Does peer information crowd out performance?

Grace HY Lee (grace.lee@monash.edu)
Monash University Malaysia

Jemy Teo
Monash University Malaysia

Erte Xiao
Monash University

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Abstract

People often struggle to achieve self-improvement goals. In a randomized controlled trial, we nudged participants with peer information to sign up for a goal-setting activity. We find that while nudging leads to a higher sign-up rate relative to the baseline without nudging, it does not always improve performance and can even lead to a lower effort when people do not internalise the value of the goal.

Keywords: peer information; nudge; goal-setting; field experiments
JEL codes: I12; C93
1. Introduction

People often struggle to change their habits. Motivational psychologists have consistently shown that setting goals allow positive changes in the lives of individuals worldwide (Locke and Latham, 2019). Positive outcomes of goal setting have been obtained in various fields of studies, including smoking cessation (Solomon et al., 2006, McCuller et al., 2006, Bricker et al. 2010), overcoming drug addiction (Chauchard et al., 2013; Laudet & Stanick, 2010), weight loss (Brawley, 2012), and academic and career achievement (Lent, Brown, & Hackett, 1994, 2002). Modern society always encourages us to think about the next milestone, and goal setting is everywhere in our lives. We set goals for our education, our careers, our health, and our lives in general.

This study examines how people make an effort after being nudged with peer information to set a self-improvement goal for themselves. Previous studies have found peer influence to be significant in college enrolment, career choice, and educational investment (Bursztyn and Jensen, 2015; Fletcher, 2012; Prinstein et al., 2001; Sokatch, 2006). However, the outcome of the nudged action cannot be predicted. For example, students who are nudged to enrol into tertiary education may have a higher dropout rate or may not experience the positive utility of tertiary education. In addition, people often start the year with positive fitness goals but find their well-intentioned plans unravelling after a short while. When goals are specific and hard, the level of performance would depend on the level of commitment. Goal commitment refers to one’s determination to reach a goal (Klein et al., 2001; Locke & Latham, 1990) or one’s willingness to strive for a goal (Brunstein, 1993). Prior studies have repeatedly shown that goal commitment is a key mechanism that links goal setting to performance (Klein et al., 1999; Seo et al., 2017; Wentzel, 2002). Although we could nudge participants to set their goals, participation in goal-setting itself does not necessarily lead to a high commitment to reach the goal. The next question is: what influences goal commitment? According to the social cognitive theory (Bandura, 1986), people are more likely to commit to the goal set when they believe that their actions will produce beneficial outcomes (e.g., if they internalize the value of the goal). If people anticipate the health benefits of their actions, these anticipated outcomes can influence the level of performance. For instance, a recreational runner completes her daily target since she values the health benefits of running and internalizes the value of the activity.

We conducted a randomized controlled trial field experiment to nudge participants with peer information to set their goals towards behavioural change. In particular, we investigate the
following questions: Are people more likely to set their goal after being nudged with peer information? Does nudged participation in the goal-setting lead to better performance? Do nudged participants internalize the value of the goal, or do they simply conform to follow their peers? We invite all students deemed inactive (walking below 7,500 steps per day on average) to set the goal of walking 10,000 steps a day. Inactive students from the first treatment group (similar peer group) receive information about their similarly inactive peers, while those in the second treatment group (superior peer group) receive information about their more active peers who walk above 7,500 steps per day on average. The information states their peers’ intention to participate in the challenge and their opinion on whether others should participate.

How do participants perform after being nudged with peer information to sign up for the program of walking 10,000 steps a day? When we nudged inactive students into setting a goal for themselves, they may be motivated to participate for various reasons. In the recruitment advertisements, we encourage students to participate in the walking study by citing the health benefits of walking. Therefore, we classify the motivations into ‘health-related motivation’ and ‘non-health-related motivation’. We hypothesize that they will walk more if they are motivated by health-related reasons and internalize the value of the goal, but if they sign up just to follow their peers, they will not walk more.

