Pre-Analysis Plan for "The Effect of Tiredness on Political and Social Behavior"

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May 2017

This document describes a pre-analysis plan for a survey experiment on the effects of sleep-deprivation on political behavior. The study consists in a two-wave survey on Amazon Mechanical Turk, in which subjects are randomly assigned to taking the second wave either in the afternoon or late at night. We discuss our theoretical motivation, subject recruitment, survey flow, and outcome measures. We also pre-specify the analyses that we will conduct.

1   Background

The goal of this study is to investigate the effects of sleep-deprivation on political behavior. The project is motivated by previous work Holbein and Schafer (2016) indicating that discontinuous changes in sleep times at the borders of U.S. time zones correspond to changes in voter turnout and election results at the county-level. The proposed project builds on this research to precisely measure with micro-level data how a lack of sleep influences the way that individuals make political decisions and

their ability to act on them. This project consists of an experimental study in which we induce changes in tiredness in the treatment group.

The experiment aims to compare measures of political attitudes and behavior between a treatment group that is experiencing short-term levels of sleep-deprivation and a control group of otherwise similar individuals. The details of the design are discussed below, but its key component is a two-wave survey, in which subjects are randomly assigned to taking the second wave either in the middle of night or in the afternoon. We recruit study participants through Amazon Mturk.

2   Background

The theoretical motivation of this study is similar to previous work we articulate in Holbein and Schafer (2016), in which we provide evidence from a geographic regression discontinuity design to suggest that individuals who balance the time constraints of modern life with the necessity of sleep are more likely to participate in politics. The new study we propose here differs in three important ways. First, it is an experiment, rather than a quasi-experiment; thus, allowing us to explore whether our first study was indeed capturing the effects of tiredness. Second, this new project focuses on micro-level processes, allowing us to explore potential mechanisms that may link sleep-deprivation with political participation. These comprise attitudinal precursors of participation such as interest in politics and sense of civic duty as well as motivational attributes such as grit and time preferences. Third, in this study we also look at forms of participation beyond voting, including: signing petitions,

ideological strength, political evaluations, and confidence in political knowledge.

This research project also builds on a recent literature in behavioral economics showing the links between sleep and productivity and health (e.g. Barnes and Wagner, 2009; Doleac and Sanders, 2015; Giuntella and Mazzonna, 2015; Giuntella, Han and Mazzonna, 2016; Gibson and Shrader, 2016; Smith, 2016). In the work most closely related to ours, Dickinson, Drummond and McElroy (2017) employ a similar experimental design to show that sleep deprivation affects economic decision-making. We mirror the design of their study and the measures used to capture participants' levels of tiredness.

3 Research questions

1. *Effects on vote intentions and political interest.* Does sleep-deprivation lower vote intentions and a sense of civic duty?

2. *Effects on attitudinal strength.* Are sleep-deprived individuals more ideologically moderate?

3. *Effects on willingness to act on attitudes.* Does sleep-deprivation affect the willingness to sign petitions and engage in other forms of behaviorally measured forms of civic participation?

4. *Effects on mood.* Does sleep-deprivation lead to more negative attitudes towards government and towards the world more generally?

5. *Political knowledge effects.* Are sleep-deprived individuals more overconfident

in their political knowledge and more likely to use mental shortcuts when they process information?

6. *Effects on self-control.* Does sleep-deprivation lead to lowers levels of grit, cognitive capacity, and patience?

4   Subjects

We will recruit participants through Amazon Mturk. All participants will receive $1.00 for their participation after taking both waves of the survey. Participants who are randomly assigned to taking the second wave during the night will receive another $2.00 for taking the survey.[1] In addition, all compliant respondents will be entered into a random drawing for an additional payment of $50 that will be paid out as a bonus. We anticipate recruiting 1,500 Mturk workers in this first experiment.

5   Design

We will recruit MTurk workers to participate in a survey about life and society. The survey will be administered through Qualtrics. Workers will be told that this survey consists of two parts. In the first part, workers will answer baseline information about themselves. At the end of this first wave, workers will be randomly assigned to take the wave 2 survey between 2-4pm (control group) or 3-5am (treatment group).

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[1]We reserve the right to increase this additional payment to the treatment group in the future; if we do so, we will report that in the write-up of results.

