

The Pennsylvania State University

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**ADDRESSING PROLONGED SEDENTARY BEHAVIORS IN WORKPLACES:  
EFFECTS OF HUMOR ON BEHAVIORAL INTENTION AND PERCEIVED  
INTERRUPTION**

A Thesis in  
Information Sciences and Technology

by

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## ABSTRACT

**Prolonged sedentary behavior is a common issue for the modern population. For office workers, one of the current economic approaches of dealing with prolonged sedentary behavior is to deliver prompts to trigger themselves to take a walk. However, researchers found that more than half of the prompts sent in the workplaces failed to trigger a break, and the two major reasons given were ignorance and refusal. Moreover, successfully functioning to interrupt recipients, the prompts may be too interrupting and annoying to the recipients, leading to future abandonment of the function or app. This study wants to investigate a way to improve user experience while keeping the prompts functional. It proposes to use humor in the content of prompts to investigate how humor can influence behavioral intention and perceived interruption. We conducted an Amazon Mechanical Turk scenario-based survey with 114 participants. This study found the use of humor triggers the behavioral intention of taking a break from prolonged sitting in the workplaces more than the prompts without humor. The findings suggest that a humorous prompt, if appreciated by the recipient, may be an effective method of getting workers to move.**

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## Chapter 1

### Introduction

Prolonged sedentary behavior is associated with many chronic diseases, such as CVD (cardiovascular disease) and obesity (González, Fuentes, & Márquez, 2017). Prolonged sedentary behavior is currently prevalent in the workplaces. For example, a study among office employees (Kazi, Duncan, Clemes, & Haslam, 2014) found that up to 70% of working hours were spent sedentarily. Likewise, Thorp et al. (Thorp et al., 2012) agreed that the workplace was the key setting for prolonged sedentary time. Moreover, unfortunately, increasing employees' physical activity or reducing their sedentary time outside work does not compensate for the negative effects of their prolonged sedentary behavior during work time (Clemes, O'Connell, & Edwardson, 2014). Bergouignan et al. (Bergouignan et al., 2016) revealed that introducing short bouts of activity during the workday routine is a promising approach to improve overall well-being at work, without detrimentally impacting worker performance. While there are a number of ways to help trigger the behavior change, one way to increase the frequency of employees taking short breaks during work is delivering prompts.

A prompt, as a strategy of persuasive technology which is usually delivered in the form of a reminder or notification, has been used to reduce prolonged sitting and encourages other healthy behavior changes (Fry & Neff, 2009). However, current prompts still need improvement on two issues. One is how efficiently the prompt triggers behavior changes, since people working may still not take a break when receiving a prompt. Luo et al. (Luo et al., 2018) found that 60% of their 1,599 prompts failed to trigger a break, of which 26% were ignored and 34% were declined. Employees' prolonged sitting periods will then negatively influence their health. Therefore, a novel approach to persuade people to take a break is still needed.

Another issue is the perceived interruption that influences user experience (Y. Wang & Reiterer, 2019a). The perceived interruption, which is a part of delivering prompts as reminders or push notifications, needs to be considered. Notifications have been ubiquitous in the present day, through mobile phones, computers, TV, smart-speakers, smart-watches, and so on. Some researchers, such as Matthies et al., claimed that urgent notifications concerning users' health should be obtrusive and force the user to take action (Matthies, Daza Parra, & Urban, 2018).

However, prompts from commercial mobile health apps, especially those sent during work, should still try to minimize the perceived interruption for user experience (Y. Wang & Reiterer, 2019a). Commercial apps do not want to interrupt the users too much to annoy the users and decrease retention. A novel approach to reduce the perceived interruption is worth exploring.

Furthermore, humor has been found as a viable message strategy for reducing psychological reactance to persuasion (Moyer-Gusé, Robinson, & Mcknight, 2018), so, to help solve the above two issues, this study introduces humor to the content of prompts. More explanations and justifications for choosing humor are in Chapter 2: Related Work. The goal of the study is to investigate the effects of prompts' humor level on the behavioral intention to take a break and perceived interruption.

Moreover, this study also includes perceived humor as a variable, because the perception of humor is subjective and may have different effects on the behavioral intention and perceived interruption. The effects may be influenced by individuals' perceived humor level. The secondary goal of the study is to investigate the relationship among perceived humor level, behavioral intention, and perceived interruption.

The purpose of this study is to assess the behavioral intention changes given humor's success in other health-related contexts. More rationale of choosing humor as the novel approach will be explained more in chapter 2. This study offers new considerations for reducing sedentary prolonged behaviors.



This thesis includes six chapters. Chapter 1 introduces the background and motivation of the study. Chapter 2 introduces related research on prompts for prolonged sedentary behavior, interruption of notifications, humor for behavioral intention, and humor for perceived interruption. Chapter 3 is the method section that introduces the participants, design and procedure, and data analysis. Chapter 4 presents findings from the data analysis for manipulation check, behavioral intention, and perceived interruption. Chapter 5 discusses the results, limitations, and future directions of the study. Chapter 6 presents the conclusion of the study.

## Chapter 2

### Related Work

This section describes prompts for prolonged sedentary behavior, interruption of the notification, humor for behavioral intention, and humor for perceived interruption in more detail. This section also presents the four hypotheses that the study wants to test, with their mechanisms explained.

#### Prompts for Prolonged Sedentary Behavior

Prompts are also called digital nudges, cues, triggers, calls to action, and so on, which could be used interchangeably (Fogg, 2009). Fogg (Fogg, 2009) in his behavior model for persuasive design originally called this similar concept a “trigger” and later changed it to “prompt”, so this study chose to use the word “prompt” to be consistent. Using his definition, a prompt is “something that tells people to perform a behavior now”. It is usually delivered through the form of notification or reminder. The prompt used in this study refers to the notification message from a mobile phone.

