Task Scheduling and Productivity

by

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Abstract

The current research aims to describe general scheduling tendencies, evaluate the impact considering task end-times have on scheduling tendencies, and finally, to assess links between scheduling tendencies and productivity. Throughout four studies, findings indicated that participants consistently preferred to schedule tasks on-the-hour (e.g., 9:00 or 10:00 vs. 9:15 or 10:30). When considering task end-times, this tendency for on-the-hour scheduling was reduced, especially when participants had five tasks or more to schedule. On-the-hour scheduling is likely a form of intermittent scheduling, which has been detrimentally associated with productivity. Although some correlational evidence was uncovered to support the notion that on-the-hour scheduling would be detrimentally linked to productivity (Study 2), replications showed no association between the variables (Study 3). These findings provide valuable information regarding scheduling tendencies, as well as the impact considering task end-times have on scheduling. However, more research is needed to examine links between on-the-hour task scheduling and productivity.
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Table of Contents

Introduction ......................................................................................................................... 1
Scheduling .......................................................................................................................... 1
  Scheduling and Productivity ......................................................................................... 2
  Types of Scheduling ...................................................................................................... 6
  What type of scheduling is common? ............................................................................. 7
Productivity ....................................................................................................................... 10
Procrastination .................................................................................................................. 11

Study 1: Task Scheduling and Deadline Effects on Scheduling ............................................ 14
Study 1a: Hypothetical Task Scheduling .......................................................................... 14
  Method ............................................................................................................................ 14
    Participants .................................................................................................................... 14
    Procedure ..................................................................................................................... 15
  Results ............................................................................................................................ 16
    Tendency to schedule on-the-hour .............................................................................. 16
    Condition effect ......................................................................................................... 17
Study 1b – Real Task Scheduling ..................................................................................... 18
  Method ............................................................................................................................ 18
    Participants .................................................................................................................... 18
    Procedure ..................................................................................................................... 19
  Results ............................................................................................................................ 19
    Tendency to schedule on-the-hour .............................................................................. 19
    Condition effect ......................................................................................................... 20
  Discussion ....................................................................................................................... 20

Study 2: Consequences of On-the-Hour Scheduling .......................................................... 21
  Method ............................................................................................................................ 23
    Participants .................................................................................................................... 23
    Procedure ..................................................................................................................... 23
  Results ............................................................................................................................ 25
    Tendency to schedule on-the-hour .............................................................................. 25
    Consequences of on-the-hour task scheduling ............................................................. 27
  Discussion ....................................................................................................................... 30

Study 3: Consequences of On-the-Hour Scheduling .......................................................... 31
  Method ............................................................................................................................ 32
    Participants .................................................................................................................... 32
    Procedure ..................................................................................................................... 32
  Results ............................................................................................................................ 36
    Preliminary Analyses ................................................................................................. 36
    Expected Productivity and Procrastination ................................................................. 37
    Productivity .................................................................................................................. 37
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procrastination</td>
<td>37</td>
</tr>
<tr>
<td>Exploratory Analyses</td>
<td>38</td>
</tr>
<tr>
<td>Study 3 Discussion</td>
<td>40</td>
</tr>
<tr>
<td>General Discussion</td>
<td>41</td>
</tr>
<tr>
<td>Theoretical Implications</td>
<td>42</td>
</tr>
<tr>
<td>Practical Implications</td>
<td>43</td>
</tr>
<tr>
<td>Limitations</td>
<td>43</td>
</tr>
<tr>
<td>Future Research</td>
<td>45</td>
</tr>
<tr>
<td>Conclusions</td>
<td>46</td>
</tr>
<tr>
<td>References</td>
<td>47</td>
</tr>
<tr>
<td>Appendices</td>
<td>54</td>
</tr>
</tbody>
</table>
List of Tables

Table 1. Average proportion of participants who scheduled each task on-the-hour by condition (Study 1a).

Table 2. Average proportion of participants who scheduled each task on-the-hour by condition (Study 1a).

Table 3. Average proportion of participants who scheduled each task on-the-hour (Study 1b).

Table 4. Tasks, downtime, productivity, and stress, by condition (Study 2).

Table 5. Tasks, downtime, productivity, and stress, correlated with percentage of tasks scheduled on the hour (Study 2).

Table 6. Means of productivity and procrastination measures by condition (Study 3).

Table 7. Productivity and procrastination measures correlated with the number of tasks scheduled on-the-hour (Study 3).

Table 8. Condition means and standard deviations for exploratory variables (Study 3).
List of Figures

**Figure 1.** Hypothetical Tasks Scheduled On-the-hour by Condition (Study 1a).

**Figure 2.** Real Tasks Scheduled On-the-hour Per Condition (Study 1b)

**Figure 3.** Mean on-the-hour scheduling by condition, split by those who listed five tasks or more (left) and four tasks or less (right) [Study 2].

**Figure 4.** Correlation Between Productivity and On-the-Hour Scheduling (Study 2).
List of Appendices

Appendix A: Study Materials for Study 1a................................................................. 54
Appendix B: Additional results from Study 1a.......................................................... 56
Appendix C: Study Materials for Study 1b............................................................... 57
Appendix D: Study Materials for Study 2 ............................................................... 59
Appendix E: Additional Results from Study 2 ......................................................... 63
Appendix F: Study Materials for Study 3 ............................................................... 64
Introduction

People are extremely busy, possibly more than ever (Darrah et al., 2007). Research shows that, at any given time, the average North American student reports as many as 15 ongoing personal projects (Masicampo & Baumeister, 2011). One way to accomplish multiple goals and juggle daily events and commitments is effective time management (Aeon et al., 2021). Time management is a concept referring to one’s ability to use time effectively in order to accomplish the many tasks required (Claessens et al. 2007). Common strategies to effectively using time include setting short- and long-term goals, planning and scheduling, setting deadlines, prioritizing tasks, and more. Time management has largely been studied in relation to productivity in academic and workplace contexts (Macan et al., 1990; Claessens & Van Eerde, 2007; Barling et al., 1996). The current research will attempt to discover the ways that people prefer to schedule their daily tasks and assess whether this has any impact on productivity.

As people’s lives become busier, there is an increase in the number of tasks that must be completed on a daily basis. In order to stay organized and remain cognizant of all the tasks that are required to be completed, effective use of time management strategies can be implemented to increase people’s ability to get things done promptly and punctually. Specifically, keeping a schedule or a daily planner has been demonstrated effective at increasing one’s ability to stay organized and get tasks done (Mumford et al., 2001; Barling et al., 1996; Leshed & Sengers, 2011). A 2011 qualitative study conducted by Leshed and Sengers uncovered that their participants used productivity tools (e.g., calendars, daily planners, weekly planners, to-do lists) to plan for, remind, document, and prepare for things they were required to do. Thus, research generally shows that productivity tools, such as calendars, are used to recall all the tasks that
people are required to complete on a daily basis (Marsh et al., 1998), otherwise known as prospective memory (Czerwinski et al., 2004).

**Scheduling**

Scheduling is a time management strategy and a form of planning in which specific times are set aside for an activity or task (Malkoc & Tonietto, 2019). Research has shown that 22% of Americans maintain a calendar on their mobile device and access said calendar five or more times per day (Malkoc & Tonietto, 2016), with others maintaining a schedule in other forms (e.g., on paper, computer, etc.). A 1998 study conducted by Marsh and colleagues uncovered that approximately 58 percent of their participants reported using a calendar or daily planner. That said, there exists lots of variability and ambiguity in the research relating to the prevalence of calendar use. Scheduling can be distinguished from other forms of planning, such as to-do lists, as it includes the planned start, and sometimes end of tasks (Geetha et al., 2021). Research shows that implementing planning strategies other than scheduling, such as to-do lists, can be even detrimental for individuals with poor time management skills (Geetha et al., 2021). An issue with scheduling relates to the phenomenon called the *planning fallacy* (Buehler et al., 1994). The planning fallacy relates to peoples’ inability to effectively estimate the duration of time it will take to complete tasks. Specifically, research shows that people are more likely to optimistically underestimate the amount of time a task will take to complete (Buehler et al., 1994). Peoples’ inability to make these predictions is likely due to people relying on ‘best-case’ scenarios to make their predictions (Buehler et al., 2002).

**Scheduling and Productivity**

As scheduling is such a popular method used to increase performance and productivity, much research has been conducted on its effectiveness. For example, a study by Baker and
colleagues (2019) evaluated whether scheduling asynchronous university course lectures would increase the likelihood of students watching the lectures and succeeding in the course. Thus, the goals of the study were to determine whether scheduling the watching of lectures would (a) increase the likelihood for students to watch the lectures, and (b) translate to academic success (i.e., higher grades). The researchers recruited one hundred and forty-five university students registered to a five-week summer online engineering course. Participants were separated into either the control condition or a scheduling condition in which participants were asked to schedule when they would watch the lectures for week one and two. Students in the scheduling condition were expected to schedule the three remaining lectures on their own time. The researchers measured the lectures watched, the time each lecture was watched, and the weekly quiz results. Results indicated that during the first week of class, 79 percent of students in the scheduling condition watched the asynchronous class at the scheduled time or earlier. This fell to 56 percent during the second week and reduced further for the following three weeks of lectures. Relative to control condition students, those in the experimental condition scored significantly higher on the first week quiz and non-significantly higher on the second week quiz, but not for the final three quizzes. For students self-reporting poor trait time management (e.g., not good at meeting deadlines and not good at planning), the beneficial effect of scheduling was stronger (Baker et al., 2019).

