Incentives to Exercise

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September 9, 2007

Abstract: Can incentives be effective when trying to encourage the development of good habits? We investigate the effect of paying people a non-trivial amount of money to attend an exercise facility over a period of time. We find that doing so leads to an attendance level that is twice as high as the level when people have not been paid, even well after the end of the intervention. This result is driven primarily by the impact on non-users (people who did not previously attend the gym), as regular users are essentially unaffected. Even though personal incentives to exercise are already in place, it appears that the financial incentive serves as a catalyst to get some people past the threshold of actually getting started with an exercise regimen. We argue that there is scope for financial intervention in habit formation, particularly in the area of health.

Keywords: Exercise, Field experiment, Habit formation, Incentives

JEL Codes: A13, B49. C93, D0

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We acknowledge helpful comments from Yan Chen, Martin Dufwenberg, Guillaume Fréchette, Jacob Goeree, Ulrike Malmendier and Priscilla Williams.
INTRODUCTION

On September 18, 2006, New York Mayor Michael Bloomberg announced a new policy he called “conditional cash transfers.” He said that the plan was designed to address the simple fact that the stress of poverty often causes people to make decisions - to skip a doctor's appointment or to neglect other basic tasks that often only worsen their long-term prospects. Conditional cash transfers give them an incentive to make sound decisions instead. The intention was to provide conditional cash transfers to families of at-risk youngsters to encourage parents and young people to engage in healthy behavior, to stay in school, stay at work, and stay on track to rise out of poverty. Bloomberg also argued that the return on such investments is necessarily delayed, but that this is a clear path out of the cycle of poverty. Mr. Bloomberg’s last comment is about changing peoples’ habits. He believes that the cost (estimated at $42 Billion) of the program is worth the benefit of this improvement in habits.

Whether or not Mr. Bloomberg is correct in his assessment, an underlying issue is whether we can construct mechanisms to induce better decision-making. As DellaVigna and Malmendier (2006) have nicely demonstrated, people make poor choices regarding membership options at a health club: people who choose to pay a flat monthly fee for membership in a gym pay more than if they would have chosen to pay a fixed cost per visit (see also Ariely and Shampan’er, 2006). So perhaps the incentives to exercise that are already present are ineffective. But can we improve on these existing incentives? Can we go beyond the mere identification of behavioral mistakes, and consider the issue of how a welfare maximizer would react if aware of his or her own bias?1

1 For a similar attempt in other economic areas, see the Benartzi and Thaler (2004) “Save More Tomorrow” plan. In a sense, this can be seen as complementary to the Behavioral I/O agenda, which considers how firms might react to consumer biases in product design, advertising, etc. See Ellison (2006) for an early summary of the relevant literature, as well as related studies by Heidhues and Koszegi (2005, 2006).
In this vein, the goal of the current paper is to test the conjecture that incentives can be used to develop or foster good habits. Habits are an important feature of our daily life. However, people often follow a routine without much ongoing consideration about the costs and benefits of the constituent elements of this routine.\(^2\)

One such habit is that of regular physical exercise. The physical benefits of exercise are undeniable, as adequate exercise is associated with better health in many respects. In particular, obesity has become a prominent health issue; the 1999-2000 National Health and Nutrition Examination Survey reported that a startling 64.5% of American adults, or more than 120 million people, were overweight or obese, the highest level ever recorded. The problem appears to be worsening: Adult obesity rates rose in 31 states from 2006 to 2007, according to the 2007 report from the Trust for America's Health; rates did not decrease in any states. A new public opinion survey featured in the report finds 85 percent of Americans believe that obesity is an epidemic. This increased prevalence of obesity is paralleled by an increase in inactivity. Most jobs today are sedentary and overweight people are even more likely to report being inactive. Yet, Americans spend billions of dollars annually on diet books, exercise equipment, and weight-loss programs (Andersen, Blair and Cheskin, 1997).

Regular exercise combined with limiting calorie intake was shown to be the most effective in reducing body mass (Anderson, 1999). Exercise provides health benefits even if people do not lose weight (Lee, Blair and Jackson, 1999). There are also psychological benefits to exercising: People who exercise regularly are likely to be less depressed, have higher self-esteem, and have an improved body image (Brownell, 1995). Regular exercise may also reduce stress and anxiety (Kayman, Bruvold and Stern, 1990).

