

# Evaluation of an Incentive-Based Obesity Management Program in a Workplace

Gyuseok Hwang  
Chungsik Yoon

School of Public Health, Seoul National University, Seoul, Korea

Hyesun Jung

The Catholic University of Korea, Seoul, Korea

Yongbae Kim

College of Medical School, Soonchunhyang University, Chungnam, Korea

*This study is to analyze the effectiveness of an incentive-based obesity management program (the Midas Project aimed to improve good health habits) at an electronics company in 2005. A total of 95 company participants with a high body mass index (BMI) were recruited for a health promotion program for 3 months that awarded gold medals as an incentive for body fat loss. BMI decreased from 28.8 to 27.8 kg/m<sup>2</sup> ( $p = .000$ ), body weight decreased from 87.2 to 83.5 kg ( $p = .000$ ), and body fat weight decreased from 25.4 to 23.3 kg ( $p = .000$ ). Systolic and diastolic blood pressure decreased from 130.5 to 125.1 mmHg ( $p = .002$ ), from 86.4 to 81.7 mmHg ( $p = .009$ ). The percentage of participants exercising more than 3 times per week increased from 27.3 to 52.3% ( $p = .000$ ). The percentage who avoided overeating at parties and midnight eating increased from 65.9 to 72.7% ( $p = .767$ ) and 70.5 to 84.1% ( $p = .172$ ), respectively. This incentive-based obesity management program was effective in improving not only BMI but also health status.*

obesity   workplace   incentive   BMI

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## 1. INTRODUCTION

Historically, obesity was considered to be primarily a problem of western societies [1, 2, 3, 4, 5] but, recently, obesity has also emerged as an important health concern in eastern societies [6, 7, 8, 9]. Obesity has increased with the change in lifestyle and eating habits in Korea. The population of Korea is least obese among members of the Organisation for Economic Co-operation and Development (OECD) as the obesity rate (body mass index [BMI]  $\geq 30$  kg/m<sup>2</sup>) of Korean males and females is 3.7 and 3.3%,

respectively. However, they are greatly increased values compared with 1.6 and 2.7% in 1998 [10]. Obesity has been an issue in Korea because obesity-related diseases such like coronary heart disease and stroke are major death causes in Korea [11]. Moreover, Korean people are more vulnerable to hypertension and diabetes mellitus at the same level of BMI compared to Caucasians [12]. Also, according to the industrial accident statistics in Korea, cerebral and cardiovascular diseases accounted for 13.0% (1493) of work-related disease and 21.4% (515) of fatal accidents in 2007 [13].

With the advent of obesity as a major health issue in Korea, many programs aimed at promoting good health and managing obesity have been developed and applied [14, 15]. Also, comprehensive longitudinal studies covering the design, implementation, and effective analysis of health promotional programs were carried out and showed good results in other countries [16, 17, 18]. However, private companies continued to look for more effective health promotion methods and an incentive-based program was one of them. According to an economic theory, financial incentives motivate people to change their behavior to increase related benefits. Therefore, if the opportunity costs do not change, people change their behavior and increase their total utility. In the workplace, financial incentives have been generalized to promote health. For example, 26% of companies offered incentives to participate in health promotion programs as a result of the 2004 National Worksite Health Promotion Survey [19]. However, incentive-based health promotion programs are very limited in Korea because, following the law, health management has focused on medical examinations. Therefore, the purpose of this study was to develop, implement, and evaluate an incentive-based voluntary obesity management program as part of a company-wide health promotion program.

## 2. MATERIALS AND METHODS

### 2.1. Outline of the Incentive-Based Obesity Management Program

In spring 2005 the health management team developed the Midas Project to improve the health condition of workers at an electronics-industry workplace at Pyungtaik, Korea. The project aimed to improve good health habits (no smoking, temperance, proper sleep, exercise, appropriate body weight, avoidance of eating between meals, and eating a regular breakfast) as demonstrated in California, USA, in the 1960s [20]. The spring season was chosen to initiate this three-month study because spring is believed

to be a good season to launch a new resolution or a new program.