In order to assess the relationship between time management practices and work engagement and work performance, Parke and colleagues (2018) recruited one hundred and eighty-seven full time workers from a wide range of organizational contexts and jobs. The researchers mentioned specifying tasks, prioritizing tasks, and scheduling as examples of time management practices which were assessed using previously published scales by Britton and
Tesser (1991) and Macan and colleagues (1990). Work engagement was assessed with the job engagement scale, and performance was assessed with the role performance scale. Results indicated a positive and significant association between time management strategies, as previously listed, and work engagement. Furthermore, engagement was significantly and positively associated with performance. Thus, time management practices, such as listing tasks, prioritizing them, and scheduling increases engagement which in turn increases performance. This provides evidence that scheduling is not only useful in an academic context, but in workplace contexts as well.

A seminal study conducted by Ariely and Wertenbroch (2002) offered participants the opportunity to complete three proofreading tasks and receive payment depending on the quality of their ability to detect grammatical and spelling errors. Participants were separated into one of three conditions, either the evenly-spaced deadlines condition (i.e., one task due per week), the end-deadline condition (i.e., all three tasks due after three weeks), and the self-imposed deadline condition (i.e., participants chose their own deadlines). Results indicated that the number of errors detected was highest in the evenly-spaced deadlines condition, with the lowest performance in the end-deadline condition (Ariely & Wertenbroch, 2002). Results also indicated that participants in the self-imposed deadlines condition that evenly-spaced their deadlines detected more errors than those who didn’t. This indicates that evenly-spacing the deadlines or scheduling of tasks throughout a given time-frame is beneficial for performance (Ariely & Wertenbroch, 2002).

Previous research has evaluated the relationship between time management behaviours, such as scheduling and planning relating to academic performance and stress (Macan et al., 1990). Macan and colleagues recruited one hundred and sixty-five undergraduate students who
were asked to complete a series of questionnaires meant to assess time management, stress, and school performance. Their results indicated a significant and positive association between scheduling and planning and grade point average and self-rated academic performance. In addition, feeling in control of time was significantly related to reduced stress. Thus, scheduling and planning might increase the feeling of being in control of time, which is significantly associated with stress reduction and increased performance (Macan et al., 1990).

In sum, many studies have associated planning and scheduling to improvements in performance and productivity (Ariely & Wertenbroch, 2002; Baker et al., 2019; Macan et al., 1990; Parke et al., 2018) and identified several reasons as to why these time management strategies might be positively associated with productivity and performance. First, pre-planning tasks increases performance by clearing out cognitive space that uncompleted tasks take up (Masicampo & Baumeister, 2011). Masicampo and Baumeister (2011) determined that when participants wrote down the tasks they wanted to complete, they were better able to focus on a task at hand, leading to reductions in distractions and intrusive task-related thoughts. Second, time management (i.e., planning, scheduling, setting goals, etc.) has been shown to reduce stress (Misra & McKean, 2000). Scheduling might increase productivity by increasing one’s subjective feeling of control of time (Macan et al., 1990) and decreasing stress levels (Misra & McKean, 2000). Thus, scheduling tasks positively impact performance and productivity. Specific ways in which people prefer to schedule their daily tasks might also impact productivity. The current research will attempt to discover the ways that people prefer to schedule daily tasks and assess whether this impacts productivity.
Types of Scheduling

While scheduling has been shown to benefit performance and productivity, there appears to be specific scheduling methods that are most beneficial. First, scheduling tasks weekly or monthly has been shown to increase productivity by assuring the completion of important tasks with lesser urgency (Gordon & Borkan, 2014). Second, research shows that people are hesitant to begin tasks they do not believe they will have time to complete in a given time-frame (Chase et al., 2013). Therefore, it is suggested to break down larger tasks into smaller ones in order to increase the likelihood of completing smaller, more achievable tasks. Third, scheduling important and/or difficult tasks at times in which you are most productive increases the likelihood of completion of said tasks (Chase et al., 2013). For example, morning people would benefit from scheduling important tasks in the morning.

Fourth, a specific form of scheduling that has been shown to pose a threat to productivity is intermittent scheduling. Malkoc and Tonietto (2019) distinguish between two types of scheduling strategies that are generally implemented: First, intermittent scheduling: scheduling tasks at pre-determined times in a way that creates slack time between tasks for shorter tasks or hard stop times for longer tasks. For example, scheduling a task at 1pm and another task at 2pm. If the first task is expected to take 45 minutes to complete, we should expect 15 minutes of slack time until the beginning of the next scheduled task. On the other hand, if the first task is expected to take 1 hour and a half, then we should expect to have to cut the first task short. Both outcomes likely affect productivity negatively. Second, back-to-back scheduling: rather than scheduling at specific times, a task is scheduled to begin after the completion of another task. This requires the planner to determine approximate times for task completion in order to assure having enough time to complete all scheduled tasks, in a specific order, but does not require set start times.
Intermittent scheduling might be detrimental to productivity for several reasons. First, Malkoc, Tonietto and Nowlis (2019) have determined that a time interval (e.g., an hour) that ends with a scheduled task (e.g., a work meeting) feels subjectively shorter and leads to less productive time within the hour than an hour that does not end with a scheduled task. For example, if a researcher plans on working on a study between 1pm and 2pm and has a scheduled meeting at 2pm, the hour will feel subjectively shorter, the researcher will spend less time working on the study and will be less likely to engage in extended tasks (even when such tasks are feasibly accomplished) compared to if the researcher did not have a scheduled task at 2pm, but still planned on stopping the task at 2pm (Malkoc et al., 2019). Second, for longer tasks, research shows that it is better to allot enough time to complete a task in order to optimize productivity, rather than having to stop and start-up again. Starting a task takes up a large ‘energy of activation’, and once you stop, it becomes more difficult to start again (Gordon & Borkan, 2014). Third, for shorter tasks, if a task takes less time than initially predicted, there will be slack time between scheduled tasks which is unlikely to be productive (Malkoc & Tonietto, 2019). These short periods of unscheduled time might be used to complete small, unimportant tasks, but are unlikely to be used to advance more important projects. Considering the planning fallacy (Buehler et al., 1994), and people’s generally unsuccessful estimations of the duration of tasks, we can assume that this will either lead to more short periods of unscheduled time between tasks or an increased necessity to cut tasks short.

**What type of scheduling is common?**

One very common tendency in day-to-day scheduling might be on-the-hour scheduling (e.g., scheduling a task to start at 9:00 or 10:00 rather than 9:10 or 10:15). Anecdotally, on-the-hour scheduling is quite common for two reasons. First, online and on-paper planners and
schedules are automatically organized to favor on-the-hour scheduling (e.g., online calendars default to on-the-hour, paper calendars visually present rows dividing the day by the hour).

Second, the tendency might be self-perpetuating, as people are conditioned from a young age to start many tasks on-the-hour. For example, many activities, such as school and sports are normally started on-the-hour. In addition, television and radio shows have most commonly been scheduled to begin at the start of the hour. Even before that, newspapers were commonly only released for purchase at the start of the hour. As such, years, decades, and likely centuries of conditioning have increased peoples’ likelihood to normalize on-the-hour start times. This likely relates to the familiarity bias, in which people will prefer what is already familiar to them (Baker & Nofsinger, 2010).

I hypothesize that people prefer to schedule tasks on-the-hour rather than off-the-hour. On-the-hour scheduling is a form of intermittent scheduling in which tasks are scheduled at predetermined times rather than following the completion of a previous task. Technically, on-the-hour scheduling could be a form of back-to-back scheduling, if tasks were to take precisely one hour to complete, however, this is likely rarely the case. What likely occurs when people schedule tasks on-the-hour is that they reserve the full hour to complete a task rather than reserving the actual amount of time the task is expected to take to complete. Thus, this form of scheduling might be common, but might not be optimal for productivity. I will also examine how to reduce the hypothesized tendency to prefer scheduling tasks on-the-hour. Considering task end-times might be one way to reduce the hypothesized tendency to prefer on-the-hour task scheduling as it focused people on how long the scheduled task might take.
Task End-Times

Accounting for task end time (the time by which one anticipates to stop working on a task or to complete the task, which includes but is not limited to task deadlines), might also impact scheduling. It is possible that considering both start and end times of tasks affects how tasks are scheduled. For example, the proposed tendency to schedule tasks on-the-hour might decrease when considering the end-time of a task. Considering the end time of a task might encourage back-to-back scheduling, as participants consider not only when they will start a task, but also when they will end it. Knowing the (anticipated) end time might increase the likelihood that the next task will be scheduled to begin once the earlier task is complete.

In reviewing the literature, I found no research on task end-times, however, this concept is extremely similar to task deadlines. Deadlines are a time management strategy and can be defined as hard stops set for task completion or pausing a task (Malkoc et al., 2019). A deadline for a given task allows the scheduler to know the precise time a task needs to be completed by. For example, if a task’s deadline is at 2pm, the scheduler knows that the task must be completed at that time. Similarly, if a task is scheduled from 1pm to 2pm, the scheduler plans to stop working on the task at 2pm, regardless of whether the task is finished. In this sense, deadlines are a way to make the end-time of a task salient. Deadlines can differ in whether they are externally imposed or self-imposed. For example, a deadline to a scheduled task may be imposed by another scheduled subsequent task, by an outside entity requiring the task to be completed at that time, or by personal preference to stop working on a task at a certain time. Deadlines appear to influence behaviour by providing pre-commitment to task completion (Bisin & Hyndman, 2019; Herweg & Müller, 2020), increasing the likelihood for task completion. Thus, as a deadline
approaches, the urgency imposed by a deadline increases the likelihood of task completion (Malkoc & Tonietto, 2019; Ariely & Wertenbroch, 2002; Howell et al., 2006; Puffer, 1989).

Very little is known about how deadlines impact planning and scheduling. I predict that considering task deadlines (i.e., task end-times), will directly impact scheduling by reducing the hypothesized tendency to schedule on-the-hour by increasing the likelihood to schedule tasks back-to-back.