\(^2\) See Ariely et al (2003) for the problematic interpretation of some incentives.
The literature discusses four main barriers to activity (Anderson, 1999): Lack of time, embarrassment at taking part in activity, inability to exercise vigorously, and lack of enjoyment of exercise. The traditional approach in economics involves providing incentives for people to engage in (or refrain from) various activities. In a certain sense, however, incentives regarding habitual behavior are already in place, without any intervention appearing to be necessary. Since powerful incentives are already present, can there be much scope for intervention in the incentive structure?

Most of the economic literature on addiction presumes that people are aware that their addictions are costly for their overall welfare; in the positive realm, people are inundated with information about the benefits of exercise and proper diet. Despite having an awareness of costs and benefits of these activities, people nevertheless engage in harmful behavior and often do not follow beneficial health regimens. The flip side of addiction is the development of beneficial habits (see Becker 1992).

We undertake financial interventions in the hope of fostering habit formation, conducting a field study in which we paid university students to attend the university’s gym. In the two main manipulations of our field study we compare high-incentive ($25 to attend the gym once in a week, and then $100 more to attend the gym eight times in the following four weeks) and no-incentive groups. We are able to observe attendance before the intervention, during the intervention, and for a period of at least seven weeks after the end of the intervention. The main result is that our behavioral intervention is successful: Post-intervention attendance is more than twice as high for the group that was paid $100 as for the control group. This difference does not decline at all during the time following payment, suggesting that the effects do have some degree of persistence.
Our results suggest that it may be possible to encourage the formation of good habits by offering monetary compensation for a sufficiently long baseline period, as doing so appears to move some people past the ‘threshold’ needed to engage in an activity. It may often be the case that there is initial resistance to commencing a beneficial regimen, as the start-up costs loom large. However, if people are ‘walked through’ this process with adequate financial incentives, perhaps positive behavior will follow.

Note that the observation that exercising is a habitual behavior suggests that people who are interested in exercising more should try and commit themselves to exercise for a while. By doing so they affect not only their current well-being but also their future utility, by making future exercise more beneficial. This type of self-enforcing mechanism is a possible explanation of the above-mentioned study of DellaVigna and Malmendier (2006). As a self-control mechanism, people may choose the more expensive plan because it reduces the marginal cost of attending to zero, and they believe that this will encourage them to attend the gym.

Potential applications are numerous, as perhaps the bulk of the population is aware of the benefits of some activity, but seems to be incapable of reforming without some assistance. For example, in education, Angrist, Lang, and Oreopoulos (2007) offer merit scholarships to undergraduates at a Canadian university; they have some success in improving performance, but mixed results overall.

A recent literature in economics ties habits and self-control. Laibson (1997) and O’Donoghue and Rabin (1999) discuss present-biased (hyperbolic) preferences as an explanation for persistent bad habits and addictions. Bernheim and Rangel (2004) present a model in which

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3 Becker and Murphy (1988) identify conditions under which past consumption of a good raises the marginal utility of present consumption; Becker (1992) applies this to habit formation. This is discussed in more detail in Section 2.
4 See Frederick, Loewenstein, and O’Donoghue (2002) for a comprehensive review of empirical research on intertemporal choice, as well as an overview of related theoretical models.
use among addicts may be a mistake triggered by environmental cues, which addicts may then try to avoid. In a related vein, Bénabou and Tirole (2004) develop a theory of internal commitments, wherein one’s self-reputation leads to self-regulation and this ‘willpower’ enables one to maintain good behavior.

1. THE FIELD EXPERIMENT

We invited 120 participants to the laboratory at a large North American university; there was no mention of physical fitness or exercise in the recruiting materials. All participants were promised payment if, and only if, they came to the laboratory once on a given date and again a week later. These 120 participants were assigned randomly to one of three treatments, which are described below. All students registered at this university receive a free membership in the campus athletic facility. Everyone was asked to sign a consent form allowing us to get the computerized report of their visits to the gym during the academic year, so we were able to obtain records concerning past attendance at this facility for all of our participants. All of the participants were given a handout about the benefits of exercise; this is shown in the Appendix.\(^5\) Forty of these people participated in a different experiment, which was completely unrelated to exercising; this was the control group.