The program's catchphrase was, "Turn fat into gold!" because each participant was awarded 1 Don, the Korean gold unit equal to 3.75 g of gold, for each kilogram of body fat a person lost during the program. The program was conceived from the ancient Greek legend of King Midas. "Turn fat into gold!" was sufficient in itself to create a sense of purpose, define a goal, and provide an appropriate incentive for the participants. We considered it very important that the participants were actively engaged from the start, especially after concluding that their active participation depended solely on their self-determination. Each participant knew at the beginning of the study that one 3.75-g gold medal would be received at the end of the program for each kilogram of body fat he or she was able to lose during the three-month program. This program was carried out from April to June 2005. This project protocol was approved by the labor union.

The original participants were selected from a large pool of applicants after their percentage of body fat was measured. The major elements of the program were counseling by factory nurses, an assisting self-help group, free gym facilities, trainers, and health information seminars and bulletin boards. A company nurse consulted all participants with their medical check data and there were small group meetings of participants for an hour every week to discuss their problems. They could use the company gym free-of-charge and were trained by an instructor. They could exercise or consult for one hour during working hours. They received health information every week by e-mail. We emphasized that one kilogram of body fat and not body weight was the defining determinant to qualify for a gold medal and this also served to prevent unhealthy fasting or liposuctions. Additionally, a minimum fat loss of 3 kg was requested to ensure active participation and a maximum fat loss of 7 kg was established to avoid excessive exercise. These stipulations were important to protect the participants from any side effects due to poor health practices.

## 2.2. Subjects

The subjects of this research were workers in the electronics industry in the city of Pyeongtaik, Korea, where cellular phones and personal computers are manufactured. The workplace employs ~6000 people, who were informed about the program through company advertisements. We used BMI as a selection criterion and recruited participants with BMI greater than 27 kg/m<sup>2</sup>. We originally intended to recruit only 50 volunteers but, with the overwhelming number of applications from over 300 workers, we ultimately recruited 95. Among the 95 participants, 79 completed a baseline health questionnaire, while the remaining 16 participants did not. Among the 79 participants, 47 completed the program and 44 of them answered the post-questionnaire. The remaining 32 out of these 79 participants were drop-outs. Among the 16 participants who did not answer the pre- and post-questionnaires, 15 workers completed the program, while one dropped out. So, 62 workers (65%) out of 95 participants completed this program, while 33 subjects (35%) did not. Since this program was voluntary and long-term, many participants gave up the program if they stopped exercising or drank alcohol during the program.

## 2.3. Study Variables and Measuring Methods

We classified the outcome variables into two categories. The first category comprised health status indicators that could be quantitatively measured such as blood pressure, cholesterol, BMI, and body fat. The other category included health behavior status indicators that were determined from the answers to questions on the standard questionnaire completed at the beginning and the end of the program. The questionnaire consisted of questions on certain habits and behaviors known to affect health: exercise, eating, alcohol consumption, smoking, and sleeping [20]. Eating habits, frequency of exercise, avoidance behavior, sleep patterns, and alcohol and tobacco use were typical health behavior variables. A qualified nurse from the company health clinic measured all

health variables. All measurements were carried out between 10 and 12 o'clock after a rest of at least 10 min. The nurse measured blood pressure (Jawon Medical, FT-500R, Korea), cholesterol (Roche, Reflotron plus, Switzerland), weight/height (Dong San Jenix, DS-102, Korea), and body fat. To measure body fat, we used a body composition analyzer (Inbody 4.0; Biospace, Korea), an instrument for measuring body fat reasonably according to the principle of bioimpedance analysis [21].

SPSS version 12.0 was used to analyze data. To examine and compare the differences between the beginning and the end of the program for those participants who completed it, the health status variables were analyzed with the paired *t* test and the behavior status variables with the  $\chi^2$  test.

## 3. RESULTS

### 3.1. General Characteristics of the Participants

Eighty-four males and 11 females participated in the study; 66 of them worked in offices, whereas 29 worked in factories. Of the 62 participants who completed the program, 57 were male, 5 were female; 44 were office workers, 18 were factory workers. Twenty-seven males and 6 females dropped out; 22 worked in offices, 11 in factories. The results of *t* and  $\chi^2$  tests did not show any significant differences between the finishers and the drop-outs with respect to age, BMI, duration of employment, gender, and job category. For percentages and other characteristics, see Table 1.