**Productivity**

The goal of time management, planning, and scheduling is to increase productivity. What is productivity? My search of the literature has discovered two primary ways in which productivity is defined. First, the subjective feeling of being productive and getting things done. Kim and colleagues (2019) conducted a qualitative study that discovered that the subjective feeling of productivity was one of the primary ways their participants defined productivity. Second, productivity can describe the quantity and quality of tasks completed in a certain time frame. This definition of productivity compares the relation of output (i.e., produced goods) to input (i.e., consumed resource) (Tangen, 2004; Hassan et al., 2008). For example, productivity might describe the amount of work (i.e., output) someone gets done in a given time frame (i.e., input). Misterek and colleagues (1992) explain that productivity is a relative concept. It cannot be said to increase or decrease unless it is compared to a standard, either your own previous standard or someone else’s standard. Thus, becoming more productive indicates either an increase in people’s subjective feeling of productivity or indicates a higher output with the same or reduced input (Moore & Tenney, 2012).

What impacts productivity? The body of literature on productivity and strategies to increase productivity is expansive. One of the many factors that affect productivity are time-
management practices: e.g., planners, scheduling, to-do lists, deadlines, short- and long-term goal setting, and more which have been shown to influence academic and workplace productivity (Leshed & Sengers, 2011; Malkoc & Tonietto, 2019; White et al., 2012). Factors negatively impacting productivity include, but are not limited to lack of support, pressure, change factors, stress (Halkos & Bousinakis, 2010; Mawanka, 2017), and intermittent scheduling (Malkoc & Tonietto, 2019; Tonietto et al., 2019). As mentioned, on-the-hour scheduling is likely a type of intermittent scheduling and, as such, might negatively impact productivity. First, scheduling intermittently is likely to allow for pockets of time to be created between scheduled tasks. For many, these pockets of time can be useful for mindless tasks (e.g., responding to emails), but are unlikely to be spent completing longer, more important tasks (e.g., certain projects, deep thinking, etc.). Second, if a task takes longer than originally expected, scheduling tasks intermittently might require the scheduler to cut a task short to begin working on the next scheduled task. As mentioned, when a task is cut short, it becomes difficult to start up again as it requires a large energy of activation, as described by Gordon and Borkan (2013). In this sense, on-the-hour scheduling is likely to either create pockets of time unlikely to be spent productively or cause the scheduler to have to cut tasks short, leading to fewer completed tasks in a day. These outcomes might lead people to feeling as though the day has been spent less productively.

**Procrastination**

Generally, feelings of procrastination and feelings of productivity are inversely related (Peper et al., 2014). As such, as procrastination (i.e., voluntary delay of tasks) increases, the feeling of overall productivity is likely to decrease. Overall, research has shown procrastination to be negatively linked with productivity and performance in both workplace and academic contexts (Lay, 1990; Gupta, 2012; van Eerde, 2003; Pychyl et al., 2000). That being said, time
management strategies (e.g., planning and scheduling, setting goals, implementation intentions) have been shown to mitigate the effect of procrastination on productivity (Häfner et al., 2014; Valshtein et al., 2020).

Procrastination refers to the voluntary delay of an intended action despite knowing that one will be worse off for the delay (Sirois & Pychyl, 2013; Steel, 2007). For example, a university student might have the intention to complete an assignment prior to the due date in order to alleviate stress and have more time to accomplish other important tasks later. However, as the assignment’s deadline approaches, the student continues to delay starting to work on the assignment. In this scenario, the student delays beginning the tasks in hopes of feeling more motivated to begin at a later time. Eventually, the deadline arrives and the student is forced to complete the assignment. Delaying starting to work on the assignment is done voluntarily, but not strategically. In reality, this type of delaying is a breakdown of self-regulation (Sirois & Pychyl, 2013). People delay because they want to avoid the negative feeling in the present moment. Therefore, they prioritize their current mood over the consequences of their inaction for their future selves (Sirois & Pychyl, 2013). In reality, we rarely feel more motivated to start the task at a later time. Research has linked task aversiveness to increased procrastination (Blunt & Pychyl, 2000; Pychyl & Flett, 2012; Klingsieck, 2013; Milgram et al., 1988). As such, the more boring, unattractive, or unappealing a task appears, the more procrastination for said tasks increases.

Procrastination has been linked with negative outcomes relating to performance and well-being. Procrastination is linked to poor mental health, anxiety and depression, stress (Sirois & Pychyl, 2013), and has been linked with negative consequences relating to physical health (Sirois & Pychyl, 2016). Not only is procrastination associated with numerous negative outcomes, it’s
also far from uncommon. Current research has demonstrated that approximately 70 percent of university students procrastinate, with as many as 50 percent claiming to procrastinate consistently and problematically (Klingsieck, 2013).

**Overview of the current research**

In the present research, I aim to examine three questions: First, how common is the tendency to schedule tasks on-the-hour (vs. off-the-hour)? I hypothesize that participants will have a strong tendency to schedule tasks on-the-hour due to years of conditioning starting tasks and activities on-the-hour (e.g., school, sports, activities, etc.), as well as the ease of on-the-hour scheduling in online and paper calendars and schedules (Hypothesis 1).

Second, how do considering task end times affect the tendency to schedule tasks on-the-hour (vs. off-the-hour)? I hypothesize that considering task end times will reduce on-the-hour task scheduling by making the length of each task more salient, increasing the likelihood for back-to-back task scheduling. Thus, I expect participants will be less likely to schedule tasks on-the-hour after considering end times of tasks as well as their start time (Hypothesis 2).

Third, how does the tendency to schedule tasks on-the-hour (vs. off-the-hour) affect productivity? I hypothesize that on-the-hour scheduling will decrease productivity, in a similar way to intermittent scheduling, as explained by Malkoc and Tonietto (2019). As such, on-the-hour scheduling is expected to decrease productivity and increase procrastination (Hypothesis 3).

I test these hypotheses across several studies. Initial studies examine Hypotheses 1 and 2, across hypothetical task scheduling (Study 1a) and real daily task scheduling (Study 1b). A second study examines Hypothesis 1, 2, and 3, while focusing on subjective, self-reported productivity (Study 2). A third study examines Hypothesis 1 and 3, with a wider range of productivity and procrastination measures (Study 3).
Study 1: Task Scheduling and Deadline Effects on Scheduling

The purpose of the two initial studies was to evaluate scheduling tendencies. More specifically, we aimed to determine a) whether people actually prefer to schedule tasks on-the-hour (e.g., 9:00 or 11:00 vs. 9:15 or 11:30), and b) whether considering task end times influences the hypothesized tendency to schedule on-the-hour. First, I hypothesized that participants would prefer to schedule on-the-hour, regardless of the condition they were in. Second, I hypothesized that participants would be less likely to schedule tasks on-the-hour when also considering task end-times (i.e., deadline condition) than when they did not consider task end-times (i.e., control condition).

I examined these two hypotheses in two initial studies. In Study 1a, participants scheduled six hypothetical tasks loosely based on typical daily tasks (Ferrari & Scher, 2000). In Study 1b, participants scheduled six real tasks they themselves planned to complete the following day. Both studies included a deadline condition in which the deadlines were included in the task instructions (Study 1a) or self-generated by participants (Study 1b) and a control condition.

Study 1a: Hypothetical Task Scheduling

Method

Participants. I posted 220 participation spots on Amazon’s Mechanical Turk (Mturk). A sample of 200 participants would allow me to detect a medium effect size (d=0.4) with 80% power and I overrecruited by 10% to account for exclusions. Two hundred and twenty-one participants from across the United States of America were recruited. Participants received $0.75 in compensation for participating in the study. An open-ended attention check question was used to identify problematic participants who might not be concentrating or who might not be actual
human participants, but rather bots (i.e., participants who did not respond to the open-ended question, who responded with nonsense strings of words or characters or who simply copied instructions instead of responding). Overall, 37 participants were excluded as problematic. The final sample consisted of 184 participants. Due to human error, demographic information was not collected, however, the data collection tool (Mturk), provided information that the sample consisted of 41% female participants, 59% male participants, with the majority born in the 1980s (39%), 1990s (28%), and the 1970s (20%), and with the majority being White/Caucasian (79%).

Procedure. After completing the informed consent form and a brief demographic survey, participants were told to imagine they’ve just woken up on a regular weekday and they have six tasks they would like to complete during the day. The six tasks were hypothetical tasks based on typical daily tasks, as found in Ferrari and Scher (2000), and participants were given an estimated duration for each task (e.g., “Put away dishes and clean up the kitchen (approximately 20 minutes)”). Participants were randomly assigned to either the no deadline control condition or the deadline experimental condition. Participants in each condition were given identical tasks along with identical expected durations for each task (see Appendix A for the full survey including all tasks). Participants in the deadline condition were also given information on when the task should be completed (e.g., “Put away dishes and clean up the kitchen (approximately 20 minutes). You want to do this before 8 pm”).

Participants were then asked, “When would you schedule these tasks into your day? We would like for you to schedule these tasks at times in which you predict you will be most motivated to start them. In other words, make a realistic schedule that will favor the completion of each task.”. Participants scheduled task start times using drop down menus indicating the hour (i.e., 1-12), the minute interval (i.e., :00:05, :05:10, …, :55:00), and selected “am”/”pm”.
These responses were coded in terms of whether tasks were scheduled on-the-hour (i.e., the :00-:05 minute interval) or off-the-hour (i.e., any other minute interval). On-the-hour and off-the-hour scheduled tasks were coded 1 and 0, respectively. We did not analyse the selected hour or the “am”/”pm” selection.

Participants also completed additional measures meant to assess their motivation levels for hypothetical tasks with either on-the-hour or off-the-hour start times. These results are not reported here for sake of brevity, but are reported in Appendix B.