The prompt has been used in workplaces to promote positive behavior changes. For example, Evans et al. found hourly PC-based prompts to reduce sitting time at work (Evans et al., 2012). However, the results were from a small sample size, and the duration of the intervention only 3-5 days. Donath et al. also found repetitive daily prompts to notably decrease sitting time in the office (Donath, Faude, Schefer, Roth, & Zahner, 2015). The intervention period of the study was 12 weeks and the study used the same three-lined pop-up message, “prolonged sitting is harmful! Change your working position! Lift up your working desk” every day. The novelty effects may have faded as time went by, and that’s why the effects were not statistically

significant. Therefore, a novel approach to improve prompts need to keep attracting recipients' attention in the long run.

Apart from prompts being positively influential, research has always investigated ways to make prompts more persuasive to for behavior changes. Suggestions on investigating the characteristics of prompts have been made in some reviews. One review (Fjeldsoe, Marshall, & Miller, 2009) pointed out that SMS design characteristics and their impact on engagement and retention, as a critical factor for successful behavior change, should be further investigated. Another review (Head, Noar, Iannarino, & Grant Harrington, 2013) suggested that researchers should also investigate theory that informs message effects, such as how text message characteristics align with message effects.

Taking the suggestions from the above reviews, some studies about prompt/message characteristics have been conducted. Head et al. (Head et al., 2013) found that message tailoring and personalization could help improve intervention efficacy. Priebe & Spink (Priebe & Spink, 2015) found that descriptive norm messages, which are messages containing perceptions about the prevalent behavior of others, may serve to decrease sedentary activity in an office setting, since our perceptions of the prevalent behavior of others could change our behaviors. Smith et al. (Smith, Dennis, & Masthoff, 2016) reported that persuasive reminders that use “authority” and “liking” are the most popular overall, but that diverse personalities also had different preferences on the type of persuasive reminder to use. O’Dolan et al. (O’Dolan, Grant, Lawrence, & Dall, 2018) claimed that the role of cultural norms and promotion of self-efficacy should be considered in the design of prompts. A recent study by Wang & Reiterer (Y. Wang & Reiterer, 2019b) reported that using visual cues of progress bars could increase usefulness and also reduce interruption.

Like previous research, the present study also investigates a novel way of designing message characteristics, and it focuses on the behavioral intention change for prolonged sitting.

Intention could be considered the “effort that the individual is willing to provide to perform the behavior (Ajzen, 1991)” and also “a subjective probability that people will perform a certain behavior (Oliver, 2010)”. The higher behavioral intentions refer to higher effectiveness of prompts. Learning from Wang & Reiterer’s study (Y. Wang & Reiterer, 2019a), this study also considers the interruption issue of prompts and aims to reduce perceived interruption for the purpose of good user experience. The following subsection introduces background and related research about the interruption issues of notifications.

### **Interruption of Notification**

Prompts could be intrusive if not delivered appropriately, leading to less engagement or even elimination of the related apps (Dennison, Morrison, Conway, & Yardley, 2013). Researchers have investigated the factors that influence the acceptability of interruption for general notifications and ways to reduce perceived interruption. Previous studies found that the acceptability of interruption for general notifications differs based on interest, perceived entertainment, relevance and actionability (Fischer et al., 2010), level of urgency (Vastenburger, Keyson, & Ridder, 2008), and importance levels as well as types of devices (Voit, Weber, & Schneegass, 2016). There is also a trend in the literature to investigate the appropriate time to deliver general notifications to reduce perceived interruption (Heilman, 2018). Beyond general notifications, the research about positive behavior changes also investigate the appropriate time to send the prompts to trigger targeted behaviors. For example, to identify appropriate prompting moments to break prolonged sedentary behaviors, Luo et al. (Luo et al., 2018) built intelligent systems that consider the contextual information, such as users’ calendar, to-do-list, phone status, and application usage. Moreover, there are also studies that focus on the content of the messages

being sent. For example, Kocielnik & Hsieh (Kocielnik & Hsieh, 2017) reported that diverse message-based triggers could reduce annoyance and boredom.

The present study focuses on the content of the prompts and investigates a novel way of structuring the content to reduce perceived interruption. The issues that this study addresses appear in the literature discussed above such as behavioral intentions and reducing the perceived interruption. Additionally, the novel approach this study investigates is the introduction of humor to the content of the prompts. The following two subsections describe how humor has shown its potential with improving behavioral intention and reducing perceived interruption.

### **Humor for Behavioral Intention**

This study chose to focus on humor to investigate its effects on the intention of taking a break from prolonged sitting in workplaces. This section provides the explanations and evidence for choosing humor as a novel strategy to reduce prolonged sitting in workplaces.

Humor is useful to increase behavioral intention. Humor could increase persuasion by positively biasing the understanding of the information (Allen & Madden, 1985) and by intriguing and increasing arousal (Speck, 1991). Some previous works have successfully used humor to increase behavioral intention in health contexts. For example, Futerfas & Nan (Futerfas & Nan, 2017) found statistically significant effects of humor on intentions to engage in unprotected sex. Moyer-Gusé et al. (Moyer-Gusé et al., 2018) also has used humor to increase parents' intention to have their children get the MMR vaccine.

In one survey, 40.6% of the participants said, they declined to take a moving break because they were busy working in the office (Luo et al., 2018). The thing is that they may experience workplace stress at the moment and have overestimated the limitation of time (Luo et al., 2018). Workplace stress is pretty common and related to mental and physical health. 83% of

workers feel stressed on the job, and nearly half of them report they need help in learning how to manage stress (Harris Interactive and Everest College, 2013). To relate stress to prolonged sedentary behavior, studies have found associations of overall sitting time with depression, anxiety, and stress symptoms (Kouvonen et al., 2013; Rebar, Vandelanotte, Van Uffelen, Short, & Duncan, 2014)

When feeling tense, people are also less likely to initiate the break and need external timers to schedule regular breaks (Kushlev, Cardoso, & Pielot, 2017). Many participants believed they did not have the ability to reduce the amount of time that they spent sitting at work. Sitting at work was reported as being ‘easy’ and taking breaks from sitting as ‘hard’ (O’Dolan et al., 2018). Those feeling tense tend to have low self-efficacy, which refers to ‘the belief in one’s capabilities to organize and execute the courses of action required to manage prospective situations.’ (Self-Efficacy Chang. Soc., 1995). As stress escalated, self-efficacy declined (Evans-Palmer, 2010). If there is a way to reduce stress and thus increase self-efficacy, workers are more likely to believe in themselves in having the ability to take a break from sitting.