The other 80 participants (in different sessions) were told that they would receive $25 to visit the gym at least once during the following week and then to return to the lab to answer questions. They were told that we would be checking their computerized records: Each time a

\(^5\) The handout mentions, for example, a recent study that found that people who spent 30 minutes on a treadmill scored 25% lower on tests measuring anxiety and also demonstrated positive changes in their brain activity. In another study, a team of Australian researchers compared people who practiced progressive-relaxation techniques with a group who did 30 minutes of aerobic exercise three times a week. It was the exercise group that had lower blood pressure and responded best to acute stress.
person enters the gym his or her card is swept and this is recorded in the system. Upon returning to the lab in the following week, participants were randomly assigned to one of two treatments. For half of them this was the end of the experiment; the other half was promised an additional $100 for attending the gym at least eight times during the next four weeks. All of the participants in the latter group achieved this goal and returned after the month was over to receive the additional money.

At the end of the academic year we retrieved the computerized records for each of the 120 participants. These records give us information about attendance before, during, and seven weeks after the end of the longer intervention.

**Hypotheses**

The standard null hypothesis is that our financial intervention will not affect behavior after the end of the intervention. We formalize this as:

**Hypothesis 0:** Participants will visit the gym with the same frequency after the incentives are removed as before the incentives were introduced.

We also test two competing hypotheses regarding the effect of this incentive. The first hypothesis is the *crowding out* effect. Studies indicate that, in some situations, providing rewards may be counter-productive, as providing an extrinsic motivation for a task or activity may crowd out existing intrinsic motivation. The formal statement of the hypothesis is:

**Hypothesis 1:** Participants will visit the gym less frequently after the incentives are removed as compared to before the incentives were introduced.

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6 Note that we do not have information on how long a participant was in the gym and we do not actually measure how much he or she exercised (we did not receive permission to perform physical tests). We discuss this in more detail in the conclusion.

7 For early demonstrations in psychology, see Deci (1971) and Lepper and Greene (1978). See Frey and Jegen (2001) and Gneezy and Rustichini (2000a, b) for the economic literature. Fehr and Falk (2002) give a more general framework of the psychology of incentives that includes the counter productivity argument. For a formal theoretical model of this issue, see Bénabou and Tirole (2003).
According to this hypothesis, participants are intrinsically motivated to exercise. Any extrinsic intervention, such as paying them to go to the gym may be counter-productive in the long run by destroying the intrinsic motivation to exercise. According to this process, before the introduction of the incentives participants exercised because it was good for them. After the incentives are introduced, they may instead feel that they exercise just for the money.

Even if the incentives are large enough to motivate people to go to the gym while in force (see Gneezy and Rustichini, 2000a and Heyman and Ariely, 2004 for the effect of the size of the incentive), the hypothesis is that after the incentives are removed participants will stop attending the gym because of the crowding out of the intrinsic motivation.

The competing hypothesis is that even after the incentives are removed, people who were incentivized for the four additional weeks would be more likely to attend the gym.

**Hypothesis 2:** Participants will visit the gym more frequently after the incentives are removed as compared to before the incentives were introduced.

One motivation for this hypothesis is “habit formation.” Becker and Murphy (1988) identify a necessary and sufficient condition for a good to be habitual near a steady state:

\[
(\alpha + 2\beta)U_{cs} > \beta U_{ss},
\]

where \(\alpha\) is the depreciation rate on past consumption, \(\beta\) is the rate of preference for the present, \(c\) is a consumption good, \(S\) is the stock of consumption capital, \(U_{cs} = \frac{\partial^2 U}{\partial c \partial S}\) and \(U_{ss} = \frac{\partial^2 U}{\partial S^2}\). \(^8\)

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\(^8\) See Becker and Murphy (1988, pp. 679-680) for the derivation. We use the Becker (1992, p. 343) formulation.
In words, an increase in one’s current consumption of $c$ increases one’s future consumption of $c$ if and only if one’s behavior displays adjacent complementarity.\textsuperscript{9,10}

Habits may be harmful or beneficial, to the extent that they decrease or increase future utility. The marginal utility of today’s consumption is correlated with historical consumption; changes today may have only a small effect in the short run, but increasingly large effects in the long run. In this view, “experiences influence … desires and choices partly by creating habits, addictions, and traditions” (Becker, 1992, p. 335).

