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Capitalizing on Fresh Starts Does Not Impact the Effectiveness of Medication Adherence Reminders: A Randomized Trial

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Introduction

Low medication adherence is problematic.¹ Well-designed reminders can increase adherence,² but when should reminders be sent to maximize impact? Prior observational studies³ and laboratory experiments⁴ have shown that engagement in healthy activities increases considerably following “fresh-start” dates—life and calendar events signaling the

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beginning of new cycles (e.g. birthdays or New Year's).^{3,4} Extending this insight, we conducted the first randomized controlled trial (RCT) examining whether sending medication adherence reminders around fresh-start dates and highlighting these dates as an opportunity for positive changes could boost reminders' effectiveness.

Methods

Between January 21 and March 25, 2015, after institutional review board waiver of informed consent, we mailed reminders to 15,011 participants (45% male; 40%–80% adherence in the past 12 months) with commercial or Medicare Advantage insurance with Humana, encouraging them to regularly take their cholesterol, diabetes, or blood pressure medications. Participants were randomly assigned to one of five mailing conditions (Figure 1). In the *Birthday Unframed* and *Birthday Framed* conditions, reminders were sent within one week before each participant's birthday. In the *New Year Unframed* and *New Year Framed* conditions, reminders were sent three weeks after New Year's Day. Reminders in the *Birthday Framed* and *New Year Framed* conditions highlighted the participants' birthday or New Year's Day, respectively, as an opportunity to make a fresh start and begin taking medications regularly. In the *Control* condition, reminders without any reference to fresh-start dates were sent on a randomly selected day that was at least one month after New Year's Day and one week away from the participant's birthday.

For each participant, we used pharmacy claims data to calculate the proportion of days covered (PDC) during our 90-day post-mailing observation period, defined as the number of days he/she had any pills in the medication category listed on his/her reminder divided by 90 days. Ordinary least squares regressions to estimate treatment effects in STATA, version 14 (StataCorp) had an 80% power to detect a difference of at least 2 percentage points between the *Control* and each treatment condition with $\alpha=.05$.

Results

Mean PDC among participants was 63.3% over 90 days post-mailing. Compared to the *Control* condition, PDCs did not significantly differ in the *Birthday Unframed* (95% confidence interval [CI] of the difference [−1.08, 2.20]), *Birthday Framed* (95% CI [−1.09, 2.19]), *New Year Unframed* (95% CI [−0.32, 2.95]), or *New Year Framed* condition (95% CI [−1.26, 2.03]). The difference in PDCs was also insignificant comparing the *Birthday Unframed* and *Birthday Framed* conditions (95% CI [−1.63, 1.66]) or the *New Year Unframed* and *New Year Framed* conditions (95% CI [−2.57, 0.71]). Figure 2 depicts these results.

Discussion

Contrary to our expectations, sending reminders following fresh-start dates did not increase medication adherence, and fresh-start-based framing did not increase reminder effectiveness. We encourage further study before concluding that the psychology of fresh starts does not apply to medication adherence. Since fresh-start dates motivate individuals wishing to initiate goal pursuit,^{3,4} our timing- and framing-based treatments may increase the

effectiveness of reminders when reminders involve goal-setting activities. Additionally, there is often a delay between a target fresh-start date and the date when treatment-condition reminders were actually received; in the *New Year* conditions, reminders often arrived in late January. Reminders received immediately after the target date could be more impactful. Further investigation into alternative ways to leverage fresh starts⁵ and compel patients to attend to public health messaging would be valuable.

This study has several limitations. The insurer sent some customers medication adherence reminders outside of the RCT, and we were unable to include a condition without reminders. Also, many participants were involved in another RCT comparing reminders that ended shortly before this RCT. Further, our participants had lower medication adherence levels than those in other recent adherence studies, possibly because of our selection criteria.⁶

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* Exclusions were done sequentially. We included participants who:

- Were prescribed any of the following medications: (a) Statin, (b) Metformin, (c) Sulfonylureas (including glipizide and gliclazide), (d) Meglitinides (including repaglinide and nateglinide), (e) Thiazolidinediones (including rosiglitazone and pioglitazone), (f) DPP-4 inhibitors (including sitagliptin, saxagliptin, linagliptin, and alogliptin), (g) Glucagon-like peptide 1 agonists (including exenatide and liraglutide), and (h) ACE/ARB/DRI.
- Were prescribed a 30-day supply of medication.
- Had a 40%-80% compliance for relevant medications in the 12 months prior to randomization.
- Had a birthday from January 21 to April 21, and were not living with any other participant in our sample.

** Researchers at the University of Pennsylvania used R version 3.1.1 (R Core Team) to randomly assign participants to conditions under a 1:1:1:1:1 allocation ratio for participants whose birthday was before April; and under a 1:1:1 allocation ratio to the *Control*, *New Year Unframed*, and *New Year Framed* conditions for participants whose birthday was in April. Participants were enrolled by Humana. All conditions were balanced on available demographic variables (age, gender, ethnicity, income) and PDC prior to our RCT, suggesting that our randomization was successful.

*** We excluded 3,005 participants born in April from our analysis in order to make conditions comparable. The *Birthday Unframed* and *Birthday Framed* conditions did not include anyone with April birthdays since our last mailing date was March 25.

Figure 1.
Flow of Study Participants

Note 1: Error bars represent ± 1 standard error.

Note 2: For each participant, our OLS regression controls for his/her PDC during the 90 days prior to the mailing date, gender, ethnicity, the linear and squared terms of age, log-transformed income, and the type of medication that was listed on the reminder (i.e., diabetes, cholesterol, or blood pressure).

Note 3: By design, any differences between the *Control* and treatment conditions reflect a combination of the time of year and the potential treatment effect of receiving a fresh-start reminder.

Figure 2.
Ordinary Least Squares (OLS) Regression-Adjusted PDCs by Different Mailing Conditions