The survey will be launched on a Monday at 4pm, Pacific Time (PT), and end on a Friday at 4pm PT, with a possible extension period last to the following Monday. To ensure that participants of the wave 1 survey return, at the end of the survey we will provide subjects with a link to the (deactivated) wave 2 survey, we will ask subjects to provide us with an email address to provide them with follow-up reminders if they have not completed the second wave, and we will ask participants to write down their assigned time and make plans for taking the second part of the survey.[2] The wave 2 survey will be activated the day after the HIT is opened.

The survey flow for the first wave is as follows. After consenting the participants, the survey begins by collecting demographic information, such as: age, gender, race, employment status, income, education, marital status, and parental status. Next, the survey asks a series of political background questions: voter registration status, interest in politics, ideology, partisanship, and membership in associations. The penultimate battery of questions elicits the big-5 personality traits, and contains questions about confidence in political knowledge (number of Democrats in the House and length of US tax code).

Finally, participants will be asked questions about their sleep habits: what time of the day is their "feeling best" time, how tired they usually feel when they wake up, at what time of the day they are in need of sleep, whether they are diagnosed with a sleep disorder, and how sleepy they usually feel when going after a number

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[2]We anticipate providing Mturk workers with at least two reminder emails, but reserve the right to send more or fewer. We will note changes in subsequent write-up of results.

of day-to-day such as watching TV or driving a car. The survey also will ask about how much sleep they got, on average, over the past week, and how much they got the previous night, their optimal hours of sleep, the hours since they woke up from their last sleep episode, as well as self-reported sleepiness at the time of the survey. These constitute a useful pre-treatment assessment of tiredness.

We will use these pre-treatment characteristics as tests for covariate balance between the treatment and the control group. For these, we will provide tests that explore the size and statistical significance of differences between the treatment and control group, along with also conducting an omnibus test that regresses treatment assignment on our pre-treatment characteristics. In so doing, we will follow the reporting guidelines outlined in Gerber et al. (2014).

6 Outcomes

The second wave of the survey begins by repeating the questions of how much sleep participants got recently and how sleepy they feel at the moment of the survey. This questions constitute a manipulation check for treatment – i.e. taking the survey between 3-5am rather than 2-4pm.[3]

The survey then measures general life satisfaction, and the political outcomes of interest: vote intentions, sense of civic duty to vote, interest in politics, beliefs about government (efficacy and trust in government), strength of ideology, and con-

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[3]For these, we will provide both comparisons of differences across the treatment and the control group, along with the first difference estimates.

fidence in political knowledge. We will also then measure grit, time discounting, over-confidence, and anchoring.

Finally, the survey includes behavioral outcomes: the willingness to sign a petition to encourage recycling in the local community, and to donate $5 out of a potential $50 bonus (randomly drawn after the survey) to the American Red Cross.

7 Analyses

We will estimate the effects of assignment to treatment via OLS. We will show results both with and without pre-treatment controls. The results will be run with robust standard errors to account for the possibility of heteroskedasticity.

In order to limit attrition from wave 1 to wave 2 of our survey, we will send participants frequent reminder emails and increase payments for the treatment group after day 3 of the survey (if necessary). We will also emphasize that participants will not be paid unless they complete both waves of the survey during their assigned block. To check for whether attrition from wave 1 to wave 2 biases out results, we will (1) compare attrition rates across the treatment and the control groups, (2) compare patterns in baseline covariates across the treatment and the control group, and (3) correct for attrition using extreme bounds as described in (Gerber and Green, 2012).

In our analyses, we face non-compliance of several types. One potential source of non-compliance may arise if participants take the survey outside their time window. We limit this form of non-compliance by locking part 2 of the survey until the day following the initial start of our survey—preventing participants from immediately

taking the second wave after the first. We also emphasize that they will not be paid if they fail to take part 2 within their time window.

Other forms of non-compliance include individuals being sleepy when taking the survey in the afternoon (control group), and not being sleepy when taking the survey in the late evening (treatment group). We can get a sense of the gravity of this type of non-compliance by (1) comparing the average duration of the survey across treatment and control groups or (2) analyzing responses to manipulation-checks that check self-reported sleep as well as attention ex-post. However, it is very difficult to assess all possible patterns non-compliance in our set-up. Therefore, while paying attention to these issues in our analyses, we will primarily focus on our Intent-to-Treat effects.

In addition to estimating average treatment effects, we will explore several theoretically important heterogeneities to understand potential moderators in the relationship between tiredness and political attitudes and behaviors. To build on our research in Holbein and Schafer (2016), we will test for differences across partisanship/ideology and vote propensity. We will also test for differences across individuals' levels of pre-treatment tiredness.

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