If exercising is a form of habitual behavior, providing incentives to go to the gym for a while may increase future utility from exercising. If the marginal utility of consumption today is positively correlated with historical consumption, than this period in which people were given financial incentives to go to the gym could also induce people to go to the gym more often in the future. Hence, we call this hypothesis habit formation.

Similar predictions come from the behaviorism literature in psychology, that have a view opposite to that described in Hypothesis 1. The main assumption in this literature is that rewards and punishment could be used to influence voluntary behavioral adaptations, and in particular that habitual behavior could be changed using extrinsic incentives. The background theory for this assumption is known as operant conditioning (Skinner, 1938, 1972). The idea is that behavior is learned and reinforced by interaction with environmental contingencies. According to this theory, we can affect behavior by changing the consequences (e.g., Budney \textit{et al.}, 2000; Roll and Higgins, 2000), as behavior is controlled by these consequences.

\textsuperscript{9} This term was first introduced Ryder and Heal (1973). An example on p. 5 is: “A person with adjacent complementarity [who expects to receive a heavy supper] would tend to eat a light breakfast and a substantial lunch,” while this would be reversed with distant complementarity.

\textsuperscript{10} In fact, past consumption of the good raises the marginal utility of present consumption whenever $U_{cs} > 0$. 

2. RESULTS

Our main result is that, after the payment period ended, the rate of gym attendance is more than twice as high for people who were paid $100 to visit the gym than for the people in the control group. Figure 1 presents this information graphically. “Before” refers to the eight weeks before the first lab visit, while “After” refers to the period after the incentives (if any) were removed.

Figure 1 - Average Weekly Gym Visits

The baseline average was 0.60, 0.70, and 0.59 visits per week per person for the high-incentive ($25 + $100), low-incentive ($25 only), and the control group, respectively, in the eight weeks before the first lab meeting. After the end of the intervention, the 40 high-incentive participants averaged 1.24 visits per week, while the low-incentive group averaged 0.76 visits per week, and the unpaid control group averaged 0.56 visits per week during the after period. Thus, we see an average increase of 0.64 visits (107% of the baseline) for the high-incentive group, compared to a rather modest increase for the low-incentive group, and a slight decline in gym visits for the control group.
These population averages mask the considerable individual heterogeneity found among our participants with respect to both gym attendance and response to the financial incentives. Figure 2 shows the distribution of the change in the number of gym visits for each individual over time:

![Figure 2 - Change in # of visits, by individual](image)

The behavior at the individual level confirms the pattern seen in the aggregate. We see that there is very little change in the control treatment, as one might expect; the majority of people did not change the number of their visits (the modal number of visits was zero in all treatments), and the difference in the number of visits exceeded four for only three people of 40. We do see a slight shift toward the right in the low-incentive treatment, but the shift to the right in the high-incentive treatment is pronounced.

A chi-squared test using individual data for negative, zero, and positive changes in gym visits categories confirms the significant difference between the high-incentive and the control treatment ($\chi^2 = 14.99, p < 0.001$) and between the high-incentive and low-incentive treatments.

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11 In fact, in the control treatment there are nine people for whom the number of gym visits decreases over time, compared to four people for whom the number of gym visits increases over time.
(\(\chi^2 = 6.27, p = 0.043\)), as well as the lack of significant difference between the low-incentive and control treatments (\(\chi^2 = 2.76, p = 0.252\)). Finally, a simple binomial test shows the number of positive changes is significantly higher than the number of negative changes (\(Z = 3.02, p = 0.003\)).