### 3.2. Lifestyle at the Beginning of the Program

We surveyed the participants' personal lifestyles. Before the program, of the 79 participants (83.2%), 20 exercised at least 3 times a week, 22 ate late night snacks at least 3 times a week, 30 participated in company dinners at least once a week, 61 drank alcohol at least once a month, 35 smoked and 25 slept at least 6 h per night (Table 2). Among the 79 participants who

TABLE 1. Characteristics of Program Participants

Population Characteristics	Total (n = 95)	Finishers (n = 62)	Drop-Outs (n = 33)	p
Age (years; $M \pm SD$ )	33.6 $\pm$ 7.4	33.8 $\pm$ 7.5	33.1 $\pm$ 7.4	.658 <sup>a</sup>
BMI (kg/m <sup>2</sup> ; $M \pm SD$ )	28.7 $\pm$ 2.5	27.6 $\pm$ 2.9	28.7 $\pm$ 2.2	.999 <sup>a</sup>
Male (%)	88.4	91.9	81.8	.142 <sup>b</sup>
Female (%)	11.6	8.1	18.2	
Office workers (%)	69.5	71.0	66.7	.665 <sup>b</sup>
Factory workers (%)	30.5	29.0	33.3	
Employment (years; $M \pm SD$ )	7.6 $\pm$ 7.5	7.6 $\pm$ 7.7	7.4 $\pm$ 7.3	.936 <sup>a</sup>

Notes. a—*t* test, b— $\chi^2$  test; BMI—body mass index.

TABLE 2. Health Behavior Status Variables at the Beginning of the Program (%)

Category	Total (n = 95)	Finishers (n = 62)	Drop-Outs (n = 33)	p
Exercise <sup>a</sup>	25.3	27.7	21.9	.196
Night eating <sup>a</sup>	27.8	29.8	25.0	.310
Dining together <sup>b</sup>	38.0	34.0	43.8	.463
Drinking	77.2	78.7	75.0	.680
Smoking	44.3	44.7	43.8	.935
Sleeping <sup>c</sup>	31.6	31.9	31.3	.906

Notes. a—more than 3 times a week, b—more than once a week, c—over 6 h a day.

TABLE 3. Lifestyle of the 44 Participants Who Completed the Questionnaires at the Beginning (Pre) and the End (Post) of the Program, n (%)

Category	Total		Office Workers		Factory Workers	
	Pre	Post	Pre	Post	Pre	Post
Exercise <sup>a</sup>	12 (27.3)*	23 (52.3)*	4 (30.8)	6 (46.2)	8 (25.8)*	17 (54.8)*
Night eating <sup>a</sup>	13 (29.5)	7 (15.9)	1 (7.7)	0 (0.0)	12 (38.7)	7 (22.6)
Dining together <sup>b</sup>	15 (34.1)	12 (27.3)	2 (15.4)	3 (23.1)	13 (41.9)	9 (29.0)
Drinking	34 (77.3)	31 (70.5)	9 (69.2)	6 (46.2)	25 (80.6)	25 (80.6)
Smoking	20 (45.5)	21 (47.7)	7 (53.8)	7 (53.8)	13 (41.9)	14 (45.2)
Sleeping <sup>c</sup>	34 (77.3)	33 (75.0)	11 (84.6)	12 (92.3)	23 (74.2)	21 (67.7)

Notes. \**p* < .05; a—more than 3 times a week, b—more than once a week, c—over 6 h a day.

filled in the baseline questionnaire, 47 workers completed the program and 32 workers dropped out. Among the finishers, 13 exercised at least 3 times a week, 11 ate late night snacks at least 3 times a week, 16 participated in company dinners at least once a week. Thirty-seven drank alcohol, 21 smoked and 15 slept at least 6 h per night. Among the 32 drop-outs, 7 exercised at least 3 times a week, 8 ate late night snacks at least 3 times a week, 14 participated in company dinners at least once a week. Twenty-four drank alcohol, 14 smoked and 10 slept at least 6 h a night. There were no significant differences between the

finishers and the drop-outs with regard to their lifestyle. For percentages, see Table 2.

