assigned to the control group received no such premium. The experimental design enables to control for a range of socio-economic and health-related characteristics of the individuals.

Serval empirical studies observe a strong correlation of obesity with socio-economic characteristics: obesity rates increase with age and are inversely correlated with a high education level and income. These correlations are even stronger for females. Furthermore, single individuals more often exhibit a normal weight than married, divorced, or widowed persons. In addition, adolescents with a migration background have a higher risk of becoming obese than natives. Several studies have shown that obese people exhibit a substantially lower employment probability than healthy-weighted people (see e. g. Bertola et al. 2001; Morris 2007; Lindeboom et al. 2010; Caliendo/Lee 2011; Reichert 2012, Paloyo et al. 2015).

Since weight loss may reduce the cost associated with obesity, employers and health insurances have become increasingly interested in using financial incentives to encourage their employees or enrollees to lose weight. In fact, some companies have already pre-tested bonus programs for weight loss, and they assessed enrollment, program attrition, and weight loss effectiveness. In the short run, financial incentives for healthy behavior seem to be effective (Augurzky et al. 2012). However, it is unclear what happens after removing the financial incentives. Hence, the long run effects are ambiguous. On the one hand, incentives may reduce the extent to which other motives affect behavior. Once the financial incentive is stopped, these other motives may take over. On the other hand, due to the change in behavior induced by the financial incentives, participants may develop a behavioral automaticity, i. e. a long-lasting change in habits (Gneezy et al. 2011). The dataset offered by the FDZ Ruhr allows to analyze both, the short-run and the long-run effects.

2 Design of the experiment

The randomized experiment has been conducted by the *RWI – Leibniz Institute for Economic Research*, Germany, and was funded by the *Pakt für Forschung und Innovation* that is part of the excellence initiative of the German government.

Furthermore, this experiment has been conducted in cooperation with the association of pharmacists of the federal state of Baden-Wurttemberg and four medical rehabilitation clinics operated by the German Pension Insurance of Baden-Wurttemberg. The study participants were invited by the clinics to take part in the experiment in their final week of their rehabilitation stay, and were informed about the procedures of the experiment by personal instructions and handouts. The clinics offered varying weight loss programs to the patients during their medical rehabilitation. The ethics commission of the Chamber of Medical Doctors of Baden-Wurttemberg approved the study protocol.

The experiment was conducted between March 2010 and July 2013. The recruitment of all participants took place between March 2010 and August 2011. Thus, the last participants finished their individual four months of weight loss by the end of January 2012.

The setting of the random experiment can be divided in four project phases (see Figure 1). The first phase is the *stay in a medical rehabilitation clinic*, which usually lasts three to four weeks. Afterwards, the second phase, with a total duration of four months, is the *weight-loss period*, followed by the third phase, a six-month *weight maintenance period* in which the participants aim at holding their achieved weight. Finally, the experiment ends with a one-year *follow-up phase*.

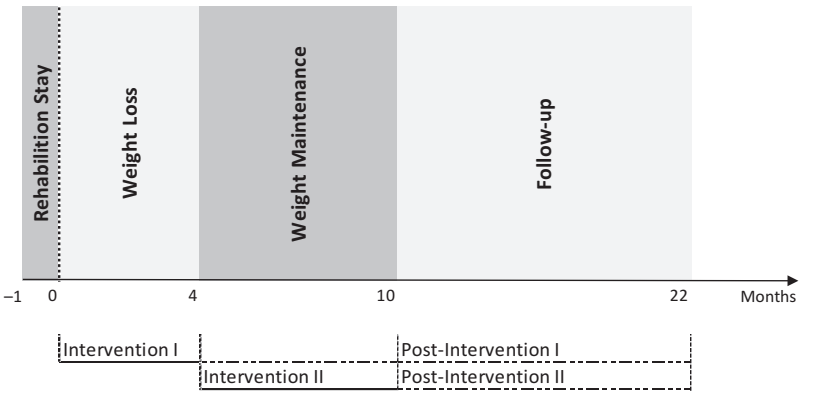

Figure 1: Experimental design.
Source: Augurzky et al. (2015), page 8.

Two randomizations took place: one at the beginning of the weight loss phase and an unannounced second one at the start of the weight maintenance phase (see Figure 2).