We can also examine the size of the changes for each individual. Once again, the pattern is similar, as seen in Figure 3:

![Figure 3: Change in Gym Visits](image)

We see that in fact nearly one-third of all participants in the high-incentive treatment (13 people of 40) increased their average number of gym visits by more than one per week, while only two participants in the low-incentive treatment, and one participant in the control treatment did so. The test of the equality of proportions (see Glasnapp and Poggio 1985) finds a very significant difference between the high-incentive and no-incentive treatments, as well as between the two incentive treatments (\(Z = 3.53\) and 3.15 for the respective comparisons, both significant at \(p < 0.001\)). In this respect, there is no difference between the low-incentive and no-incentive treatments (\(Z = 0.59\)).
Another consideration is how different segments of the population are being affected by this incentive. One test is for gender differences.\textsuperscript{12} We find essentially none: in the high-incentive group, the average number of gym visits was 0.59 for males and 0.62 for females before the lab meeting, and 1.32 for males and 1.17 for females in the seven weeks after the intervention. Five of 19 males increased their average number of visits by more than one per week, while seven of 21 females did so. None of these differences comes close to being statistically significant.

We can view another cross-section of the population by categorizing people before the intervention as regular attendees (at least one visit per week) or non-regular attendees (less than one visit per week). From the standpoint of society, it might be more useful to convert people who attend the gym either infrequently or not at all into regular attendees than to increase the visitation rate for already regular attendees. The effect of high incentives on the people who were not regular attendees is also particularly relevant for testing habit formation.

There were 27 people in the high-incentive group who had not been attending the gym regularly; 12 of these people (44%) became regular attendees after being paid to go to the gym for a month; these 12 people represent 30% of the sample population. The average change for people who had not been regular attendees was 0.98 visits. In contrast, the average change for the 13 people who were already regular attendees was -0.07. Thus, the entire effect of the $100 incentive comes from those people who had not been regular attendees.

Table 1 illustrates the gym attendance rates before and after any intervention for the control group, the $25 (low-incentive) group, and the $100 (high-incentive) group for both previously regular and non-regular attendees:

\textsuperscript{12} We did not collect other demographic information.
Table 1: Mean weekly gym attendance rates

<table>
<thead>
<tr>
<th></th>
<th>Ex-ante regular attendees</th>
<th>Ex-ante non-regular attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Control group</td>
<td>1.844</td>
<td>1.774</td>
</tr>
<tr>
<td></td>
<td>(0.296)</td>
<td>(0.376)</td>
</tr>
<tr>
<td>Low-incentive group</td>
<td>1.866</td>
<td>1.827</td>
</tr>
<tr>
<td></td>
<td>(0.165)</td>
<td>(0.211)</td>
</tr>
<tr>
<td>High-incentive group</td>
<td>1.644</td>
<td>1.571</td>
</tr>
<tr>
<td></td>
<td>(0.127)</td>
<td>(0.304)</td>
</tr>
</tbody>
</table>

Standard errors are in parentheses.

We see that there is no real effect on the attendance rates of those people who were already regular attendees; in fact, there is a slight downward drift whether there were no incentives, low incentives, or high incentives. Similarly, there is a slight downward drift for ex-ante non-regular attendees who were given no incentives. We do observe a small increase in attendance for non-regulars in the low-attendance group; however, by far the largest effect is observed for non-regulars in the high-incentive treatment.

One might argue that requiring people to go through any initial set-up and thereby becoming familiar with the gym might be driving our results. Perhaps this partially explains the small increase in the attendance rate for non-regular attendees. But if this were the full explanation, there should be little difference between the low-incentive and high-incentive groups, since they both were required to attend the gym and incur any set-up costs. Yet we see that the increase in gym attendance is nearly 10 times as large for non-regular attendees in the high-incentive treatment than in the low-incentive treatment.

Thus, we see support for Hypothesis 2 over Hypothesis 0 in the case of high incentives for people who did not previously attend the gym regularly (obviously we cannot test Hypothesis 2 against Hypothesis 1 for those people who had not attended the gym before the intervention, as
their attendance rate cannot decrease). On the other hand, Hypothesis 0 appears to hold for the low incentive treatment.\textsuperscript{13}

We supplement our descriptive results and nonparametric statistics with some Tobit regressions that account for the censoring problem. These are presented in Table 2:

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance before</td>
<td>1.262***</td>
<td>1.434***</td>
</tr>
<tr>
<td></td>
<td>[0.154]</td>
<td>[0.205]</td>
</tr>
<tr>
<td>Low incentive</td>
<td>0.292</td>
<td>0.184</td>
</tr>
<tr>
<td></td>
<td>[0.358]</td>
<td>[0.450]</td>
</tr>
<tr>
<td>High incentive</td>
<td>1.320***</td>
<td>1.874***</td>
</tr>
<tr>
<td></td>
<td>[0.350]</td>
<td>[0.404]</td>
</tr>
<tr>
<td>Male</td>
<td>0.135</td>
<td>0.153</td>
</tr>
<tr>
<td></td>
<td>[0.280]</td>
<td>[0.268]</td>
</tr>
<tr>
<td>Low*regular</td>
<td>-1.527***</td>
<td>-1.362***</td>
</tr>
<tr>
<td></td>
<td>[0.589]</td>
<td>[0.533]</td>
</tr>
<tr>
<td>High*regular</td>
<td>-1.243**</td>
<td>-1.362***</td>
</tr>
<tr>
<td></td>
<td>[0.366]</td>
<td>[0.386]</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.243**</td>
<td>-1.362***</td>
</tr>
<tr>
<td></td>
<td>[0.366]</td>
<td>[0.386]</td>
</tr>
<tr>
<td># Observations</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Pseudo R\textsuperscript{2}</td>
<td>0.211</td>
<td>0.241</td>
</tr>
</tbody>
</table>

The no-incentive attendee is the omitted variable in these regressions. *** indicates significance at the 1% level.

The regressions confirm our less formal discussion. Specification (1) indicates that (in addition to the initial level of attendance) only high incentives influence post-intervention gym

\textsuperscript{13} Some detail may be useful: 25 people in the no-incentive treatment did not attend the gym during the pre-intervention period, and only one of these ever attended the gym after the intervention period (and only attended once); 21 people in the low-incentive treatment did not attend the gym during the pre-intervention period, and four of these attended the gym after the intervention period (with two of these averaging more than once per week); 21 people in the high-incentive treatment did not attend the gym during the pre-intervention period, and 10 of these attended the gym after the intervention period (with five of these averaging more than once per week).
attendance; specification (2) shows that the effect largely vanishes for \textit{ex ante} regular attendees who were given high incentives.

It is not surprising that the financial incentives lead to a strong effect during the incentive period. But how persistent are the post-intervention effects - do these appear to be diminishing over time? Figure 4 shows that there is very little change in attendance rates once the intervention is over. We see virtually no change over the remaining time; if anything, there is a slight increasing trend for people in the high-incentive group.\textsuperscript{14}

![Figure 4: Avg. Gym Visits over Time](image)

**3. CONCLUSION**

Some of us have too many bad habits, such as smoking, and too few good ones, such as exercising. Could incentives be used to “improve” one’s habit formation—reducing the bad ones and increasing the good ones?

\textsuperscript{14} We do not have data past the twelfth week after the initial lab visit, as the school year ended; our permission to gather these data did not extend to the next academic year.
In this study we paid people to go to the gym for several weeks, and then observed their exercising habits after the incentives were removed. Two competing predictions regarding the long-term effect on exercising can arise from the existing literature. The use of incentives might weaken the intrinsic motivation to engage in exercise, such that when the incentives are removed people would exercise less than before. Alternatively, the period of time during which people were induced to exercise might be sufficient to form a habit that will remain even after the removal of the incentives.

In fact, we find that there is a positive effect from paying people $100 to go to the gym eight times over a period of one month, as the rate of gym visits after the intervention is double the initial rate for the population as a whole. Upon closer examination, we have the encouraging result that our incentive scheme was successful in creating this positive habit of exercising more: Participants who did not exercise before our study began to do so during our intervention and continued to exercise after it was concluded.

There are still many open questions in the literature on incentives and habit formation. Findings in the literature on bad habits, such as smoking, are not as encouraging as our findings. For example, in cigarette smoking cessations, researchers have used punishment or rewards (Donatelle et al., 2004), with very little success. The basic finding is that people refrain from smoking when incentives are present, but go back after the incentives are removed. An answer that future research should address is why are habits that we are trying to eliminate different from habits that we are trying to acquire.