In this study, we use the students’ body weight as a proxy for their motivations in participating in the challenge. We hypothesize that those who are underweight have lower health-related motivation compared to those who are heavier. They are less likely to be motivated to perform during the challenge as they are less concerned about their weight and have a lower desire to get fitter (O’Dea and Amy, 2011)\(^1\). In a message coding experiment carried out based on a survey conducted after the challenge, we confirm that underweight students are less motivated by health-related reasons.

The key finding of this study is that although nudging leads to a higher sign-up rate for goal-setting, the intervention is ineffective when people simply conform to goal-setting without internalizing the values of the target activity (e.g., when there is a lack of health-related motivation). Our findings show that the nudged students who are underweight (with low health-related motivation) perform poorly in the challenge as compared to the underweight students in the control group. In contrast, nudged students with normal weight perform better compared

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\(^1\) We follow the WHO Asian BMI classification as the cut-off point and categorise the students into underweight, normal and overweight groups: underweight: \(<18.5\); normal: \(18.5-22.99\); overweight: \(\geq 23\) (WHO, 2014b).

\(^2\) Studies by Ferrar and Olds (2010), Kahn et al. (2008), and Levin et. al (2003) have also shown that underweight adolescents are less physically active.
to their counterparts in the control group during the challenge, although the difference is not significant.\(^3\) This shows that when the health-related motivation is low, nudging will lead to a lower level of performance as peer information crowds out motivation; when health-related motivation is high, the crowding-out effect is less likely to occur as participants are more likely to internalize the value of walking. The presence of crowding-out effect leads to underperformance of the underweight students who are nudged into the challenge by their similar peer. We do not detect any crowding-out effect in the superior peer group. Information from superior peers may not lead to information spillover as the nudged participants are less likely to perceive that they participate in the challenge due to peer information (Battaglini, Bénabou, and Tirole, 2005; Battaglini, Díaz, and Patacchini, 2015).

This study contributes to the literature by investigating the cognitive dissonance theory in a peer influence or peer intervention context, which provides a deeper understanding of how the crowding-out effect may affect the performance of nudged participants in a goal-setting program. The findings also have important policy implications. Once nudge designers have targeted the behaviour they want to change, they should identify the barriers that keep the targeted behavior from changing (e.g., the crowding-out effect, in our study, is the non-health-related motivation). Policymakers should take the crowding-out effect into account when they nudge people to engage in specific activities. For example, individuals who sign up for a gym membership due to peer influence may not experience the benefit of exercise if they have little health-related motivation to exercise. Similarly, a person who is nudged to sign up for organ donation may refuse a living donation if she signs up merely due to peer influence.

The remainder of the paper is organised as follows: Section 2 provides a review of the literature. Section 3 presents the methodology and methods, while Section 4 provides the results and discussion. The final section offers some concluding remarks.

2. Literature Review

Researchers find that comparing a person to his peers, neighbours, or friends can be an effective way to motivate behavioural changes. Studies have shown that people adjust their behaviour when provided with information about their performance or position relative to others. These strategies are built upon Leon Festinger’s (1954) social comparison theory, which postulates that individuals evaluate the appropriateness of their actions or thoughts by comparing

\(^3\) A small sample of overweight nudged students perform better than those in the control group. We report the results in Appendix A.4.
themselves to other people. Sunstein (2018, p.21) recognizes that “some nudges work because of social influences. If you are told what other people do, you might do it too, because you think it’s probably a good idea to do what they do. And even if you aren’t sure, you might not want to violate social norms, and so you’ll go along.” The mechanism of norm-nudging involves providing social information or eliciting social expectations with the intent of inducing desirable behaviour (Bicchieri and Dimant, 2019). Norm-based nudges are often used to influence a range of behaviours such as alcohol and drug use, water consumption (Ferraro et al. 2011; Goldstein et al. 2008) and energy use (Allcott 2011; Allcott and Mullainathan 2010; Schultz et al. 2007).