Results

Tendency to schedule on-the-hour. Logically, if tasks are scheduled at random over the course of the hour, we should expect a 1:12 chance for each task to be scheduled on-the-hour, because there are 12 five-minute intervals. Across all six tasks (and across conditions), 2.64 tasks of the six tasks were scheduled on-the-hour (i.e., the :00-:05 minute interval was selected as start time). This is equivalent to a ratio of 5:12 chance for tasks to be scheduled on-the-hour, or five times more frequent than one would expect from chance. To confirm that this was a significant preference for on-the-hour scheduling, I compared the proportion of on-the-hour minute interval selections to the value one would expect if this minute interval was chosen at random (0.08 or $1/12^{th}$) in one-sample t-tests. Each of the six tasks showed that on average, participants were significantly more likely to schedule on the :00-:05 (on-the-hour) interval than any other minute interval. See Table 1.

Table 1. Average proportion of participants who scheduled each task on-the-hour by condition

<table>
<thead>
<tr>
<th>Task</th>
<th>Proportion who scheduled this task on-the-hour</th>
<th>Effect size ($d$) of difference to at-chance proportion (0.08)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean kitchen</td>
<td>0.42</td>
<td>.68</td>
</tr>
<tr>
<td>Call a friend</td>
<td>0.40</td>
<td>.65</td>
</tr>
<tr>
<td>Watch TV</td>
<td>0.48</td>
<td>.80</td>
</tr>
</tbody>
</table>
Write a report 0.40 .49 .65
Answer emails 0.47 .50 .78
Prep for a meeting 0.47 .50 .77

Note. 0.08 is 1/12th or the value expected for equal distribution across intervals.

**Condition effect.** A comparison of the two conditions indicated that overall, participants in the deadline experimental condition were significantly less likely to schedule tasks on-the-hour ($M = 2.35$ tasks out of 6, $SD = 1.85$) than those in the no deadline control condition ($M = 2.96$ tasks out of 6, $SD = 1.88$), $t(182) = 2.20, p = .029, d = .32$. This difference is portrayed as boxplot in Figure 1.

**Figure 1.**
Hypothetical Tasks Scheduled On-the-hour by Condition

The same tendency was apparent when analyzed by task: the proportion of participants who scheduled each task on-the-hour was lower in the deadline experimental condition than the no deadline control condition in four out of the six tasks (Table 2). One task (Put away dishes and clean up the kitchen) did not show a difference by condition and one task (Read up on regulations for a work meeting) showed the reverse tendency, with more people scheduling it on-the-hour in the deadline condition. It’s possible that an increase in task aversiveness for these tasks has impacted procrastination and scheduling, reducing the condition effect. Task
aversiveness has been linked with increased procrastination (Blunt & Pychyl, 2000), which may have impacted the scheduling of these tasks.

Table 2
Average proportion of participants who scheduled each task on-the-hour by condition

<table>
<thead>
<tr>
<th>Task</th>
<th>No Deadline Control Condition</th>
<th>Deadline Experimental Condition</th>
<th>effect size of the condition difference (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Clean kitchen</td>
<td>.41</td>
<td>.49</td>
<td>.43</td>
</tr>
<tr>
<td>Call a friend</td>
<td>.51</td>
<td>.50</td>
<td>.43</td>
</tr>
<tr>
<td>Watch TV</td>
<td>.59</td>
<td>.49</td>
<td>.38</td>
</tr>
<tr>
<td>Write a report</td>
<td>.54</td>
<td>.50</td>
<td>.27</td>
</tr>
<tr>
<td>Answer emails</td>
<td>.53</td>
<td>.50</td>
<td>.41</td>
</tr>
<tr>
<td>Prep for a meeting</td>
<td>.37</td>
<td>.48</td>
<td>.56</td>
</tr>
</tbody>
</table>

Study 1b – Real Task Scheduling

Method

Participants. 220 participant spots were posted on Mturk. A sample of 200 participants would allow me to detect a medium effect size (d=0.4) with 80% power and I overrecruited by 10% to account for exclusions. I continued to use a medium effect size in the power analyses rather than modifying based on effect sizes uncovered in Study 1a. Two hundred and thirty-two participants from the United States of America were recruited. Participants received $0.75 in compensation for participating in the study. An attention check question was used to exclude problematic participants (n=30). The final sample consisted of 202 participants. Due to human error, demographic information was not collected, however, the data collection tool (Mturk), provided information that the sample consisted of 45% female participants, 55% male participants, with the majority born in the 1980s (39%), 1990s (25%), and the 1970s (23%), and with the majority being White/Caucasian (81%).
Procedure. The procedure was the same as Study 1a, except for two differences. The first difference being that participants were asked to list out six actual tasks they planned to complete the following day, along with an estimated duration for task completion for each task (e.g., “Please take a moment to write down 6 tasks you will have to do or want to do tomorrow. These tasks can be work or school-related, can be household tasks or hobbies and physical activity, etc.”). On average, participants listed 5.96 tasks (SD = .396). For example, they listed tasks such as “Reading”, “Painting”, “Family Pictures”, “Wash dishes”. The second difference being that participants in the deadline experimental condition were themselves responsible for setting a reasonable deadline for each task rather than being given a deadline. They were instructed: “For each task, we would also like for you to give yourself a deadline (i.e., a time by which you want to have the task completed by)”. Participants in the no deadline control condition did not receive this instruction. Participants were then asked to schedule each task into their upcoming day, as in Study 1a. See Appendix C for the full survey.

Results

Tendency to schedule on-the-hour. Across all six tasks (and across condition), 3.03 of the six tasks were scheduled on-the-hour, showing a clear preference for this type of scheduling. When examining this preference for each of the six tasks separately, results showed that on average, participants were significantly more likely to schedule each of the tasks for the next day on the :00-.05 minute interval (i.e., on-the-hour). Effect sizes $d$ ranged from .75 to .97 (as represented in Table 3).
Table 3.

Average proportion of participants who scheduled each task on-the-hour

<table>
<thead>
<tr>
<th>Task</th>
<th>Proportion who scheduled this task on-the-hour (%)</th>
<th>Proportion who scheduled this task on-the-hour (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SD</td>
<td>effect size (d) of difference to at-chance proportion (0.08)</td>
</tr>
<tr>
<td>Task 1</td>
<td>0.57</td>
<td>.50</td>
</tr>
<tr>
<td>Task 2</td>
<td>0.47</td>
<td>.50</td>
</tr>
<tr>
<td>Task 3</td>
<td>0.53</td>
<td>.50</td>
</tr>
<tr>
<td>Task 4</td>
<td>0.53</td>
<td>.50</td>
</tr>
<tr>
<td>Task 5</td>
<td>0.46</td>
<td>.50</td>
</tr>
<tr>
<td>Task 6</td>
<td>0.47</td>
<td>.50</td>
</tr>
</tbody>
</table>

Note. 0.08 is 1/12th or the value expected for equal distribution across intervals.

Condition effect. As hypothesized, participants considering the tasks end times (i.e., deadline condition) were again less likely to schedule tasks on-the-hour ($M = 2.59$ tasks, $SD = 2.06$) than those who did not consider the tasks end times ($M = 3.28$ tasks, $SD = 2.28$), $t(200) = 2.218$, $p = .028$, $d = .32$. This difference is portrayed as a boxplot in Figure 2.

Figure 2.

Real Tasks Scheduled On-the-hour Per Condition

Discussion

The results of these pilot studies clearly indicate that people have a strong tendency to schedule hypothetical tasks (Study 1a) and real tasks (Study 1b) on-the-hour rather than off-the-
hour. This is considered a “strong” tendency because participants scheduled tasks on-the-hour five times more frequently than what would have been expected if tasks were evenly scheduled throughout the hour. The findings from these studies also shed light on the impact deadlines have on scheduling tendencies. More specifically, when people are prompted to consider a deadline, the on-the-hour scheduling tendency is reduced. This might be due to a cognitive bias called time anchoring (Furnham & Boo, 2011). Participants considering only a task’s start time will use this time as the reference point, whereas those considering both task start and task end time might prefer to use the deadline as the reference point or anchor. Thus, participants of each condition might be anchoring differently, leading to differences in scheduling preferences. More practically, considering task end times might encourage back-to-back scheduling as participants are reminded of when their schedule will become free to start the next task. Therefore, anticipating task end times will likely reduce the likelihood of on-the-hour, intermittent scheduling. If many tasks are scheduled on-the-hour, we should expect an increase in ‘slack’ or downtime in between tasks, as tasks rarely take exactly one hour to complete. Thus, scheduling multiple tasks on-the-hour would represent intermittent scheduling, a form of scheduling having been shown to be detrimental to productivity. Calling to mind the end times of tasks might lead people to try and reduce the intermissions of downtime by scheduling tasks directly after each other rather than on the next full hour.

**Study 2: Consequences of On-the-Hour Scheduling**

In the next study, I examined the consequences of on-the-hour task scheduling. In addition to evaluating the on-the-hour task scheduling tendency, this study also assessed self-reported task completion, and subjective productivity, procrastination, and stress. In this study, procrastination relates to a subjective feeling that arises through time wasting behaviours (i.e.,
time wasted on non-goal-related tasks). First, I hypothesized that participants, no matter the condition, will prefer to schedule tasks on-the-hour rather than off-the-hour. Second, I hypothesized that prompting people to consider task deadlines will reduce the on-the-hour scheduling tendency, as in Studies 1a and 1b. Third, I hypothesized that on-the-hour scheduling would be associated with more procrastination and less productivity. In addition, it is also expected that procrastination and productivity will have an impact on stress, either increasing or decreasing stress. For this reason, stress is being assessed as an exploratory variable. I predict that on-the-hour scheduling will increase procrastination by creating more ‘slack’ or downtime that will be used to work or waste time on non-goal-related activities. Therefore, more downtime will be associated with more time-wasting behaviours, which will increase the feeling of procrastinating important tasks/goals. Consequently, I also expect an increase in procrastination to go hand in hand with lowered subjective productivity.