Humor has already been used in workplaces for purposes, including reducing workplace stress and increasing performance. As noted by Mesmer-Magnus et al. (Mesmer-Magnus, Glew, & Viswesvaran, 2012), the use of humor by employees and supervisors in the workplace can enhance work performance, workgroup cohesion, and satisfaction. Especially for employees, the use of humor is associated with their improved health, decreased burnout, and reduced stress (Mesmer-Magnus et al., 2012). Wang et al. (R. Wang et al., 2018) also recommended employees use humor in effective ways to reduce workplace stress. Romero (Romero & Cruthirds, 2006) supported the use of humor in workplaces and also pointed out the need to consider humor styles and individual differences to realize expected positive outcomes.

Therefore, this study hypothesizes that the use of humor can change behavior intention to reduce prolonged sedentary behaviors in workplace either by increasing persuasion and arousal or

by reducing workplace stress and thus increasing self-efficacy. This study explores the effectiveness of adding humor in prompt content.

**The Hypotheses:**

- 1) Prompt with humor content is related to higher behavioral intention to take a break.
- 2) Higher perceived humor level is related to higher behavioral intention.

### **Humor for Perceived Interruption**

This study chose humor to reduce users from prolonged sitting behaviors in the workplace. The expectation here is the use of humor will reduce the perceived interruption that may cause negative user experience and decrease app retention. This section provides the explanations and evidence for choosing humor as a novel strategy to help deliver functional but also acceptable notifications.

The use of humor would not impact the function of the prompt but would help them get more attention. Due to the mechanism of humor processing, humor works well in attracting attention (Blanc & Brigaud, 2014) in health advertisement. Monhan (Monahan, 2013) also found that humor can increase attention given to a message.

Besides enhancing the original function of prompts to nudge, humor could also help solve the problem associated with prompts - the perceived interruption that may cause users to stop using the app or function. Martin (Martin, 2007) found that humor can elicit feelings of happiness, playfulness, and cheerfulness (Weinberger & Gulas, 1992). The feeling of amusement from humor can increase source liking and reduce reactance (Brehm & Brehm, 2013). Humor can induce desirable responses by attracting audience attention and making the content seem more likeable and memorable (Severin, 1967). For example, the use of humor has been

widespread in advertising. 11% to 50% of U.S. television advertising use humor (Rime, Corsini, & Herbette, 2002).

Following these findings, this study wanted to use humor, first, to interrupt the worker from working by attracting attention; and, second, to avoid annoying the user by making the prompt content seem more likeable. The corresponding hypotheses are:

- 3) Prompt with humor content is related to lower perceived interruption.
- 4) Higher perceived humor level is related to lower perceived interruption.



## Chapter 3

### Method

This is an online survey study delivered through Amazon Mechanical Turk. This study was conducted as a between-subject decision with two conditions (humor vs. non-humor). This section describes participants, design and procedure, and data analysis.

### Participants

The survey was delivered through Amazon Mechanical Turk (MTurk). Workers had to be in the United States to accept the task, had an acceptance rate of over 95%, and were the MTurk masters. Afterwards, a link to the Qualtrics survey showed up. They were offered \$0.90 for accomplishing the survey.

I cleaned the data through three approaches. Firstly, participants needed to enter their Amazon Mechanical Turk (MTurk) Work ID at the end of survey; they also needed to enter the survey code to finish MTurk hit. I removed those whose work ID or survey code failed to match (0). Secondly, there were three attention check questions in the survey. I deleted data from those who failed any of those attention check questions (9). Thirdly, I also removed speeders (finished in less than 30% of the median time) (2), as well as duplicate responses using the same IP address (15). Some participants failed more than one criterion above. In total, I removed 20 from the original 134 participants.

After data cleaning, the study used data from a total of 114 participants. The sample reported an average age of 41.05 with range from 22 to 73. Among them, the gender distribution is similar (female = 48% and male = 51%). Participants mostly had a bachelor's degree (42%), a high school diploma (34%), master's degree(15%), or Ph.D. or higher degree (4%). Participants

were mostly Caucasian (81%), but also included people who self-identified as African American (6%), Asian (5%), Latino or Hispanic (4%), or Native American(2%). I edited the setting of the Qualtrics survey to randomly and evenly present one of the two conditions, so before data cleaning there were an equal number of participants in two groups. After data cleaning when the data points were removed from both groups, 58 were left in the Humor condition, and 56 were left in the non-humor condition.

### **Design and Procedure**

This study was conducted as a between-subject design with two conditions ( humor level of prompt: humor vs. non-humor). After opening the survey and completing the online consent form, participants were randomly assigned to one of the two conditions, both providing the same scenario describing a graduate student who has been sitting working for a long time and just received a prompt aiming to trigger her to take a break:

“Scenario: Alexa is a graduate student working in her lab office. She is busy and under stress. It was 3pm on Monday. She had been sitting and working in front of her computer screen for over six hours. She knew that she needed to be prompted to take a walk as a short break, so she had scheduled several prompts among the day. Sometimes she ignored the prompt and kept working; sometimes she followed the prompt and took a walk as a short break.

At the moment, her phone on the desk vibrated. She took a glance on the screen and saw the prompt:”

Participants in the humor condition were presented with the prompt:

“📱: Do you remember the joke I told you recently about your spine? It was about a “week” back. Anyway, time to take a walk!”

Those in the non-humor condition were presented with the prompt:

“📱: Standing up can make a difference on your body. It’s good to take a break and lower your stress. Time to take a walk.”