### 3.3. Health Behavior Status at the End of the Program

Table 3 summarizes the health behavior status variables determined at the end of the program. Of the 44 participants who completed the standard questionnaire at the beginning and at the end of the program, the number of those who exercised at least 3 times a week increased significantly from 12 (27.3%) to 23 (52.3%) (*p* < .001). However, among all those finishers,

there were no significant differences between the beginning and the end of the program for eating late night snacks, participating in company dinner parties that usually ended with overeating and alcohol consumption, alcohol consumption, smoking, and sleeping over 6 h per night (Tables 2–3).

3.4. Health Status Variables at the Beginning and End of the Program

Table 4 summarizes the health behavior status variables determined at the end of the program. All of the objective health status variables with the exception of cholesterol exhibited significant decreases during the three months of the program (Table 4). Mean BMI decreased from 28.8 to 27.8 kg/m<sup>2</sup> ( $p = .000$ ), mean weight decreased from 87.2 to 83.5 kg ( $p = .000$ ), and mean body fat decreased from 25.4 to 23.3 kg ( $p = .000$ ). Mean systolic and diastolic blood pressure decreased from 130.5 to 125.1 mmHg ( $p = .002$ ), and from 86.4 to 81.7 mmHg ( $p = .009$ ), respectively. There was an unfavorable change in cholesterol from 164.6 to 172.6 mg/dL but this trend was not significant ( $p = .172$ ) and the increased level was still within the normal range.

4. DISCUSSION

In modern societies, people spend more time at the workplace; this is particularly so for employees in Korea who work the longest

hours among employees in the OECD member countries [22, 23]. Because workers spend more time at the workplace, more workplace health promotion programs are needed. Workers in Korea have been learning about health through periodic safety and health education in the workplace, which is stipulated by the safety and health law. Meanwhile, they need to take action to reach the stage of commitment to a plan of action. The concept of intention and identification of a planned strategy leads to implementation of health behavior [24]. Employees can participate freely and easily at their workplaces and also derive meaningful and healthful social exchange and stimulation from one another [25]. Additionally, health promotion programs are needed in the workplace to reduce medical costs for employers, increase productivity, and improve company image [26]. In fact, many companies have implemented health promotion programs [27], and the public health promotion law of 1995, and an article relating to health promotion at the workplace, have contributed to the current occupational safety and health law in Korea. Thus, all Korean companies must now implement health promotion programs to abide by these social laws and many of the larger companies have applied such programs aggressively [14, 15, 28, 29].

This company has been implementing a number of health promotional activities continuously since 2000; however, the results have not met our expectations, largely because

TABLE 4. Objective Health Status Variables at the Beginning (Pre) and the End (Post) of the Program, *M* (*SD*)

Category	Total				Office Workers				Factory Workers			
	<i>N</i>	Pre		Post	<i>N</i>	Pre		Post	<i>N</i>	Pre		Post
BMI (kg/m <sup>2</sup> )	44	28.8 (2.5)**	27.8 (2.7)**	13	28.8 (4.2)**	27.9 (4.2)**	31	28.8 (1.4)**	27.7 (1.8)**			
Body weight (kg)	44	87.2 (10.2)**	83.5 (10.8)**	13	83.4 (15.0)*	78.7 (14.6)*	31	88.7 (7.0)**	85.5 (8.2)**			
Body fat weight (kg)	44	25.4 (5.3)**	23.3 (5.8)**	13	25.8 (8.3)**	23.7 (8.5)**	31	25.2 (3.6)**	23.1 (4.4)**			
Systolic blood pressure (mmHg)	35	130.5 (12.6)**	125.1 (12.6)**	11	134.5 (18.6)*	125.7 (18.5)*	24	128.7 (8.6)*	124.9 (9.3)*			
Diastolic blood pressure (mmHg)	35	86.4 (11.0)**	81.7 (9.3)**	11	89.3 (11.8)	84.9 (10.1)	24	85.1 (10.7)*	80.2 (8.7)*			
Cholesterol (mg/dL)	33	164.6 (27.4)	172.6 (26.5)	10	157.4 (30.4)	169.3 (30.3)	23	167.7 (26.1)	174.0 (25.2)			