This study was preregistered (https://aspredicted.org/blind.php?x=7x4ih2) and full materials are presented in Appendix D. Hypotheses 1 and 2 were pre-registered, whereas Hypothesis 3 was added after pre-registration, and before data analysis. We also preregistered an additional hypothesis, which is reported on in Appendix E.

As in Study 1b, participants listed their own tasks for the next day. However, they were asked to list up to ten tasks (rather than 6 tasks, cf. Study 1b), in an effort to capture all the tasks people were planning to work on during that day. Unlike the previous two studies, this study included two control conditions: one in which participants scheduled tasks but did not consider the deadline (i.e., no deadline control condition), and one in which participants simply listed tasks without scheduling them (i.e., no schedule control condition). This was done to see if
scheduling itself (regardless of whether the deadline is considered or not) might have an impact on task completion and productivity.

Method

Participants. Five hundred participant spots were posted on Mturk. A final sample of 246 participants would allow us to detect a medium effect size ($f=0.2$) between three groups with 80% power. I overrecruited to account for attrition and exclusions. Four hundred and ninety-nine participants were recruited for the Time 1 survey on a Friday. Participants received $0.75 in compensation for participating in each part of this study. Participants that did not complete the Time 2 survey were excluded ($n = 152$). Additionally, as preregistered, seven participants were excluded based on problematic responses in the open-ended attention check question. The final sample consisted of three hundred and forty participants, mean age of 40.96 years ($SD = 12.61$), 50% female, and 50% male.

Procedure

Time 1. After completing the informed consent and a brief demographic survey, participants were randomly assigned to either the no schedule control condition, the no deadline control condition or the deadline condition. Participants were asked to list up to ten tasks they would like to complete the following day (i.e., Saturday), as well as the estimated duration for each task. It was specified that these tasks could be any type of task (e.g., work-related, household, hobbies, etc.). Participants listed between two and ten tasks ($M = 5.63$ tasks, $SD = 2.46$). This represents a large difference in the number of tasks listed by participants which might cause an issue when considering certain participants will have scheduled ten tasks, whereas others will only have scheduled two. Thus, we added exploratory analyses considering the number of tasks listed as a potential covariate.
Then, participants in the deadline condition and no deadline control condition were asked to schedule each task into their upcoming day. Participants in the deadline condition were also asked to set themselves a deadline for each task. Participants in the no schedule control condition were not asked to schedule or to set a deadline. Considering that participants differed in the number of tasks they wrote, we computed the percentage of the total amount of tasks scheduled on-the-hour for each participant rather than examining each participants’ raw number of tasks scheduled on-the-hour. This way, if one participant schedules eight out of ten tasks on-the-hour and another schedules four out of five tasks on-the-hour, they both have scheduled eighty percent of their tasks on-the-hour.

Following this, all participants reported how many tasks they subjectively expected to complete the following day (“How many tasks will you do tomorrow?”) on a scale from 1 = Very few to 7 = A lot and reported their subjective expected procrastination (i.e., downtime) (“How much free time will you have between tasks tomorrow?”) on a scale from Very little (1) to A lot (7). Lastly, participants completed an attention check question.

**Time 2.** Two days after the first time of measure, participants were invited to participate in a second survey. First, participants answered two questions meant to assess how many tasks they completed the previous day (“How many tasks did you complete yesterday?”) and their subjective downtime the previous day (“How much free time did you have between tasks yesterday?”) on the same subjective Likert scales as Time 1.

Then, participants were asked to recall and list the tasks they had listed at the first time of measure (e.g., “In our first survey, we asked you to list the tasks you wanted to complete two days ago (Saturday). These could be work-related tasks, hobbies, exercising, care-taking tasks. Now we would like to know whether and when you completed these tasks. Please list all of the
tasks that you wanted to complete yesterday (as brief keywords)”). I counted the number of tasks completed for each participant. Participants also reported how long each task took, when they began and ended the task (see Appendix E for an analysis of the start times).

Participants were then asked three questions to assess procrastination (“How much time did you spend procrastinating yesterday?”, “How much time did you spend ‘killing time’ between tasks?”, “How often did you find yourself on a break between tasks?”; α = .81) on scales from None (1) to A lot (7). They also answered three questions to assess perceived productivity (“How productive did you feel yesterday?”, “Are you satisfied with how much you got done yesterday?”; “How efficient did you feel yesterday?”, α = .93), and three questions to assess stress (“Overall, how stressed did you feel yesterday?”, “Overall, how busy did you feel yesterday?”; “How overwhelmed did you feel by tasks yesterday?” α = .79), on scales from Not at all (1) to Extremely (7).

Results

Tendency to schedule on-the-hour. First, I examined whether participants exhibited a tendency to schedule tasks on-the-hour and whether deadlines would reduce this tendency. Overall, participants again showed a preference to schedule tasks on-the-hour: For an average of 58.6 percent of the listed tasks, participants selected the :00:05 interval for the start time. This percentage is comparable to Study 1a (44%) and Study 1b (50%).

I examined whether this preference changed between the scheduling conditions. An ANOVA indicated no overall effect of condition, $F(2, 229) = 1.33, p = .251$, $eta^2 = .006$. There was no statistically significant difference between the percentage of tasks scheduled on-the-hour for participants who scheduled without considering task end times ($M = 61.06\%, SD = 32.76\%$), and those who did ($M = 55.91\%, SD = 35.17\%$).
In exploratory (non-preregistered) analyses, I examined the deadline condition and the no deadline control condition in more detail, to see why the effect of deadlines on scheduling tendencies found in Studies 1a and 1b did not replicate in this study. Specifically, I examined the number of tasks participants listed as a potential moderator. About two-thirds of participants reported at least 5 tasks ($n = 143$), which is more similar to Study 1a and 1b in which all participants reported 5 or 6 tasks. As shown in Figure 3, among this subset of participants, the effect of deadline condition was significant, $t(141) = 2.350, p = .020$, $eta^2 = .038$, with participants in the deadline condition ($M = 49.18\%, SD = 33.35\%$) being less likely to schedule tasks on-the-hour than participants in the no deadline control condition ($M = 61.48\%, SD = 29.22\%$). In contrast, among the subset of participants who listed four tasks or less ($n = 86$), the results indicated an opposite tendency. As shown in Figure 3, among this subset, participants in the deadline condition ($M = 67.5\%, SD = 36.01\%$) were non-significantly more likely to schedule tasks on-the-hour compared to participants in the no deadline control condition ($M = 60.1\%, SD = 38.19\%$), $t(84) = -.920, p = .360$, $eta^2 = .010$. Thus, it seems likely that the change in procedure of asking participants to list as many tasks as they want underlies the lack of replication from Studies 1a and 1b to this study. It is possible that when scheduling only a few tasks over the course of a whole day, they are scheduled so far apart that considering their deadlines does not affect subsequent task scheduling.
**Figure 3.**
Mean on-the-hour scheduling by condition, split by those who listed five tasks or more (left) and four tasks or less (right).

**Consequences of on-the-hour task scheduling.** Next, I assessed the consequences of on-the-hour scheduling. I examined the link between on-the-hour scheduling and indicators of productivity by condition and correlation.

First, I examined whether there were any differences by condition. The number of tasks planned for the next day (reported at T1) did not differ across the three conditions, $F(1,335) = 2.31, p = .101$, $eta^2 = .014$. The amount of expected downtime for the following day also did not differ by condition, $F(2,337) = 0.16, p = .849$, $eta^2 = .001$. The subjective number of tasks did differ by condition, $F(2,337) = 4.47, p = .012$, $eta^2 = .026$, with participants in the no deadline control condition and the deadline condition expecting that they would get subjectively fewer tasks done than participants in the no schedule control condition (contrasts: $t = 2.21, p = .028$ and $t = 2.86, p = .004$, respectively).

The number of tasks reported as completed (reported at T2) did not differ by condition, $F(2,327) = 0.83, p = .437$, $eta^2 = .005$, suggesting that participants completed an equal number of tasks. This effect remained nonsignificant when controlling for how many tasks they had listed at
T1, $F(2,326) = 0.06, p = .805$, eta$^2 = .378$. The subjective number of tasks they got done the previous day did not differ by condition, $F(2,337) = 1.02, p = .360$, eta$^2 = .007$, and the subjective amount of free time did not differ by condition, $F(2,336) = 0.29, p = .750$, eta$^2 = .002$.

There were also no significant condition differences between self-reported productivity, $F(2,337) = 1.84, p = .161$, eta$^2 = .011$, and stress, $F(2,336) = 1.30, p = .274$, eta$^2 = .008$ (see Table 4).

These null results are perhaps not surprising given that the conditions did not shift the tendency to schedule on-the-hour (exploratory analyses also showed no condition differences for the subsets of participants who listed five tasks or more).