Our study has several limitations. The most obvious is the fact that we do not actually measure the amount each person exercised (however, to the extent that people have developed the habit of simply swiping the card and leaving, one wonders why this habit would be so
attractive after the incentives are removed); in this respect, it would be interesting to consider fitness measures such as the BMI, to see whether the new habit actually improves the health of the participants. In addition, future research would benefit from a longer post-intervention period to have a better measure of the persistence of the effect we find.

REFERENCES

Ariely, D. and K. Shampan’er (2006) “What is a price of 0?,” mimeo, MIT.


Please read the following essay

The importance of exercising

Exercise is good for your body, but did you know that exercise is also good for your mind?

Research has shown that regular exercise delivers a mental and emotional boost. It improves your mood, bolsters your self-esteem and gives you the confidence to handle whatever comes your way. Some studies hint that it also enhances the functioning of your brain.

Your Body's Medicine Cabinet

When you are physically active your body releases chemicals known as endorphins. These are your body's natural painkillers and stress reducers. They diminish anxiety and depression and produce a sense of well being known as the exercise "high."

Just one workout can release another cache of natural antidepressant chemicals from your body's medicine cabinet, such as dopamine, serotonin and norepinephrine.

A study at Duke University found that intense bouts of exercise are every effective in reducing feelings of depression, tension, anger and confusion.

Meanwhile, a host of other studies have shown that even short spurts of moderate exercise can improve your outlook on life and make you less anxious. Whether you take a brisk ten-minute walk, do a few jumping jacks, or bicycle around the block, you will feel the benefit both physically and emotionally.

Stress Buster

Chronic stress releases a number of different chemicals and hormones into your body that raise blood pressure, weaken your immunity to colds and illness, impair your memory, increase fat cell storage, and lead to depression.

Regular physical activity has been shown to be an effective stress buster and successful weapon against its debilitating effects. The set of beneficial chemicals and hormones released during exercise are an important arsenal that can defeat the negative chemicals created by stress.

Canadian researchers discovered that depressed people experienced significantly less depression after exercising for anywhere from 20 minutes to an hour, three times a week for five weeks. In
some cases the benefits lasted up to one year. It is important to note however, that severe cases of depression require medical review and a combination of treatments.

In another study, a team of Australian researchers compared people who practiced progressive-relaxation techniques with a group who did 30 minutes of aerobic exercise three times a week. It was the exercise group that had lower blood pressure and responded best to acute stress.

**A Boost to Self-esteem**

How we feel directly affects how we use our bodies and how we look. Feelings of distress or doubt can cause us to hunch our bodies in an effort at self-protection. As a result our spines are compressed and our breathing is shallow. We limit ourselves to small movements leading our muscles and joints to stiffen and weaken. It is no wonder that our spirits might sag and our sense of self-esteem drop through the floor.

Often just starting out on a new exercise program can boost your sense of self-worth. As you find yourself progressing, you'll also find your confidence growing. Choose physical activities that stretch and strengthen. They will help you to physically stand taller, feel better, and face the world with a positive outlook.

**Time Out**

Like many leisure activities such as meditation or your favorite hobby, exercise gives your mind needed time out from everyday thoughts, worries and responsibilities. You return to your life refreshed, invigorated, and perhaps even mentally sharper.

By improving the flow of blood and consequently of oxygen and nutrients to your brain, it may be that aerobic exercise helps you to think better.

Regular weight training and aerobic exercise have been shown in several studies to impart an additional benefit. They can improve the quality and duration of sleep. A good night's rest can make you less fatigued and better able to function in your daily life.

**A Little Bit Can Go a Long Way**

A great deal of research continues to be done on the mental and emotional effects of physical activity. A recent study found that after several subjects spent 30 minutes on a treadmill, they scored 25 percent lower on tests that measure anxiety as well as demonstrated positive changes in their brain activity.
A brisk walk, a short jog, or even just several stretches during your day can help relieve stress and improve your outlook on life. Regular physical exercise releases a host of beneficial chemicals that can help you feel physically fit, mentally sharp, and emotionally positive. Find a physical activity you enjoy and give yourself a dose of good health every day. Stay fit and stay happy.