When people learn that their behaviour deviates from the majority of their peers, they would be encouraged to change their behaviour towards those societal norms as they think their peers may know something that they do not and that they would feel socially uncomfortable to violate the social norms (Asch, 1956). While the majority of published work in this area support the positive impact on behavioural change⁴, much less scholarly attention has been paid to the unintended and ineffective outcomes of nudging which may even lead to backfiring when it triggers the adoption of the opposite target behaviour.

3. Methodology and Methods

This study examines how people perform after being nudged with peer information to set a goal for a health-promoting activity using an experimental approach spanning eight weeks.⁵ The experiment comprises of two stages. The first stage studies the effect of peer information on the participation rate of a challenge to walk 10,000 steps a day. The second stage measures the effect of peer information on performance and the effectiveness of the challenge on physical activity level.

Recruitment was done by distributing flyers on a university campus with Quick Response (QR) code (see Appendix A.1). In case that someone might not know how to access the QR code, we also provided an email contact for participants to receive the link to the website. When interested students scanned the QR code using their smartphones, they were directed to a registration page with a short survey (see Appendix A.2). As this study intends to promote health-promoting physical activity, the target students are the inactive students. Based

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⁴ A meta-analysis conducted by Rivis and Sheeran (2003) reported a medium to strong sample-weighted average correlation between descriptive norms and intentions ($r = .44$), with the correlations being stronger for the young samples and health risk behaviours.

⁵ Ethics approval for the study was obtained through the Monash University Human Research Ethics Committee (MUHREC) (Project ID: 0219).
on the information given in the registration survey, particularly the number of hours they engage in various physical activities, we invited students who were most likely to be inactive to participate in the study. They were given a pedometer and were required to send us the step counts daily.\(^6\) Detailed instructions were given to the students upon collection of the pedometers (see Appendix A.3).

We recorded all participants’ daily step counts during the first four weeks of the experiment and identified those who were inactive (e.g., walked below 7,500 steps per day on average).\(^7\) These inactive students were then randomised by gender and school and invited to sign up for a challenge of walking 10,000 steps a day with the message corresponding to their treatment groups as stated in Table 1.

\(^6\) The students could keep the pedometer after the experiment as a reward, provided they submitted all of their data throughout the experiment period over eight weeks.

\(^7\) The definition of inactive students follows the guidelines of those considered low active and sedentary in the two papers (Tudor-Locke and Bassett, 2004; Tudor-Locke, Hatano, Pangrazi, and Kang, 2008).


| Treatment groups | Messages |
|------------------|----------|
| Control          | Are you interested in participating a 10,000 steps challenge that will be held from week 12th September to 9th October? It is merely a challenge and no action will be taken if you do not achieve 10,000 steps a day. For the purpose of the experiment, please keep this invitation to yourself. Other participants may be notified at a different time. |
| Similar peer     | Are you interested in participating a 10,000 steps challenge that will be held from week 12th September to 9th October? It is merely a challenge and no action will be taken if you do not achieve 10,000 steps a day. In a survey session we conducted previously, about 80% of the participants who have similar step counts as you have signed up for the 10,000 steps challenge and they think people who walk about 4000 steps to 7500 steps should sign up. For the purpose of the experiment, please keep this invitation to yourself. Other participants may be notified at a different time. |
| Superior peer    | Are you interested in participating a 10,000 steps challenge that will be held from week 12th September to 9th October? It is merely a challenge and no action will be taken if you do not achieve 10,000 steps a day. In a survey session we conducted previously, about 80% of the participants who walks above 7500 steps have signed up for the 10,000 steps challenge and they think people who walk about 4000 steps to 7500 steps should sign up." For the purpose of the experiment, please keep this invitation to yourself. |

We provided the students in each treatment group with a message summarising the choices of their peers (descriptive information) and the majority beliefs about what ought to be done (normative information) as we invited the students to set their fitness goals. We selected a few random students from both active and inactive groups and invited them to participate in the 10,000 steps challenge to form the descriptive information. The outcome of the invitation

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8 Students whose decisions and opinions are used to form descriptive and normative information are excluded from the analysis.
was then provided to the students in the treatment groups as descriptive information. The normative information, what one ought to do, was formed through asking the same students the following question, “Do you think individuals who walk fewer than 7,500 steps should participate in the 10,000 steps challenge?”