**Table 4.**
Tasks, downtime, productivity, and stress, by condition

<table>
<thead>
<tr>
<th></th>
<th>No Deadline Control Condition</th>
<th>Deadline Condition</th>
<th>No Schedule Control Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Time 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of tasks listed as planned</td>
<td>5.24</td>
<td>2.09</td>
<td>5.54</td>
</tr>
<tr>
<td>Subjective amount of work tomorrow</td>
<td>4.41</td>
<td>1.59</td>
<td>4.27</td>
</tr>
<tr>
<td>Subjective amount of free time tomorrow</td>
<td>4.07</td>
<td>1.67</td>
<td>4.04</td>
</tr>
<tr>
<td><strong>Time 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of tasks listed as completed</td>
<td>4.62</td>
<td>2.27</td>
<td>4.75</td>
</tr>
<tr>
<td>Subjective amount of work yesterday</td>
<td>3.93</td>
<td>1.77</td>
<td>3.99</td>
</tr>
<tr>
<td>Subjective amount of free time yesterday</td>
<td>6.83</td>
<td>3.69</td>
<td>6.49</td>
</tr>
<tr>
<td>Downtime yesterday</td>
<td>3.56</td>
<td>1.44</td>
<td>3.61</td>
</tr>
<tr>
<td>Productivity yesterday</td>
<td>4.87</td>
<td>1.51</td>
<td>5.04</td>
</tr>
<tr>
<td>Stress yesterday</td>
<td>3.37</td>
<td>1.43</td>
<td>3.17</td>
</tr>
</tbody>
</table>

*Note. Number of tasks is counted from participants schedules or plans, all other variables are responses on 7-pt Likert scales.*

Second, I examined whether the tendency to schedule tasks on-the-hour was correlated to indicators of productivity. These analyses consider only the two conditions in which participants scheduled the anticipated tasks because these are the only conditions in which a percentage of on-the-hour scheduling can be calculated. A higher percentage of tasks scheduled on-the-hour was significantly linked to listing fewer tasks for tomorrow at T1, and to expecting to complete a
subjectively lower amount of tasks, but was not linked to expecting more downtime (Table 5). A higher percentage of tasks scheduled on-the-hour was significantly linked to reporting fewer completed tasks the next day and was linked with having done subjectively less tasks, but was not linked to more subjective downtime (Table 5). A higher percentage of tasks scheduled on-the-hour was also marginally correlated with more procrastination reported the next day, but was not significantly linked with stress (Table 5). Finally, a higher percentage of tasks scheduled on-the-hour was significantly and negatively correlated with perceived productivity (Figure 4).

**Figure 4.** Correlation Between Productivity and On-the-Hour Scheduling.

![Correlation Between Productivity and On-the-Hour Scheduling](image)

**Table 5.**
Tasks, downtime, productivity, and stress, correlated with percentage of tasks scheduled on the hour

<table>
<thead>
<tr>
<th></th>
<th>Correlation with percentage of tasks scheduled on-the-hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time 1</strong></td>
<td></td>
</tr>
<tr>
<td>Number of tasks listed as planned</td>
<td>-.20*</td>
</tr>
<tr>
<td>Subjective amount of work tomorrow</td>
<td>-.22*</td>
</tr>
<tr>
<td>Subjective procrastination for tomorrow</td>
<td>.07</td>
</tr>
<tr>
<td><strong>Time 2</strong></td>
<td></td>
</tr>
<tr>
<td>Number of tasks listed as completed</td>
<td>-.17*</td>
</tr>
<tr>
<td>Subjective amount of work yesterday</td>
<td>-.20*</td>
</tr>
<tr>
<td>Subjective amount of free time yesterday</td>
<td>.09</td>
</tr>
<tr>
<td>Procrastination yesterday</td>
<td>.13†</td>
</tr>
<tr>
<td>Productivity yesterday</td>
<td>-.20*</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Stress yesterday</td>
<td>-.11</td>
</tr>
</tbody>
</table>

*Note.* *p* < .05, †*p* < .06

**Discussion**

First, this study again established that people prefer to schedule tasks on-the-hour. Second, in this study, the deadline manipulation was not effective at reducing the tendency for on-the-hour scheduling as it had done in two previous studies. Exploratory analyses uncovered that only participants having listed five tasks or more had a reduced tendency to schedule on-the-hour when considering task end-times. Third, scheduling had no benefit in relation to task completion and subjective productivity measures when compared to participants who only made a plan. Fourth, on-the-hour scheduling was significantly and negatively correlated with productivity, and non-significantly positively correlated with procrastination (i.e., ‘slack’ time between tasks likely spent on time wasting behaviours).

Two primary reasons have been determined as to why the deadline manipulation was ineffective at reducing on-the-hour scheduling in this study. First, by asking participants to consider task duration, it’s possible that the end-time of tasks were indirectly made salient. As such, this may have increased the likelihood for back-to-back, off-the-hour scheduling. This explanation is unlikely considering participants in Studies 1a and 1b were also asked to consider task duration, and this didn’t impact the on-the-hour scheduling tendency. Second, it’s possible that having fewer tasks to schedule reduces the effect, as people have more time to schedule throughout the day and aren’t busy enough to have the need to schedule tasks back-to-back.

Although no causal link could be uncovered between on-the-hour scheduling and reduced productivity, this is likely due to the deadline manipulation being largely ineffective at reducing the on-the-hour scheduling tendency. The findings from Study 2 nonetheless suggests that the
tendency to schedule tasks on-the-hour is detrimental to productivity, at least correlationally. In the next study, I further assess causality between on-the-hour scheduling and negative impacts on productivity and procrastination.

**Study 3: Consequences of On-the-Hour Scheduling**

Three previous studies have demonstrated a strong preference for on-the-hour task scheduling. In addition, correlational evidence from Study 2 has also suggested at least some detrimental associations between on-the-hour scheduling and productivity measures. However, there were several limitations to Study 2 which will be corrected in Study 3.

First, in Study 2, the causal link between on-the-hour scheduling and negative outcomes for productivity remains unknown as the deadline manipulation was ineffective at reducing on-the-hour scheduling as it had done in two previous studies (i.e., Study 1a and 1b). Because the manipulation did not affect scheduling preferences, it could not test the downstream effects on productivity. In Study 3, I will be testing the causal link more directly, separating participants into either a control condition or an off-the-hour scheduling condition. This more direct manipulation of scheduling tendencies might have a stronger effect on scheduling on-vs. off-the-hour so that downstream effects on productivity can be tested.

Second, in Study 2, participants varied widely in the number of tasks they listed for the next day, which was problematic and perhaps explains some of the differences between Study 2 and Study 1a and 1b (i.e., the null effect of the deadline manipulation). In Study 3, participants will be asked to list six tasks they wish to complete the following day (as in Study 1b), to reduce the variability in the number of tasks listed by participants.

Third, in Study 2, participants were asked to recall the tasks they had completed the previous day. This might lead to issues as some participants might not be able to remember the
six tasks they had listed at Time 1 (i.e., two days earlier). Therefore, this technique might not have been as reliable as we would have hoped. In Study 3, Qualtrics coding will be used in order to present the exact six tasks scheduled at Time 1 at Time 2, eliminating the need to rely on the memory of participants.

Fourth, in Study 2, only one productivity and procrastination scale was used. Both of these scales were not previously validated. In Study 3, productivity measures were extended to include an adapted version of the Endicott Productivity Scale (Endicott & Nee, 1997) and procrastination measures were extended to include an adapted version of the Multifaceted Measure of Academic Procrastination: Procrastination Behaviour Scale (Haghbin, 2015). Both of the scales included in Study 3 have been previously validated.

**Method**

**Participants.** Three hundred participant spots were posted on Mturk. A final sample of 126 participants would allow to detect a medium effect size between two conditions \( (d = 0.5) \) at 80% power. Three hundred and one participants were recruited for the Time 1 survey on a Friday. Participants received $0.75 in compensation for participating in part 1 and $1 for participating in part 2. Participants that did not complete the Time 2 survey were excluded from analyses \( (n = 131) \). An additional one participant was excluded due to a problematic response to the open-ended question. The final sample consisted of one hundred and seventy participants, mean age of 38.72 \( (SD = 11.99) \), 50% male, 48.8% female, 1.2% other, and predominantly White (80%).

**Procedure.** Interested participants signed up on Mturk. Participants were given an informed consent to sign before beginning the study (see unabbreviated survey in Appendix F). Then, they responded to a brief demographic questionnaire assessing age, gender, ethnicity,
employment status, and whether they would be working the following day. Then, participants were randomly assigned to either the control condition or the off-the-hour scheduling condition. Similar to Study 2, the first time of measure was conducted on a Friday, and the second time of measure on a Sunday. This was done for two reasons: First, because there was a high rate of participants that completed both times of measure in Study 2. Second, because weekend days, such as Saturdays, might allow for more freedom in task scheduling than weekdays.

**Time 1.** After completion of the informed consent and demographic questionnaire, all participants were asked to list six tasks they planned on completing the following day. All participants listed six tasks, except one participant that listed four tasks (i.e., $M_{tasks} = 5.99$, $SD = .15$). Once the tasks were listed, participants were asked to schedule each task into their upcoming day. Participants in the control condition were not given any specific instructions on their scheduling. Our previous studies have shown that when left to their own devices, people schedule tasks on-the-hour approximately 50 percent of the time. In addition, not giving specific scheduling instructions allowed participants to schedule as they normally would, which will include a tendency to schedule on-the-hour. Participants in the off-the-hour scheduling condition were given the following instructions: “Next, we would like for you to schedule each task into your day tomorrow. Schedule the time you plan on starting each of the tasks. Normally, people prefer to schedule tasks on-the-hour (for example, 9:00 or 11:00). However, for tomorrow, we’d like you to consider scheduling tasks off-the-hour (e.g., 9:15 or 11:10) to allow for new tasks starting right after another task is finished (i.e., scheduling tasks back-to-back). Please use the full range of possible times to plan when you will begin each task”.

Finally, all participants reported on their expectations for their productivity and procrastination for the following day. For expected productivity, participants were asked three
questions (“How productive do you expect you will be tomorrow?”, “How effective do you expect to be tomorrow?”, “How satisfied do you expect you will be with what you will get done tomorrow?”). All questions for expected productivity are on a scale from Not at all (1) to Extremely (7). The expected productivity scale consisted of three items and the value for Cronbach’s alpha was $\alpha = .84$. Generally, a Cronbach’s alpha of 0.6-0.7 is considered acceptable (Ursachi et al., 2015). For this study, scales having a Cronbach’s alpha greater than 0.7 will be aggregated into a single mean.