**Staying motivated**

One way to stay motivated is to constantly remind yourself that a worthwhile pay-off lies ahead; a new, healthy, strong you is emerging. Effective, consistent exercise will not only improve your overall health and fitness, but will also improve your appearance, energy level, and social interactions. Also, look forward to the many psychological benefits as well: confidence, self-esteem, and relief from depression, anxiety and stress.

If you are serious about your health and well-being, you will take action and begin an exercise program, and you will benefit in all these ways. Once you see the results, you will become even more motivated. Action creates motivation!

**Set Goals**

Goal-setting is another great way of staying motivated. Goals focus your workout program and clarify what you are trying to achieve. As you attain each goal, you gain encouragement and further motivation. Here is how to achieve the goals you set and obtain the results you deserve.

1. **Make sure your goals are measurable**: A vague goal, such as "I want to be fit," gives you nothing to shoot for. Decide when and what you are going to achieve, such as "I want to lose 2 percent of my body fat by August 1st."

2. **Be realistic**: Make sure your goals are attainable. If you set your expectations too high, you will get frustrated and will be more likely to quit. Make sure, however, that your goals are not too easy; they should be challenging. When you achieve a challenging goal, your pride and satisfaction will create more motivation.

3. **Set short-term goals as stepping stones to your "ultimate" (long-term) goals**: If your long-term goal is to bench press 200 pounds in one year, then set short-term weekly or monthly goals of the weight you will need to bench press to achieve your long term goal--develop a plan. It is a lot easier to accomplish a goal one day or week at a time, such as increasing 2.5 or 5 pounds a week, than it is to think that you need to increase your bench press by 50 pounds.
Make It Fun

Another way of assuring that you stay motivated is to make exercise fun. If you perceive your workout as a chore, you more than likely will not stick with it. Here are some techniques for making your workout something to look forward to.

1. Add Variety: If your weightlifting is getting tedious and boring, change one of these factors:
   - Vary how often you do an exercise and the number of sets and reps you do.
   - Find an alternate exercise; for example, if you always do the bench press using a barbell, try doing it with dumbbells or on a machine.
   - Change the order of the exercises you do for each muscle group and the muscle groups themselves.

2. Include Friends and Family: Training with a workout partner not only makes your training session more fun, safe, and intense, but will also increase the likelihood of your showing up at the gym. Make sure you pick a partner whose goals and interests are similar to yours and who is willing to spot you correctly and motivate you to do your best.

3. Fight Discouragement: If once in a long while you blow off a workout because you choose to go out with friends, just accept and enjoy your choice--do not feel guilty. Otherwise, the sense of failure can make it harder to get yourself back on track. Focus on how much progress you have made so far, not on how far you have to go.

4. Expect and Prepare for Plateaus: If you feel you have reached a plateau and/or are bored, do not give up--this is a natural part of working out. Make sure to vary the exercises, sets, repetitions and order of your workout--continually search for new ways of making your routine fun and exciting.

5. Schedule your Workout: If you always exercise on the same days at the same time, your routine will become a fixture in your life, not a whim. Not going to the gym will feel unnatural. Including exercise into your busy schedule will be an adjustment, and staying motivated will be equally challenging. Change is difficult for many people. However, if you have the willingness to work through the initial emotional discomfort as you move step by step through a safe and effective program, you will find the confidence, commitment and determination that will ease the way.

When you begin achieving great results, the excitement and fun you experience will make the change well worth the effort. Action creates motivation! Good luck: we hope you enjoy all the wonderful benefits of a healthy, active lifestyle.
Please answer the following questions

1. How often do you exercise? __________ times a week

2. What type of regular physical exercise do you engage in?
   ____________________________________________________________
   ____________________________________________________________

3. What type of physical exercises have you engaged in during the last 5 years?
   ____________________________________________________________
   ____________________________________________________________

4. Have there been periods in your life when you exercised more often? If so, please describe when:
   ____________________________________________________________
   ____________________________________________________________

5. Do you wish to exercise more than you do today? If yes, please describe why you do not exercise more:
   ____________________________________________________________
   ____________________________________________________________

6. Taken all together, how happy would you say you are?

   -3    -2    -1    0    1    2    3
   Not at all happy    Very happy