Then, participants needed to answer three questions assessing the variables of interest, which included perceived humor level of the prompt as part of the manipulation check, behavioral intention, and perceived interruption as two dependent variables; the three measures of which were explained in more detail below. Those questions asked the participants to rate, on a five-point Likert scale, their level of agreement (1 = strongly disagree, 5 = strongly agree) with the corresponding statements based on the variables measured, for example, if they were Alexa, how much they think Alexa would agree. Later, the survey collected participants’ demographic information, including age, gender, education, and ethnicity.

The following are the three measures of the study.

### **Perceived Humor Level of Prompt**

Perceived humor level of prompt was used to check whether the humor level of the prompt was successfully manipulated. The study asked participants to rate their level of agreement (1 = strongly disagree, 5 = strongly agree) with the following statement: “This prompt is humorous”. The study used an analysis of variance (ANOVA) to determine whether the two conditions (humor and non-humor) differed in perceived humor level of prompt, as the manipulation check.

### **Behavioral Intention**

To measure the behavioral intention, the study asked participants to rate their agreement (1 = strongly disagree, 5 = strongly agree) with the following statement: “After reading this prompt, now I’m gonna take a walk”. An analysis of variance (ANOVA) would be used to determine whether the two conditions (humor and non-humor) differed in behavioral intention.

### **Perceived Interruption**

To measure the perceived interruption, the study asked participants to rate their agreement (1 = strongly disagree, 5 = strongly agree) with the following statement: “I feel interrupted by this prompt”. An analysis of variance (ANOVA) would be used to determine whether the two conditions (humor and non-humor) differed in perceived interruption.

### **Data Analysis**

This section presents the data analysis of the survey. There are three variables in the study: ratings of humor level of prompts, behavioral intention, and perceived interruption. For the corresponding survey results of the three questions, “strongly disagree” is transcribed to 1, and “strongly agree” is transcribed to 5. The non-humor condition is labeled as -1, and the humor condition is labeled as 1. The statistical software used for the analysis is RStudio (<https://support.rstudio.com/hc/en-us/articles/206212048-Citing-RStudio>). The statistical tests used include one-way ANOVA and linear regression.

## Chapter 4

### Results

This section presents the results of the data analysis, including the results of the manipulation check and four hypotheses. The section also presents the results of humor perception across different demographics, including age and gender.

#### Manipulation Check

After data cleaning, I performed an analysis of variance (ANOVA) to determine whether the two groups (humor and non-humor) differed in perceived humor level of prompt. In the ANOVA, the independent variable was group and the dependent variable was the perceived humor level of prompt. Results of one-way ANOVA revealed significant differences across the two groups of perceived humor level of prompt ( $F[1,112] = 56.44, p = 3.6e-11$ ). Overall, the manipulation check results suggested that the humor level of the prompt content was successfully manipulated, as shown in Figure 4-1.

The figure showed that the average ratings of the prompt humor level in the humor group was higher than those in the non-humor group, which was the desired result. However, as the figure showed, some participants in the non-humor condition had 5 for the ratings of prompt humor level, which means that they thought the prompt in the non-humor condition was extremely humorous. Likewise, some other participants regarded the prompt in the humor condition as extremely not funny. This situation is understandable, because humor is subjective, but it also showed that the manipulation was not perfect. Another possibility was that some participants passed the attention check questions but they aimed to provide unreal answers. In

addition, this spread of the humor group data also created the necessity of considering and analyzing perceived humor.

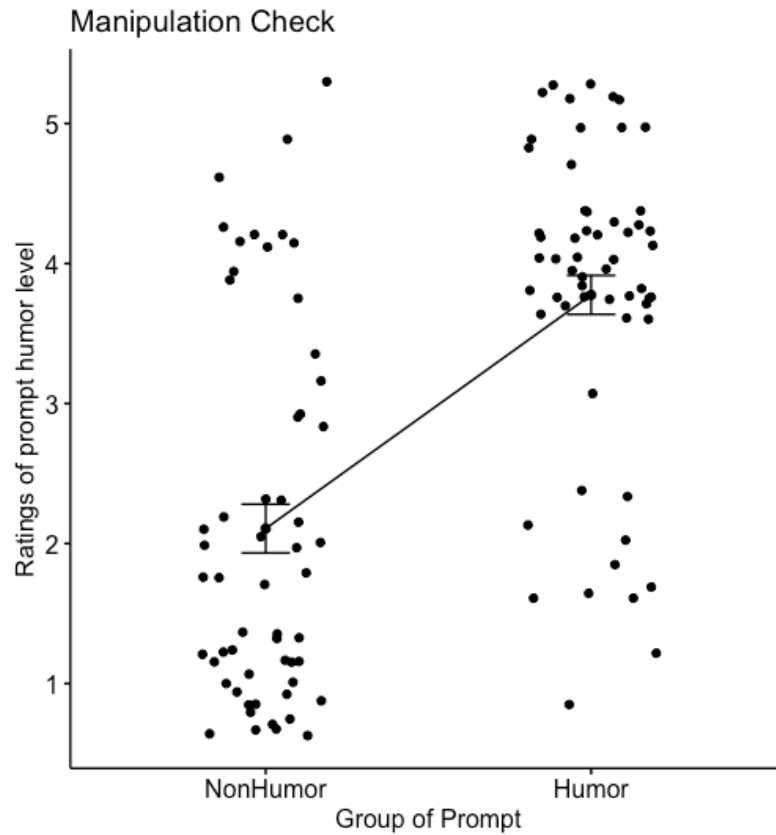


Figure 4-1: Ratings of prompt humor level (manipulation check). The data shows that humor level of the prompt content was successfully manipulated ( $F[1,112] = 56.44$ ,  $p = 3.6e-11$ ). However, data points at the up-left and bottom-right corner reflect that the manipulation was not perfect.

### Hypothesis 1

Hypothesis 1 predicted the relationship between the humor level of prompt and behavioral intention. It was expected that prompts with humorous content would be more effective to trigger breaks in the given scenario. As shown in Figure 4-2, there was hardly a difference of behavioral intention existing between groups of humor. The data was analyzed

using one-way ANOVA. Results revealed that the difference was insignificant across the two groups of behavioral intention ( $F[1,112] = 0.02, p = 0.887$ ). Therefore, these results do not support hypothesis 1, but all means were in the predicted direction.