Expected procrastination is assessed based on three questions (“Tomorrow, I expect to procrastinate…”, “Tomorrow, I expect to delay working on tasks from the time I intended to start them”, “Tomorrow, I expect to delay the start of tasks for no good reason”. Questions on a scale from Never (1) to Always (7). The expected procrastination scale consisted of three items and the value for Cronbach’s alpha was $\alpha = .83$. Considering these scales are measuring opposing constructs, it’s expected that the results differ from one another. Confirming this, expected productivity and expected procrastination correlated negatively ($r = -.540, p < .0001$).

Finally, participants also responded to the exploratory variables “When scheduling the tasks for tomorrow, did you consider how long the tasks will take?” and “When scheduling the tasks for tomorrow, did you consider when the tasks would be finished?” on scales from 1 (Not at all) to 7 (A lot).

**Time 2.** At the second time of measure, participants were presented the exact six tasks they had listed at Time 1. Then, they indicated whether they had completed each task and the progress made towards task completion for each task. Participants used a slide bar ranging from 0 to 100 to indicate the progress made towards task completion for each task. If a task was fully completed, participants were instructed to slide the bar to 100. I counted how many tasks were
marked as completed and computed the average progress across tasks as indicators of objective productivity. Participants reported their perceived productivity and procrastination during the day.

Subjective productivity was assessed in two ways. First, participants responded to three questions (“How efficient did you feel yesterday?”, “How productive did you feel yesterday?”, “How satisfied are you with how much you got done yesterday?”). All questions for subjective productivity are on a scale from Not at all (1) to Extremely (7). The subjective productivity scale consisted of three items and the value for Cronbach’s alpha was $\alpha = .95$, and scores were aggregated into a single subjective productivity mean. Second, self-reported productivity was assessed using an adapted version of the Endicott Productivity Scale containing five items (e.g., “Yesterday, did you find your productivity for the time spent working/completing tasks was lower than you expected?”). Questions from the adapted Endicott Productivity Scale are on a scale from Never (1) to Almost Always (5) (See Appendix F for all five questions). The adapted version of the Endicott Productivity Scale consisted of five items and the value for Cronbach’s alpha was $\alpha = .85$, therefore the scores were aggregated into a single Endicott Productivity Scale mean. To assure that both productivity scales were assessing the same construct, both scales were correlated to one another. Results indicated a positive correlation between the three-item productivity scale and the Endicott productivity scale ($r = .60, p < .0001$).

Procrastination was assessed in two ways. First, subjective procrastination was assessed using three questions (“Yesterday, I procrastinated…”, “Yesterday, I delayed working on tasks from the time I intended to start them”, “Yesterday, I frequently delayed starting tasks for no good reason”), on a scale from Never (1) to Always (7). The subjective procrastination scale consisted of three items and the value for Cronbach’s alpha was $\alpha = .96$, therefore, scores were
aggregated into a single subjective procrastination mean. Second, self-reported procrastination was assessed using an adapted version of the Multifaceted Measure of Academic Procrastination: Procrastination Behaviour Scale (MMAP-PBS), containing 10 items (e.g., “Yesterday, when tasks needed to be completed, I told myself that I would not start them late, but I ended up delaying them without a good reason.”) Questions from the MMAP-PBS are on a scale from \textit{Never} (1) to \textit{Always} (6). The MMAP-PBS consisted of ten items and the value for Cronbach’s alpha was $\alpha = .95$. Considering both scales are meant to assess procrastination, they should be positively correlated to one another. Correlational analyses demonstrated a strong and positive correlation between the scales of $r = .86$, $p < .0001$.

\textbf{Results}

\textit{Preliminary Analyses.} First, I examined whether participants exhibited a tendency to schedule tasks on-the-hour and whether the manipulation was effective at reducing this tendency. Overall, 50.7 percent of tasks were scheduled on-the-hour, once again demonstrating a clear preference for on-the-hour scheduling. This percentage is comparable to Study 1a (44 percent), Study 1b (50 percent), and Study 2 (58.6 percent).

I then examined whether this preference changed between the control condition and the off-the-hour scheduling condition. In order to compare the conditions, I compared the mean number of tasks scheduled on-the-hour per condition using an independent samples t-test. Results indicated that participants in the off-the-hour scheduling condition were significantly less likely to schedule tasks on-the-hour ($M = 2.45$, $SD = 2.21$) than participants in the control condition ($M = 3.56$, $SD = 1.94$), $t(168) = 3.47$, $p = .001$, $d = .53$. These results indicate that the manipulation was successful at reducing on-the-hour scheduling.
Expected Productivity and Procrastination. Expected productivity and procrastination were assessed at Time 1. Independent samples t-tests comparing conditions showed no differences between conditions for expected productivity, $t(168) = .434, p = .665, d = .07$ and for expected procrastination, $t(168) = .472, p = .638, d = .07$, (see Table 6 for exact means and standard deviations).

Productivity. Independent samples t-tests comparing the control condition and the off-the-hour scheduling condition showed no significant condition differences in average subjective productivity, $t(168) = .476, p = .635, d = .07$, in the average Endicott Productivity Score, $t(168) = .299, p = .765, d = -.05$, no differences in the number of tasks completed, $t(168) = -.871, p = .381, d = -.13$, and no differences in the progress made towards task completion, $t(168) = -.705, p = .482, d = -.11$ (see Table 6 for exact means and standard deviations).

Procrastination. Independent samples t-tests indicated no significant difference between the control condition and the off-the-hour scheduling condition in the subjective procrastination score, $t(168) = -.375, p = .708, d = -.06$, or in the MMAP-PBS score, $t(168) = -.364, p = .716, d = -.06$ (see Table 6 for exact means and standard deviations).

Table 6. Means of productivity and procrastination measures by condition

<table>
<thead>
<tr>
<th></th>
<th>Control Condition</th>
<th>Off-the-hour Scheduling Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>SD</td>
</tr>
<tr>
<td><strong>Time 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of tasks scheduled on-the-hour</td>
<td>3.56</td>
<td>1.94</td>
</tr>
<tr>
<td>Expected productivity</td>
<td>5.71</td>
<td>0.98</td>
</tr>
<tr>
<td>Expected procrastination</td>
<td>2.37</td>
<td>1.25</td>
</tr>
<tr>
<td><strong>Time 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective productivity</td>
<td>5.13</td>
<td>1.41</td>
</tr>
<tr>
<td>Measure</td>
<td>Time 1</td>
<td>Time 2</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Endicott productivity scale</td>
<td>3.80</td>
<td>3.84</td>
</tr>
<tr>
<td>Task completion</td>
<td>3.14</td>
<td>3.39</td>
</tr>
<tr>
<td>Progress made toward task completion</td>
<td>71.3</td>
<td>73.6</td>
</tr>
<tr>
<td>Subjective procrastination</td>
<td>2.82</td>
<td>2.92</td>
</tr>
<tr>
<td>MMAP-PBS</td>
<td>2.24</td>
<td>2.30</td>
</tr>
</tbody>
</table>

Note. The tendency to schedule on-the-hour variable ranges from 0 to 6. Expected productivity and procrastination are on 7-point scales. Subjective productivity is on a 7-point scale and the Endicott productivity scale is on a 5-point scale. Progress made toward task completion was measured out of 100. Subjective procrastination was on a 7-point scale, and the MMAP-PBS was on a 6-point scale.

**Exploratory Analyses**

**Correlation Between On-the-hour Scheduling and Productivity and Procrastination.**

Considering no significant differences were discovered between conditions, I also assessed the correlation between the tendency for on-the-hour scheduling and productivity and procrastination measures. Across conditions, results indicated no significant Pearson’s $r$ correlation between the number of tasks scheduled on-the-hour and any of the productivity and procrastination measures (see Table 7 for results).

**Table 7.**
Productivity and procrastination measures correlated with the number of tasks scheduled on-the-hour

<table>
<thead>
<tr>
<th>Measure</th>
<th>Correlation with number of tasks scheduled on the hour ($r$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected productivity</td>
<td>.04</td>
</tr>
<tr>
<td>Expected procrastination</td>
<td>-.04</td>
</tr>
<tr>
<td>Subjective productivity</td>
<td>.05</td>
</tr>
<tr>
<td>Endicott Productivity Scale</td>
<td>.01</td>
</tr>
<tr>
<td>Number of tasks completed</td>
<td>.05</td>
</tr>
<tr>
<td>Progress made towards task completion</td>
<td>.02</td>
</tr>
<tr>
<td>Subjective procrastination</td>
<td>-.09</td>
</tr>
</tbody>
</table>
Note. * p < .05 (none of the correlations reached significance)

**Did participants consider how long tasks would take to complete, as well as the end time of their tasks?**

One of the assumptions made in this program of research is that people schedule on-the-hour because they aren’t considering task duration and when a task will end. Since most tasks don’t take exactly one hour to complete, it is likely that participants are not considering task length and task end times when scheduling tasks on-the-hour. To assess this assumption, two independent samples t-test compared participants’ responses to the exploratory variables assessing whether they considered task duration and task end times. For both variables, there were no significant differences between conditions, ps > .05 (see Table 8 for exact means and standard deviations).

**Table 8.**
Condition means and standard deviations for exploratory variables.

<table>
<thead>
<tr>
<th></th>
<th>Control Condition</th>
<th>Off-the-hour Scheduling Condition</th>
<th>effect of condition (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
<td><strong>M</strong></td>
<td><strong>SD</strong></td>
</tr>
<tr>
<td>When scheduling the tasks for tomorrow, did you consider how long the tasks will take?</td>
<td>6.09</td>
<td>1.22</td>
<td>6.15</td>
</tr>
<tr>
<td>When scheduling the tasks for tomorrow, did you consider when the tasks would be finished?</td>
<td>5.85</td>
<td>1.54</td>
<td>6.18</td>
</tr>
</tbody>
</table>

Note. Responses measured on 7-point scales.