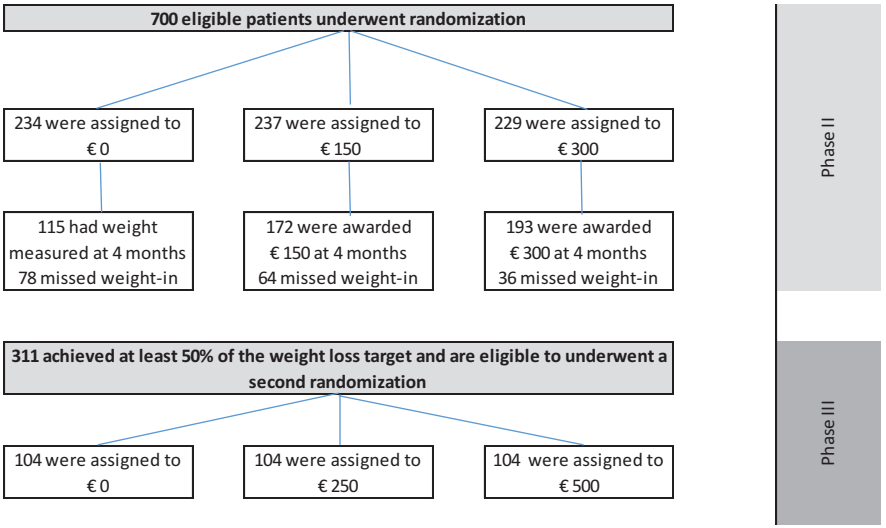

Figure 2: Study procedure.
Source: Paloyo et al. (2015), own calculation.

2.1 Phase I – Rehabilitation stay

2.1.1 The medical rehabilitation clinics

The participants were recruited in four medical rehabilitation clinics located in different cities in Baden-Wurttemberg. In particular, the medical rehabilitation clinics in Bad Mergentheim, Bad Kissingen, Isny and Glottertal were involved in the trial. Most of the patients were admitted to the clinics due to diagnoses other than adiposity.

2.1.2 Selection of participants

Individuals were eligible for the experiments if they comply with a range of inclusion and exclusion criteria for participation. Inclusion criteria were a BMI above 30 at admission, age between 18 and 75 years and having a residence in Baden-Wurttemberg. Individuals with considerable language barriers, pregnancy, psychological and eating disorders, tumor disease within the last five years, abuse of alcohol and drugs, and severe general diseases were excluded. In total 700 participants were recruited, from which two individuals were

subsequently excluded from the trial due to a pregnancy and cancer, respectively.[2] The study procedure is depicted in Figure 3 and shows the distribution of participants and their paid bonus for Phase II and Phase III.