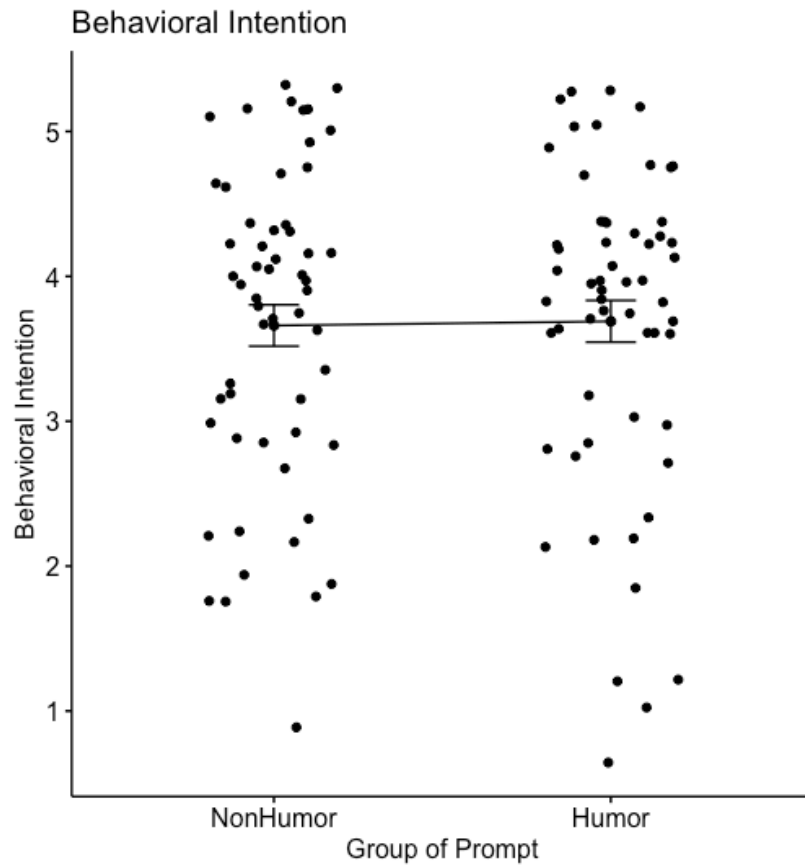


Figure 4-2: Behavioral intention across two conditions. The data does not support hypothesis 1 — behavior intention between two conditions was not significant with  $F[1,112] = 0.02, p = 0.887$ .

## Hypothesis 2

Hypothesis 2 predicted the relationship between perceived humor and behavioral intention. It was expected that people who gave higher humor ratings would be more likely to take breaks in the given scenario. The data was analyzed using linear regression. Figure 4-3

showed the positive linear regression line that best expresses the relationship between behavioral intention and perceived humor. Results revealed that the perceived humor is significantly positively correlated to the behavioral intention to take a break ( $b = 0.213$ ,  $p = 0.002$ ). These results strongly supported hypothesis 2.

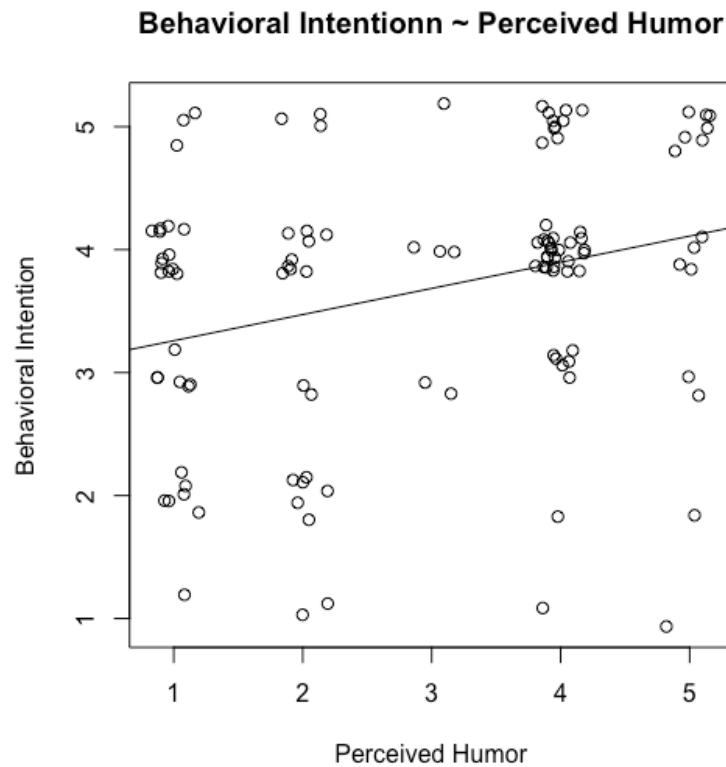


Figure 4-3: Behavior intention by perceived humor level. The positive linear regression line showed a significantly positive relationship between behavioral intention and perceived humor ( $b = 0.213$ ,  $p = 0.002$ ). This supports hypothesis 2.

### Hypothesis 3

This subsection describes data related to perceived interruption and provides the results of hypothesis 3. Hypothesis 3 predicted the relationship between the humor level of prompt and



perceived interruption. It was expected that the prompt with humorous content would trigger less feelings of interruption in the given scenario. As shown in Figure 4-4, the perceived interruption in the non-humor group was higher. However, results from one-way ANOVA revealed that the difference was insignificant across the two groups of perceived interruption ( $F[1,112] = 0.76, p = 0.385$ ). Therefore, these results did not support hypothesis 3, but all means were in the predicted direction.