Notes. \* $p < .05$ , \*\* $p < .01$ ; BMI—body mass index.



employees have not been very interested in participating in these programs. The effects of past programs could not be evaluated properly because the participation rates were low and the programs were usually cancelled prematurely due to high drop-out rates. One possible explanation for these failures is the company's top-down approach, in which the program operating staff make all the decisions. Such one-way structured health promotion programs are problematic at best, which is why we actively encouraged employee input to plan this Midas Project in 2005. Employee participation requires employee interest and foreseeable benefits that, with respect to this project, relate to improved health. Basically, the Midas Project aimed to improve good health habits (no smoking, temperance, proper sleep, exercise, appropriate body weight, avoidance of eating between meals, and eating a regular breakfast) as demonstrated in California, USA, in the 1960s [20]. We established a quantitative goal for participants by examining their health conditions and providing concrete visible incentives (gold medals) to stimulate their active participation. In particular, we tried to increase participant interest by not only providing passive education and personal publicity but also by presenting them with a quantitative target and an attractive incentive.

We focused on two features when we developed this program. The first involved creating a concrete visible image relevant to the program. That, in itself, explained the name Midas Project, which symbolizes turning useless yellow fat into valuable yellow gold. The second feature was that we provided the subjects with an opportunity to participate voluntarily, without any mandates or requirements. We continuously educated the participants throughout the program and we provided free gym facilities, trainers, and information.

It should be emphasized that well-defined goals are very important for health promotion programs and, in this study, the smoking rate, which is considered a major health index, did not change after the program (Table 3). One reason for this is that the goal of this program was to reduce obesity, not the smoking rate. Therefore,

it was expected that participants would concentrate on reducing body fat rather than not smoking.

All but one (cholesterol) of the objective health status variables studied showed significant positive changes, whereas only exercise showed significant positive improvement among the health behavior variables. This discrepancy between the objective and subjective variables is not easily explained but perhaps one reason lies in the objective, concrete nature of certain health status variables. It could be that their very objective nature is motivating in the same way that the concrete, visible gold medal seemed to effectively motivate participants in the overall program.

The object of the Midas Project was to induce participants to develop good health habits and to improve health status through this health promotional program. As a result, participants exercised more frequently and curtailed eating at night, dining together, and drinking. Therefore, BMI, body weight, body fat weight, and systolic and diastolic blood pressure of the participants improved during the three-month project. Blood pressure decrease is reported as one of the main indices in health promotion programs [14, 15] and, in this study, both systolic and diastolic blood pressure decreased significantly.

Among good health habits, exercise levels improved greatly but the rates of drinking and dining together did not meaningfully alter. The reason that exercise improved was that participants could control their own exercise but they could not control dining and drinking together because these are considered formal social activities in Korea with resultant social pressures. As key features of Korean work and social culture, dining and drinking together are difficult to avoid. In Korea, dining together is considered as a job-related task, and it continues in the form of drinking parties. This is one reason why the drinking rate is very high in Korea. It has been estimated that among those over 13 years of age in Korea, 82.8% of males and 63.5% of females drink alcohol [29]. Reductions in body weight (4.2%) and in BMI (3.5%) were not as great as in some other studies probably

because the initial body weights and BMIs were closer to the normal range to begin with [31, 32].

One limitation of this study was that we did not analyze the detailed information on the drop-outs, even though there was no significant difference between the finishers and the drop-outs at the start of the program. Also, we could not quantify detailed health behaviors that took place during the program because the program was strictly voluntary, with no obligation on the part of the participants. Establishing goals through incentives without any detailed obligations or requirements on the part of the participants was a key aspect of this program. However, we did make available information, counseling, training, education, and encouragement for those participants who were interested.

One significant fact is that female participants were extremely under-represented in our study; this was because apparently they had personal privacy concerns and issues that we attributed to societal perceptions of beauty and consequent feelings about self-image. Indeed, active participation in this study, by definition, rendered the participant a subject of discussion on obesity, despite the confidentiality that was strictly adhered to. Therefore, it seems necessary to develop health promotional programs for women with great care. This program was very popular among workers and many became interested in health. We decided to monitor the continuation of health promotion behavior through periodic medical check for the participants.

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