The students from the control group are not provided with any peer information; they only received an invitation to the 10,000 steps challenge. Students from the two treatment groups, similar peer groups and superior peer groups, receive information about different peer groups. The similar peer group receives information about peers similar to them in behavior (inactive students who walked fewer than 7,500 steps a day). The superior peer group receives information about the more active students (students who walk more than 7,500 steps a day). We provided the students with a link to register online after they had communicated their interest in participating. Before the 10,000 steps challenge commencement date, we sent a reminder to the participants. The normative and descriptive information was repeated in the reminder following the treatment groups. For example, students from the similar peer group received the following message:

“The 10,000 steps challenge will commence tomorrow. It will be held from 12th September to 9th October. Please set your goal as 10,000 steps and if you used to remove the band during any training or sports event, you can keep it on from now on.

In a survey session we conducted previously, about 80% of the participants who have similar step counts as you have signed up for the 10,000 steps challenge.”

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9 The participants were asked to remove the band during a one-time event or training that they will not engage in normally. The initial measurement period (e.g., before the challenge) coincided with a sports event in the university, and it would have resulted in an upward bias if the participants were to include that in their measurements.
3.1 Message coding experiment

After the 10,000 steps challenge, we asked the participants their reasons for participating in a survey and further conducted a content analysis of the messages written by the participants. We employed House and Xiao’s (2011) classification coordination game to incentivize coding and recruited 23 evaluators from the student subject pool for this purpose. Evaluators were seated separately and worked independently in a computer lab. They first read the coding instructions explaining their task. They were also provided with a summary of the walking experiment and asked to complete a quiz to ensure they understood the instructions. They were not given any information about the purpose of the study. Evaluators then received all the challenge participants’ messages and were asked to classify each message under at least one of the six categories: reasons related to health; weight loss; peer influence; having fun; challenge; and others.

Each evaluator received RM10 for coding all messages.\textsuperscript{10} In addition, three messages were randomly selected at the end of the session. For each, if an evaluator’s classification matched the most popular classification, he/she received an additional RM5. We classify a message to a specific category if it is the most popular choice of all evaluators (all messages have a unique most popular choice). Detailed instructions of the message coding experiment are provided in Appendix A.5.

4. Results and Discussion

Table 2. Total recruitment

|                | Female | Male | Total |
|----------------|--------|------|-------|
| Active         | 34     | 40   | 74    |
| Inactive       | 273    | 136  | 409   |
| signed up for challenge | 185 | 98   |       |
| did not sign up for challenge | 88  | 38   |       |
| Total          | 307    | 176  | 483   |

Table 2 reports the total number of participants who signed up for the experiment. Out of a total of 483 participants, 409 of them were identified as inactive (walked less than 7500 steps per day on average), and 74 of them were active after we measured their initial step counts in the first four weeks of the experiment. We then randomly assigned these inactive students into

\textsuperscript{10} We paid them an additional RM10 for appearing at the lab on time.
one of the three treatment groups and invited them to set a goal of walking 10,000 steps per day for four weeks (see Table 3). Overall, 69.19% (283 out of 409) inactive students signed up for the goal-setting activity.

Table 3. Average initial step counts (daily) before challenge

| Treatment       | Daily average initial step (before challenge) | Female | Male | Total |
|-----------------|----------------------------------------------|--------|------|-------|
| Control         | 5284.19                                      | 91     | 51   | 142   |
| Similar peer    | 5554.83                                      | 86     | 45   | 131   |
| Superior peer   | 5549.57                                      | 96     | 40   | 136   |

According to the theory of self-control in peer groups, “good news” from similar peers should increase self-confidence, which results in higher self-control (Battaglini, Bénabou and Tirole, 2005). We do find evidence that nudging with similar peer information encourages a significantly higher goal-setting participation rate than the control group (76.34% vs. 64.79%, Z-test, p =0.037). Information from superior peers leads to a slightly higher sign-up rate than the control group, although the difference is insignificant (66.91% vs. 64.79%, Z-test, p=0.710).