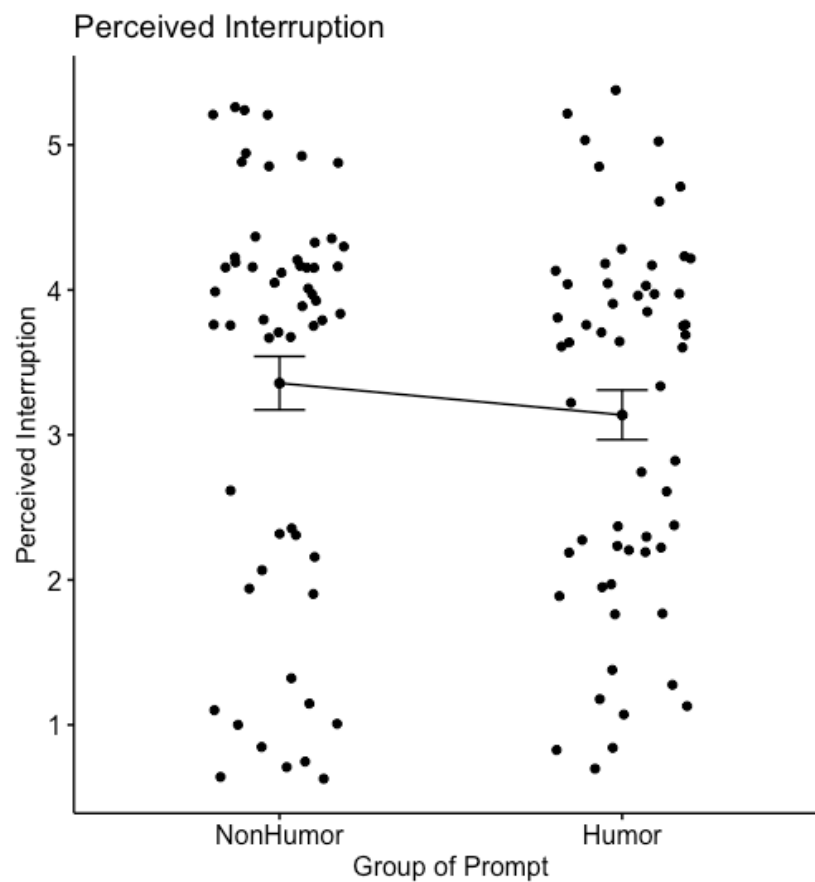


Figure 4-4: Perceived interruption across two study conditions. The perceived interruption in the non-humor group was higher, but the difference was not significant ( $F[1,112] = 0.76, p = 0.385$ ).

### Hypothesis 4

Hypothesis 4 predicted the relationship between perceived humor and perceived interruption. It was expected that people who gave higher humor ratings would be likely to feel less interrupted in the given scenario. The data was analyzed using linear regression. Figure 4-5 showed a pretty flat linear regression line. Results revealed that there was no correlation between the perceived humor and the perceived interruption ( $b = -0.016$ ,  $p = 0.856$ ). These results did not support hypothesis 4, but all means were in the predicted direction.

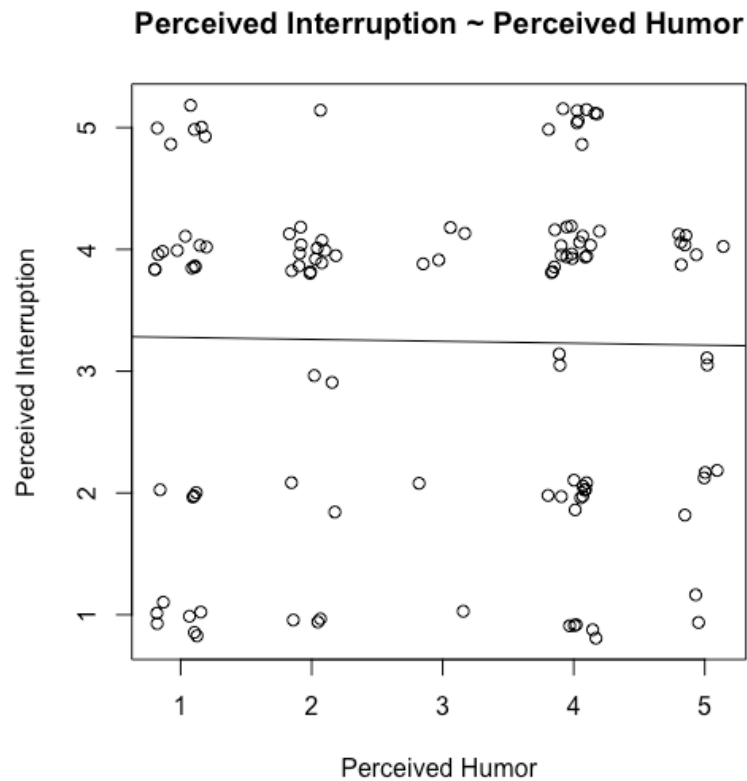


Figure 4-5: Perceived interruption by perceived humor level. The correlation between the perceived humor and the perceived interruption is not significant ( $b = -0.016$ ,  $p = 0.856$ ).

### Perception of Humor, Age, and Gender

This subsection presents the results of humor perception across different demographics, including age and gender. I found that there was a statistically significantly negative correlation between humor perception and age ( $b = -0.023$ ,  $p < 0.05$ ). The older the participants were, the lower they rated the prompts. As shown in Figure 4-6, the perceived humor level by female participants was higher, but the difference was not significant ( $F[2,111] = 0.348$ ,  $p = 0.707$ ).