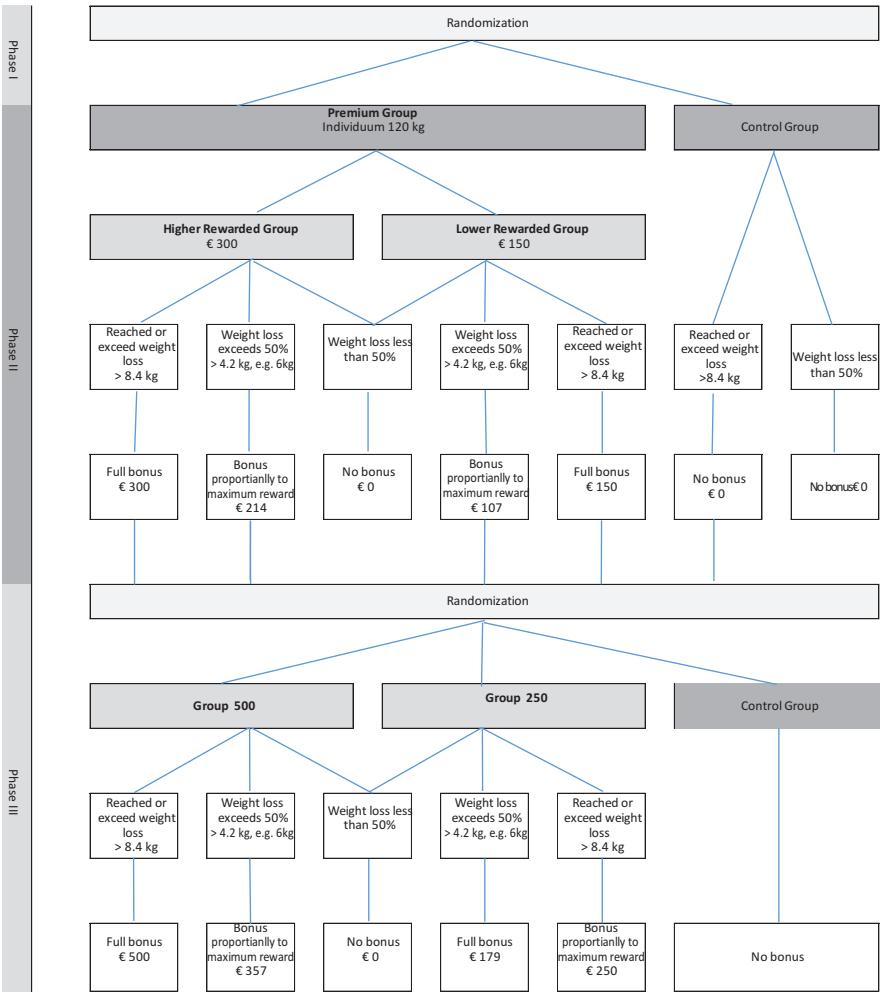

Figure 3: Example for bonus payments.
Source: Augurzky et al. (2015), own calculation.

2 Three more participants are excluded in the follow-up phase because of internal documentation issues and missing consent form.

2.2 Phase II – Weight loss period

After the discharge from the clinic, a random assignment into two treatment groups and one control group took place. Randomization was carried out without replacement and is stratified by the clinics. With respect to this randomization procedure, the participants were equally assigned to one of the three groups. Individuals assigned to the treatment groups were promised to receive a premium up to € 150 or € 300, respectively, contingent on their weight loss. By achieving 50 % of their weight loss target the participant received 50 % of the premium. If the participant reduced his weight even more than the target weight loss, the premium increased proportionally to the maximum reward (for further information see Augurzky et al. 2012). In case of less than 50 % of their weight loss target they received no premium. Members of the control group did not receive any premium at all.

2.3 Phase III – Weight maintenance

Those participants who achieved at least 50 % of their target weight loss after the completion of the weight loss phase (irrespective of group assignment in this phase), were randomly assigned again at the end of the weight loss phase. Randomization was conducted without replacement and without stratification by the clinics. Three experimental groups with equal shares were assigned including two treatment groups, which were promised € 250 and € 500, respectively, for maintaining a body weight below their target weight ten months after enrollment. Participants assigned to the control group (€ 0) were not informed about this weight maintenance randomization. All participants were told to assure their weight does not exceed the individually assigned target weight during the weight maintenance phase and the follow-up phase. As in the weight loss phase, members of the treatment groups were paid the full bonus or a premium proportionally to the maximum reward if they maintained their target weight. Participants were informed regularly by mail about their maximum possible premium, which did not apply to members of the control group.

3 Data acquisition

Individual data were collected at the end of each project phase. The collected data can be divided into two types: First, medical target variables were collected by medical professionals (i. e. physicians and pharmacists), and second, self-

assessed variables were extracted from questionnaires filled out by the participants themselves.

By the end of the stay in the rehabilitation clinic, baseline measurements of several medical target variables such as the BMI, the blood glucose level and the cholesterol level were carried out by the medical staff of the clinics. The physician in charge suggested an individual weight loss target between 6 and 8 % of the current body weight to the participants, which they were supposed to realize in the second phase, the weight loss period, which were the subsequent four months.

Further medical variables such as the participant's body height, body weight, blood glucose and cholesterol levels were collected by pharmacies by the end of each of the last three phases. For this purpose, two weeks prior to the end of the respective phase, a reminder for the measurement of these medical variables was sent to the participants. Moreover, the reminder letter contained a questionnaire with the same set of questions on time-varying variables as the one collected at the initiation of the experiment.

In order to ensure an independent control measurement, the reminder indicated a nearby pharmacy. Beforehand, the project staff called pharmacies in order to ask for participation, to figure out whether the necessary equipment for the control measurements was available, and to give brief instructions. Pharmacies without scales were not eligible. Pharmacies which had a scale but lacked devices for the measurement of the blood glucose and the cholesterol levels were eligible as second-best options in order to avoid long travel times for participants when attending the weight-in. Advantages of assigning participants to specific pharmacies are, first of all, that treatment group participants cannot switch between pharmacies in order to take advantages of probable measurement errors of the scales. Second, this procedure generates exogenous variation in a determinant of sample attrition, which is exploited to tackle selectivity bias (Augurzky et al. 2012).