Our focus is whether students perform better after participating in the walking challenge. We compare the step difference accumulated during the challenge with the initial step (during the first four weeks) to measure the change in physical activity levels. A positive value reflects an increase in physical activity level during the challenge period.\footnote{Five days of data during the challenge were removed as it coincided with the semester break. The inclusion of the data would have resulted in a downward bias.} We find that, on average, students who participated in the challenge walked 485.25 steps more per day, while those who did not participate walked 222.95 steps lesser per day (t-test, p=0.000). Overall, our results indicate that goal setting is effective in improving performance.

Table 4. Average step improvement (daily) after goal-setting (signup only)

| Treatments         | Daily average initial step (before challenge) | Daily average step improvement | % Improvement | t-test; p-value (vs.control) |
|--------------------|-----------------------------------------------|-------------------------------|---------------|-----------------------------|
| Control            | 5300.01 (144.44)                              | 582.80 (152.22)               | 11.00%        |                             |
| Similar peer       | 5559.23 (128.41)                              | 383.75 (144.05)               | 6.90%         | 0.343                       |
| Superior peer      | 5545.04 (144.05)                              | 498.16 (152.05)               | 8.98%         | 0.694                       |
Although nudging with similar peer information leads to a significantly higher signup rate for the challenge, it does not significantly improve performance. Table 4 indicates that the average steps improvement is the lowest in the similar peer group, although the difference is not statistically significant compared to the control group (383.75 vs. 582.80, t-test, p=0.343).

4.1 Coding experiment – identification of health-related and non-health-related motivation

From the coding experiment, we identified 6 categories of reasons for participating in the challenge (e.g., health – 36.33%, weight loss – 7.12%, peer influence – 4.12%, having fun – 17.60%, challenge – 29.21%, and others – 5.62%). Consistent with the recruitment advertisement that we put up, we classify the motivation into health-related and non-health-related (i.e., peer, fun, challenge, and others). Results in Table 5 indicate that nudging with similar peer information attracted a significantly higher percentage of non-health motivated students to sign up for the challenge than the baseline (z-test, p=0.066). However, we do not observe such an effect in the superior peer group (see Table 5).

Table 5. Distribution of non-health-related motivation by treatment

|                      | Percentage motivated by non-health-related reasons | z-test, p-value (vs. control) |
|----------------------|----------------------------------------------------|------------------------------|
| Control              | 57.47                                              |                              |
| Similar peer         | 70.53                                              | 0.066                        |
| Superior peer        | 62.35                                              | 0.514                        |

Overall, students who signed up for health-related reasons walked significantly more steps after the challenge than those motivated by non-health-related reasons (average step improvement of 941.27 vs. 220.45; t-test; p=0.000). Figure 1 demonstrates that compared to the baseline, while students motivated by non-health-related reasons in the superior peer group walked more, those nudged by the similar peers walked significantly lesser after joining the challenge (355.15 vs. -36.26; t-test; p=0.075). We also conducted a panel regression analysis (random effect) by restricting the sample to only those motivated by non-health-related reasons, adding gender as a control. The empirical results in Table 6 confirmed that the student's performance improved only in the control and superior peer groups, but not the similar peer
group. Goal setting is ineffective in improving performance when participants nudged by their similar peer are unable to internalise the value of the target activity.

**Figure 1.** Average step improvement (daily) after goal-setting

![Average step improvement chart](chart.png)

Note: Average step improvement = average step count during the challenge – average initial step count before challenge.