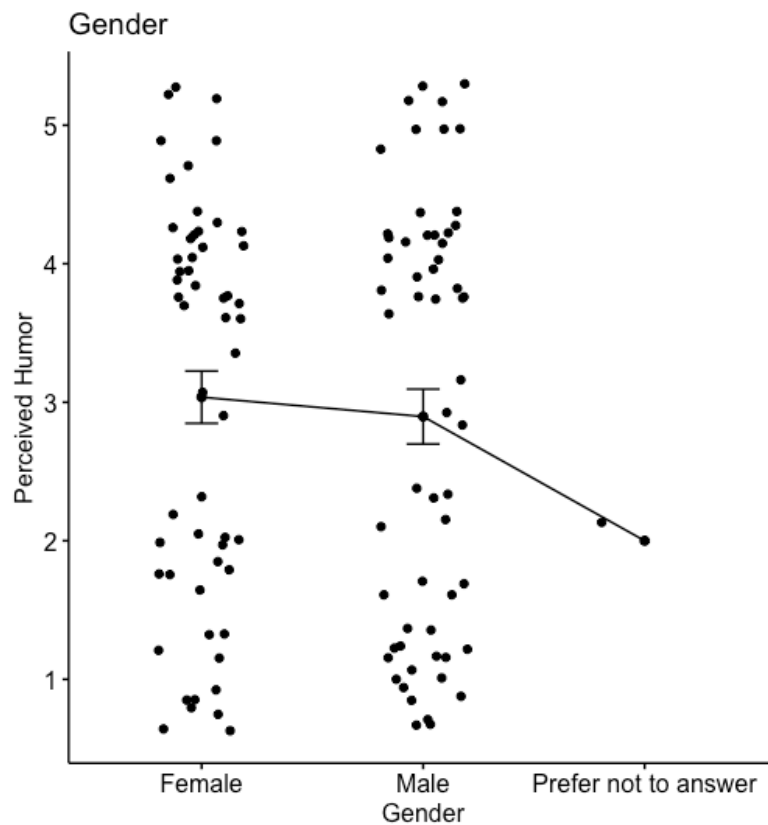


Figure 4-6: Perceived humor level by gender. The perceived humor level by female participants was higher, but the difference was not significant ( $F[2,111] = 0.348$ ,  $p = 0.707$ ).

## **Chapter 5**

### **Discussion**

This section discusses the results of the study for behavioral intention and perceived interruption. The objectives of this research were to examine the effects of humorous prompts on the two dependent variables; behavioral intention and perceived interruption. This section also discusses limitations and future directions of the study.

#### **Behavioral Intention**

Hypothesis 1 and 2 are about behavioral intention. The first hypothesis predicted that a prompt with humor content is related to higher behavioral intention to take a break from prolonged sitting at work. I developed this hypothesis based on the evidence of humor increasing persuasion and decreasing stress. Decreased stress is related to increased self-efficacy so that workers would perceive themselves as having high ability to have time to take a break from work. Thus, they are more willing to take a break. However, the results indicated that there was no difference in behavioral intention between those who received humorous prompts and those who received non-humorous prompts. The results did not support the hypothesis, but the means were in the predicted direction. The choice of prompt content in the humor condition and subjective nature of perceived humor may help explain the results. The prompt in the humor condition was not considered humorous by all the participants. Some participants in the humor condition still rated the humorous prompt as not humorous at all, and some participants in the non-humor condition rated the non-humorous prompt as extremely humorous. To figure out the relationship between humor and behavioral intention and avoid individual preference, I came up with

hypothesis 2 to investigate the relationship between perceived humor and behavioral intention, assuming in the future there could be ways to deliver personalized humorous prompts.

The second hypothesis predicted that higher perceived humor level is related to higher behavioral intention. I developed this hypothesis based on the evidence of humor increasing persuasion and decreasing stress, as well as the concern of not manipulating the humor level successfully. Results from the study were consistent with the predictions, that those who gave higher ratings of perceived humor level of prompt, no matter what prompt they received, also tended to have higher behavioral intention to take a break. The results, thus, supported hypothesis 2.

In sum, there is a positive correlation between perceived humor and behavioral intention, but it would be difficult to manipulate humor for all participants due to individual differences. Health behavior change apps should consider the individual differences on humor perception. To make sure the recipient would regard the prompt as humorous, practitioners should try to tailor corresponding humor styles to recipients who have different gender, ethnicity, and so on.

### **Perceived Interruption**

Hypotheses 3 and 4 are about perceived interruption. The third hypothesis predicted that a prompt with humor content is related to lower perceived interruption when participants receive prompts asking them to take a break from prolonged sitting at work. I developed this hypothesis based on previous findings regarding positive arousal induced by humor. The arousal of positive feelings, such as happiness, could lead to source liking, lower reactance, and thus lower perceived interruption. However, the results indicated that there was no difference in perceived interruption between those who received humorous prompt and those who received non-humorous prompt. The hypothesis was not supported but the means were in the predicted direction. This finding may

also be explained by the choice of prompt content in humor condition and subjective nature of perceived humor. To figure out the relationship between humor and perceived interruption, I came up with hypothesis 4 to investigate the relationship between perceived humor and perceived interruption.

The fourth hypothesis predicted that higher perceived humor level is related to lower perceived interruption. I developed this hypothesis based on the positive arousal induced by humor. However, the results from the study indicated that there was no correlation between perceived humor and perceived interruption. The results did not support the hypothesis, but the means were in the predicted direction. The explanation may be that participants have different humor appreciation and attitudes towards humor. Perceiving a prompt as humorous, those who do not appreciate humor may feel more interrupted, while those who appreciate humor may feel less interrupted.

None of the hypotheses regarding perceived interruption were not supported. In sum, the relationship between humor and perceived interruption remains unclear based on the results from this study. The practical implications of the findings, therefore, need further support from future research work.

### **Perception of Humor, Age, and Gender**

From the results, perception of humor seems to be different across age and gender. Older participants tended to give lower ratings of perceived humor on the prompts. Women tended to give higher ratings of perceived humor on the prompts. The individual differences, such as age and gender, had effects on perception of humor. These individual differences may influence the results of our hypotheses.

### **Limitations**

The study has a number of limitations. The current prompts in humor condition used puns. That is, the humor generation process in the study depended on incongruity-resolution theory (Forabosco, 1992). The study could choose other types of humor, following other generation processes, such as arousal-safety theory (Shabbir & Thwaites, 2007). Different types of humor generation process might impact outcome variables differently. Second, the study only used one pair of prompts. The results may not be generalizable to a different pair of prompts, according to the language-as-fixed-effect fallacy (Raaijmakers, Schrijnemakers, & Gremmen, 1999). Third, besides random assignment, as a between-subject design, the study failed to consider the individual differences among participants which may impact their perception of humor. In addition, the study employed a survey to assess behavioral intentions and perceived interruption. The results of the actual behavior and perception from a field study may be different from the results of this scenario-based online survey study.