In addition to the medical target variables, participants answered a detailed questionnaire about their socioeconomic background, further health outcomes and preventive behavior by the end of each project phase of the experiment. The number and the topic of questions in each of the four questionnaires vary to some extent. Questionnaires can be found in Eilers and Pilny (2015).

4 Representativeness, quality and analysis potential

The database is restricted to rehabilitation clinics operated by the *German Pension Insurance of Baden-Wurttemberg*. The German Pension Insurance

predominantly aims at avoiding unemployment or early retirement, requiring that the patient's ability to work is generally recoverable. The dataset is not representative for either Germany or the pension system, since it only includes Baden-Wurttemberg and clinics operated by the German Pension Insurance. Within this group, there is random assignment after clinic discharge to the treatment and control groups in the weight loss phase. The four rehabilitation clinics are located in different cities in Baden-Wurttemberg. The participants distribute on the clinics as follows: 42 % were recruited by the clinic in Bad Mergentheim, 33 % in Bad Kissingen, 18 % in Isny and 7 % in Glottertal. The intervention periods were spent outside the medical rehabilitation clinic. Therefore, interactions between the participants are unlikely.

Table 1 compares socioeconomic characteristics of the study population, characteristics on the patients of the four rehabilitation clinics and representative obese in Germany. Main reason for large differences between the study population and the obese population in Germany in age and the share of employed participants is the composition of the populations. The medical rehabilitation in the co-operating clinics is paid by the German pension fund, whose predominant goal is to avoid work inability and early retirement. Thus, the study population oversamples persons that are available for the labor market, whereas in the overall population many obese persons are already retired.

Table 1: Socioeconomic background of the study population and the obese in Germany.

	Study population	Patients of the four rehabilitation clinics	Representative obese in Germany (BMI ≥ 30)
Female (%)	32.23	34.17	49.98
Age (years)	48.11	49.69	57.11
Married (%)	61.03	71.37	62.23
Residents of Baden-Wurttemberg (%)	100	94.99	11.84
Natives (%)	78.89	82.67	86.30
Full-time employed	69.44	76.12	34.85
Part-time employed (%)	9.04	11.01	14.27
Unemployed (%)	13.20	8.23	6.90

Source: Augurzky et al. (2012), own data collection, German Federal Pension Fund, German Socio-economic Panel (SOEP).
Notes: The categories full-time employed, part-time employed, marginally employed, no information on the type of occupation, unemployed and not-employed add up to one.

Experiment attrition occurred due to participants who actively canceled their participation or due to participants who did not send in the required

documents at the end of an experimental phase. To reduce the latter reason for sample attrition, participants, regardless of their weight loss, received € 25 if they sent in the documents and were still paid if the date of measurement indicated by the pharmacist was within 14 days after the end of the due date. Moreover, participants were contacted by phone if their documents were still pending three working days after the specified week.

The data set is characterized by a panel structure that comprises all four phases for each of the 700 participants, i. e. with 2,800 observations in total. The variables are segmented into the following four groups: medical information, participation survey, and two kinds of generated variables by the RWI, i. e. the administrative and generated data. In general, these variables can be divided into medical and socioeconomic characteristics. The medical information was collected at the end of Phase I to Phase III by medical clinic and by pharmacy staff. Socioeconomic information were collected at the end of each phase by questionnaires which contain, depending on the phase, information on family background, education, employment, health and life style as well as stay in the medical rehabilitation clinic, weight reduction, sexuality and others. A detailed variable description is provided by Eilers and Pilny (2015).

Due to the large extent of medical and detailed socio-economic information asked in the questionnaires, the dataset is suitable to investigate a variety of research questions (see e. g. Augurzky et al. 2012, 2015; Reichert et al. 2015). In the following, we give some examples:

- The effect of financial incentives on weight reduction and health improvements,
- The potential of cash rewards to prevent weight cycling,
- Heterogeneous effects among different population groups according to socio-economic characteristics,
- The relationship between weight loss and sexual activity.

5 Data availability

A scientific use file including all phases of the experiment is available for non-commercial research (http://doi.org/10.7807/Obesity:2015:v1). Data access requires a signed data use agreement, and only persons who are affiliates with a scientific institution are eligible to apply for data access. Data access is provided by the Research Data Centre (FDZ) Ruhr at the RWI – Leibniz-Institute for Economic Research. Data can be applied online at http://fdz.rwi-essen.de/application.html. The application form includes a brief description and

title of the project, cooperation, department, expected duration of data usage as well as further participants in the project.

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