**Table 6.** Panel regression (random effect) – average step improvement for participants motivated by non-health-related reasons only

|                              | Regression (1) | Regression (2) | Regression (3) |
|------------------------------|----------------|----------------|----------------|
|                              | Control        | Similar Peer   | Superior Peer  |
| Challenge                    | 340.57*        | -50.95         | 385.24**       |
|                              | (189.77)       | (122.49)       | (190.57)       |
| Female                       | -45.08         | -167.55        | -420.67        |
|                              | (441.69)       | (354.19)       | (504.62)       |
| Constant                     | 5255.39***     | 5585.29***     | 6064.78***     |
Observations | 2167 | 2984 | 2286
---|---|---|---

Note: Challenge=1 during challenge period; =0 before challenge. The sample is restricted to those who signed up due to non-health-related reasons. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

### 4.2 Categorization by weight

In order to test our hypothesis that the underweights have lower health-related motivation compared to those who are heavier, we split our sample into three weight categories: underweight, normal weight, and overweight. Table 7 reports the number of participants who set their goal to walk 10,000 steps a day in each treatment by weight categories. Compared to the normal weight participants, a significantly greater percentage of underweight participants were motivated by non-health-related reasons (73.33% vs. 56.69%; z-test; p=0.006).

**Table 7. Number of challenge participants in each treatment by weight categories**

| Treatments   | Underweight | Normal weight | Overweight | Total |
|--------------|-------------|---------------|------------|-------|
| Control      | 42          | 43            | 7          | 92    |
| Similar peer | 45          | 43            | 12         | 100   |
| Superior peer| 40          | 47            | 4          | 91    |
| Total        | 127         | 133           | 23         | 283   |

Note: we drop the overweight category in our analysis due to the small sample size.

**Table 8. Average step improvement (challenge participants) by weight categories**

| Treatments       | Underweight | Normal weight |
|------------------|-------------|---------------|
| Control          | 689.30      | 611.99        |
| Similar peer     | -317.03     | 892.80        |
| Superior peer    | 3.07        | 918.91        |

| t-test; p-values |
|------------------|
| Control vs. similar peer | 0.000  | 0.435 |
| Control vs. superior peer | 0.017  | 0.364 |

Note: Average step improvement = average step count during the challenge – average initial step count before challenge.

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12 Refer to footnote 1 for the definitions.
Table 8 reports the average step improvement for each treatment by weight categories.\textsuperscript{13} Our data suggest that normal weight students performed better across all three treatments after the challenge, with those nudged by similar and superior peers walked relatively more than those in the control group although the difference is not significant. A panel regression analysis (random-effect) confirms the positive effects of goal-setting for the normal weight participants across all treatments, controlling for gender (see Table 9).

**Table 9.** Panel regression (random effect) – all normal weight participants who signed up

| Dependent variable: Average step improvement | Regression (1) | Regression (2) | Regression (3) |
|---------------------------------------------|---------------|----------------|----------------|
|                                             | Control       | Similar Peer   | Superior peer  |
| Challenge                                   | 575.61***     | 908.21***      | 934.08***      |
|                                             | (231.81)      | (247.88)       | (226.53)       |
| Female                                      | -202.07       | -836.85**      | -532.58        |
|                                             | (541.35)      | (375.16)       | (540.92)       |
| Constant                                    | 5777.16***    | 6408.82***     | 6369.29***     |
|                                             | (471.79)      | (262.41)       | (439.55)       |
| Observations                                | 1833          | 1804           | 1989           |

Note: Challenge=1 during challenge period; =0 before challenge. Robust standard errors are in parentheses. \textsuperscript{***} \(p<0.01\), \textsuperscript{**} \(p<0.05\), \textsuperscript{*} \(p<0.1\).