### **Future Directions**

The results of the study may be useful for the fields of behavior change intervention and notification systems. Researchers who study behavior change intervention may leverage the study findings to investigate the effects of humor on other targeted healthy behavior change. Researchers who study notification systems might also find it useful to further explore whether and how humor could reduce the daily perceived interruption of the notification systems. Practitioners from health care and application or system designers may find the preliminary results interesting and incorporate humor in their systems. The practical use of humor should take individual differences into consideration, thinking about how to tailor appropriate prompts with

preferred humor types to trigger expected results. The use of humor in behavior change and notification systems has potential, but its practical implications still need further investigation and rigorous studies.

Future studies should also consider more pairs of prompts using other types of humor, to increase generalization of the results and reduce language-as-fixed-effect fallacy (Raaijmakers et al., 1999). Future studies can conduct a within-subject design to avoid or reduce the effects of individual differences, such as ethnicity and gender, on perception of humor. In the future, field studies can be conducted to collect real feelings and actions, using passive sensing devices, to investigate the short-term and long-term effects of humorous prompts. Moreover, future studies can help to establish the causal effects of humor on behavior change by manipulating different variables including the effect of stress, appreciation of humor, and attitudes towards humor.



## **Chapter 6**

### **Conclusion**

This study investigates a novel approach to help improve the effectiveness and user experience of the prompts by exploring the relationships between humorous prompt, perceived humor, behavioral intention, and perceived interruption. The findings suggest that a prompt, when perceived as humorous by a recipient, may trigger higher behavioral intention of taking a break from prolonged sedentary behavior in the workplaces. However, the relationship between humor and perceived interruption remains unclear and needs further investigation with potential moderators, such as stress level, appreciation of humor, and attitudes towards humor. In addition, there are individual differences, including age and gender, that influence perception of humor. The results add to the extant literature by providing some evidence supporting the use of humor to increase behavioral intention of taking a break from prolonged sitting in the workplaces.

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## Appendix

### Survey Instrument

You are being invited to volunteer to participate in a research study. This summary explains information about this research.

Prompts, in the form of reminders and notifications, have been used to trigger healthy behavior changes, such as introducing short bouts of activity during the workday routine to improve overall well-being. However, they do not work well in some contexts. This study aims to improve prompts to trigger breaks (take a walk) during stressful work. You will answer a survey that includes the collection of the evaluation of two prompts in perspective of humor levels, perceived interruption, and behavior intention in the given scenario, your own sense of humor, stress levels, and demographic data (age, gender, ethnicity, education).

All information will be stored in secure servers and will be appropriately encrypted. Information collected in this project may be shared with other researchers, but we will not share any information that could identify you.

If you have questions, complaints, or concerns about the research, you should contact Shan Wang at 530-979-4003. If you have questions regarding your rights as a research subject or concerns regarding your privacy, you may contact the Office for Research Protections at 814-865-1775.


Your participation is voluntary, and you may decide to stop at any time.

1. I consent to the above and wish to participate in this study

Scenario: Alexa is a graduate student working in her lab office. She is busy and under stress. It was 3pm on Monday. She had been sitting and working in front of her computer screen

for over six hours. She knew that she needed to be prompted to take a walk as a short break, so she had scheduled several prompts among the day. Sometimes she ignored the prompt and kept working; sometimes she followed the prompt and took a walk as short break.

At the moment, her phone on the desk vibrated. She took a glance on the screen and saw the prompt:

: Do you remember the joke I told you recently about your spine? It was about a “week” back. Anyway, time to take a walk!


If Alexa has the same stress level and sense of humor as you, please rate how much do you think she will agree with the following statements.

2. Saw the prompt and Ready to rate
3. This prompt is humorous.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
4. I feel interrupted by this prompt.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
5. After reading this prompt, now I'm gonna take a walk.
  - a. Strongly agree
  - b. Somewhat agree

- c. Neither agree nor disagree
- d. Somewhat disagree
- e. Strongly disagree

Scenario: Alexa is a graduate student working in her lab office. She is busy and under stress. It was 3pm on Monday. She had been sitting and working in front of her computer screen for over six hours. She knew that she needed to be prompted to take a walk as a short break, so she had scheduled several prompts among the day. Sometimes she ignored the prompt and kept working; sometimes she followed the prompt and took a walk as short break.

At the moment, her phone on the desk vibrated. She took a glance on the screen and saw the prompt:

: Standing up can make a difference on your body. It's good to take a break and lower your stress. Time to take a walk.

If Alexa has the same stress level and sense of humor as you, please rate how much do you think she will agree with the following statements.

- 6. Saw the prompt and Ready to rate
- 7. This prompt is humorous.
  - f. Strongly agree
  - g. Somewhat agree
  - h. Neither agree nor disagree
  - i. Somewhat disagree
  - j. Strongly disagree
- 8. I feel interrupted by this prompt.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree

- d. Somewhat disagree
  - e. Strongly disagree
9. After reading this prompt, now I'm gonna take a walk.
- f. Strongly agree
  - g. Somewhat agree
  - h. Neither agree nor disagree
  - i. Somewhat disagree
  - j. Strongly disagree
10. What is your age?
11. What gender do you identify as?
12. What is the highest degree or level of education you have completed?
- a. Some high school
  - b. High school
  - c. Bachelor's degree
  - d. Master's degree
  - e. Ph.D. or higher
  - f. Trade School
  - g. Prefer not to say
13. Please specify your ethnicity.
- a. Caucasian
  - b. African-American
  - c. Latino or Hispanic
  - d. Asian
  - e. Native American
  - f. Native Hawaiian or Pacific Islander

g. Two or More Other/unknown

h. Prefer not to say

14. What is your Amazon Mechanical Turk Worker ID?

Please note that if you don't answer this question, you may not get paid for your hit.

Your survey code is 6120.