On the other hand, we observe a reduction in step count during the challenge period among the underweight students who were nudged into the challenge with similar peer information. Compared to those in the control group who walked 689.30 steps more, underweight students who were nudged by their similar peer walked about 317.03 steps lesser (t-test, \(p=0.000\)), and those who received superior peer information walked only 3.1 more steps on average (t-test, \(p=0.017\)) after they participated in the challenge. The panel regression results in Table 10 confirm that underweight students in the control group walked significantly more while those who were nudged by their similar peers walked significantly lesser after the challenge. The results are robust to the inclusion of gender. This suggests that the crowding-out effect is only present among students with non-health-related motivation (the underweight students) who received similar peer information.

\textsuperscript{13} Due to the small sample size in each treatment, we report the results for the overweight category in Appendix A.4 for interested readers.
Table 10. Panel regression (random effect) – all underweight participants who signed up

|                  | Control (1)     | Regression (2) | Regression (3) |
|------------------|-----------------|----------------|----------------|
| Challenge        | 672.83***       | -309.07**      | -25.61         |
|                  | (200.74)        | (125.65)       | (170.81)       |
| Female           | -378.41         | -135.64        | 288.86         |
|                  | (492.92)        | (423.10)       | (430.82)       |
| Constant         | 5276.31***      | 5345.05***     | 4828.14***     |
|                  | (369.70)        | (349.25)       | (358.16)       |
| Observations     | 1855            | 2070           | 1750           |

Note: Challenge=1 during challenge period; =0 before challenge. Robust standard errors are in parentheses. *** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.1 \).

Overall, our results revealed that participating in a set goal (10,000 steps per day) can enhance performance. It could be explained by the fact that it directed attention toward goal-relevant activities and directed people away from goal-irrelevant activities (Locke and Latham, 2002). We found that participation in the challenge improves performance even among students motivated by non-health-related reasons (underweight). However, nudging students with similar peer information into goal-setting did not lead to the desired behaviours among the underweight students mainly motivated by non-health-related reasons. These students may not have the incentive to improve their steps as they probably form the belief that they participate just to conform to the peer information without internalising the value of walking more. Hence, their performance is poorer than the students in the control group during the challenge.

We further investigated the model by including an interaction term in the regression and reported the results in Table 11. The results in Column 5 confirm that nudging with similar peer information improves performance only when the students are motivated by health-related reasons (e.g., the coefficient of the interaction term between similar peer and health motivation is positively significant at 10%). Results in Table 11 Column 6 show that underweight students under-performed during the challenge as they were less concerned about their health (e.g., they walked 826.53 steps lesser, and the result is significant at 5%).

Table 11. Cross-sectional regression – all participants who signed up
### 5. Conclusion

Even since the publication of the book *Nudge* by Richard Thaler and Cass Sunstein, nudges became an influential marketing and political strategy to deliberately manipulate how choices are presented to the decision-makers and steer them toward desired behavioral outcomes. Research shows that nudges can be effective in influencing behaviors. Many nudges have virtuous effects, encouraging people to give for charity, live healthy lives, donate their organs, recycle, and save more money for retirement. However, nudging people to make good choices may not always go as planned. Indeed, when there is a lack of the right motivation, nudging...
with peer information is ineffective and can even be detrimental in encouraging the desired behaviors. When students with low health-related motivation were nudged with similar peer information into participating in the challenge, they could experience conflicting behaviours and beliefs. They might soon realise that they were only participating in the challenge because of peer information and are less likely to internalize the value of the target activity. As a result, they were less motivated to change their behaviour as required by the challenge. The result from this study is consistent with the cognitive dissonance theory, which predicts that when there is an inconsistency between attitudes or behaviours (dissonance), something must change to reduce the discomfort.

The findings from our experiment offer useful insights into policymaking and marketing strategies. Policymakers around the world aim to change individuals’ behavior, guiding them toward decisions deemed to be in their best interests. In addition, marketers are constantly devising ways to nudge people into buying more to stimulate sales. Although nudging leads to a higher sign-up rate for goal-setting, the intervention is ineffective when health-related motivation is lacking. Given these results, nudging can be ineffective if individuals conform without internalizing the values of the goal.

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**Competing Interests**

No competing interests reported.
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