Similarly, the number of tasks scheduled on-the-hour did not correlate with whether participants reported considering duration, \( r(170) = -.09, p = .233 \), or end times, \( r(170) = -.09, p = .229 \). Taken together, this indicates that considering task duration or end times doesn’t impact
scheduling. It’s possible that task end times only impact scheduling if in the form of a specific deadline.

*Did on-the-hour scheduling translate to on-the-hour start times?*

Another assumption was that on-the-hour scheduling would result in on-the-hour start times, and conversely, off-the-hour scheduling would lead to off-the-hour start times. To test whether this is actually occurring, participants’ start times reported at Time 2 were coded into on-the-hour and off-the-hour start times, similar to how scheduling was coded. Participants in the control condition scheduled an average 3.55 tasks on-the-hour ($SD = 1.93$) and started a mean of 2.79 ($SD = 1.84$) tasks on-the-hour. In the off-the-hour scheduling condition, participants scheduled an average of 2.45 ($SD = 2.21$) and started an average of 2.52 ($SD = 1.83$) tasks on-the-hour. There was no difference in the number of tasks actually started on-the-hour by condition, $t(168) = .937, \ p = .776, \ d = .16$.

Next, a correlational analysis was conducted to measure the association between on-the-hour scheduling and on-the-hour start times. Results indicated a strong, positive and significant correlation between the variables, $r(170) = .53, \ p < .001$. This information suggests that a tendency to schedule on-the-hour is linked with the tendency to actually start tasks on-the-hour.

**Study 3 Discussion**

Study 3 showed, once again, a strong preference for on-the-hour task scheduling when scheduling daily tasks. In addition, on-the-hour scheduling was successfully reduced, simply by asking participants to consider off-the-hour scheduling of tasks. However, I was unable to discover any signs indicating that on-the-hour scheduling would be detrimental to productivity and procrastination, either as a function of the condition or correlationally.
There are a few potential reasons for why no associations were uncovered between on-the-hour scheduling and productivity and procrastination measures in Study 3. First, it is possible that simply asking participants to schedule off-the-hour was ineffective at reducing actual on-the-hour start times the next day, thus, the plan might not have translated into actual behavior.

Exploratory analyses found a high correlation between on-the-hour scheduling and on-the-hour start times, however, there’s no way of confirming that the specific tasks scheduled on-the-hour were actually started on-the-hour. Second, it is possible that the correlational link between on-the-hour scheduling and productivity in Study 2 occurred by chance and that there are actually no associations between on-the-hour scheduling and productivity and procrastination. Third, research shows that intermittent scheduling is detrimental to productivity (Malkoc & Tonietto, 2018). In this study, we assume that on-the-hour scheduling translates into intermittent scheduling, which reduces productivity. However, that might not always be the case. Some tasks realistically do take one hour to complete. Therefore, it’s possible that participants are simultaneously scheduling on-the-hour and scheduling tasks back-to-back, which would then have little to no impact on productivity.

**General Discussion**

The purpose of the present program of research was to gain a better understanding of on-the-hour scheduling tendencies, the impact that considering task end-times have on this tendency, as well as the ways that scheduling might impact productivity. Across four studies, participants scheduled between 44 percent and 59 percent of their tasks on-the-hour, showing that participants had a strong tendency to schedule on-the-hour. A second research goal was to assess whether considering task end-times (i.e., deadlines) would have an impact on the on-the-hour scheduling tendency. It was hypothesized that considering task end-times would reduce on-the-hour scheduling by increasing back-to-back scheduling. Indeed, Studies 1a and 1b showed
that on-the-hour scheduling was reduced for participants having considered task end-times, and in Study 2, participants who scheduled five tasks or more saw reductions in on-the-hour scheduling when considering task end-times. Finally, a third aim of the work was to examine downstream effects of on-the-hour scheduling. It was hypothesized that on-the-hour scheduling would be detrimental for productivity, as it is likely a form of intermittent scheduling. However, the studies conducted for this thesis did not provide conclusive supporting evidence for this supposition. It remains unclear as to whether the on-the-hour scheduling preference has a positive, negative, or neutral impact on productivity and performance. Although in Study 2, a negative correlation was uncovered between the tendency to schedule on-the-hour and productivity, this correlation was not replicated in Study 3 where no causal or correlational links were found between on-the-hour scheduling and productivity or procrastination measures.

Theoretical Contributions

This program of research expands on previous research by describing general scheduling tendencies. Even though a large literature exists on scheduling (Ariely & Wertenbroch, 2002; Macan et al., 1990; Baker et al., 2019), no research has looked at specific scheduling tendencies, and more specifically, the tendency that people have to schedule tasks on-the-hour. In addition, the studies conducted for this thesis also discovered a way to reduce the tendency to schedule tasks on-the-hour. Specifically, considering task end-times was an effective way to reduce on-the-hour scheduling. This contributes to the literature on task deadlines (Malkoc et al., 2019; Bisin & Hyndman, 2019; Herweg & Müller, 2020; Ariely & Wertenbroch, 2002).

Finally, this set of studies also contributes to existing work on productivity, in attempting to identify a factor that increases productivity. Past literature has consistently linked scheduling to increased productivity (Malkoc et al., 2019; Ariely & Wertenbroch, 2002; Baker et al., 2019;
Macan et al., 1990; Parke et al., 2018), however, no research has looked at specific scheduling tendencies relating to productivity. Although we didn’t find any hard evidence linking on-the-hour scheduling to productivity, this program of research contributes to the previous research on task scheduling and productivity.

**Practical Implications**

People schedule tasks all the time. In 2016, sales of appointment books, paper planners, and calendars amounted to approximately $342 million U.S. dollars, in the United States alone (Simionato, 2021). In addition, statistics released by Google indicate that more than 500 million people use the Google Calendar (Smith, 2020). As planning and scheduling is so prominent in the daily lives of the average North American, it’s important to be cognizant of general scheduling tendencies, such as the on-the-hour scheduling tendency. In addition, it’s also important to know whether general scheduling tendencies have any impact on productivity, in order to optimize productivity and reduce avoidable productivity loss.

**Limitations**

There are several limitations of the current studies that need to be acknowledged. First, considering participants were asked to list a precise number of tasks for the next day (e.g., 6 or 10), it’s possible that these were not a comprehensive list of all the tasks that participants wanted to complete. For example, some participants may have listed six tasks, but actually planned on completing ten. Thus, they are scheduling the six tasks they have listed, but in reality, they have other (un)scheduled tasks in between those they scheduled for the study. This might be influencing their scheduling strategy, as well as their productivity and procrastination. As such, these unmentioned tasks are completely unaccounted for.

Another limitation exists in the accuracy of some of the measurements. Specifically, asking participants to consider tasks for the following day is unlikely to be perfectly accurate.
For many of us, some tasks we complete during the day are either spontaneous or unknown the day prior. Therefore, if we were to plan our day the day before, we wouldn’t even know to list and account for these tasks. Thus, asking participants to plan their upcoming day without any opportunity to modify their schedule at a later time might reduce the accuracy of the findings. In addition, asking participants to recall task start times and task completion the following day is also likely to detrimentally impact accuracy of the findings – immediate recording of start and end times or online tracking would provide better accuracy here. In Study 3, Qualtrics coding was used to list the exact tasks that participants had listed at Time 1 to remind participants of the exact tasks they had planned (and scheduled). However, this does not mean that participants were better able to recall task completion, task start times, as well as their productivity and procrastination for the previous day. Participants may still mis-remember or forget some of the information at the second time of measure.

These findings generalize to a North American population, considering only Mturk users from the U.S. and Canada were permitted to participate. This impacts generalizability of the findings, as research has previously shown different cultures to perceive time differently (Reinecke et al., 2013; Arman & Adair, 2011). For example, previous research has shown that people from individualist countries, such as the United States, Switzerland, and Germany place more importance on time management and planning than people from collectivist countries, such as China, Japan, Brazil, and more (Reinecke et al., 2013). In addition, as explained by Arman and Adair (2011), scheduling is a process shaped by social and cultural norms and values. Thus, different cultures across the globe perceive time differently, which likely leads to differences in scheduling tendencies. For this reason, the findings from this study cannot be generalized to other cultures and countries across the globe. In addition, considering Mturk was used to recruit
participants throughout all four studies, self-selection sampling is also likely impacting
generalizability of the findings. In this sense, it’s possible that participants were all simply
motivated by the $0.75 compensation, and thus, not representative of the general population.

**Future Research**

Future research should assess the impact of scheduling tendencies on productivity by
implementing a diary study research methodology. In this study, rather than having two times of
measure, researchers would follow participants across a day or even a few days. Using this type
of methodology, participants could write the tasks they plan on completing at the start of each
day, the times they plan to start each task, and the time they plan to end each task. Then, they
would be asked to fill out a few questions at random times throughout the day. For example,
“What tasks have you completed so far today?”, “When did you start and end each task?”, “How
productive are you feeling?”, “Have you been procrastinating?”, etc. Using this research
methodology would likely increase accuracy of the findings and allow researchers to get a better
understanding of the impact of on-the-hour scheduling on productivity measures.

Future research could also create a more controlled environment, by giving participants a
certain number of tasks to complete in a given time-frame. The researchers could then create an
on-the-hour scheduling manipulation and allow participants to schedule their tasks. Following
this, researchers would be able to observe participants’ scheduling tendencies, progress towards
task completion, and actual task start-times. This type of research methodology would allow for
a more controlled environment and lead to more accurate results. However, it also creates an
artificial environment, potentially dissimilar to participants’ everyday lives.

Third, future research could aim to assess cultural differences in scheduling tendencies.
For example, research has shown that cultures around the world perceive time differently
(Reinecke et al., 2013; Arman & Adair, 2011), however, does this translate into different scheduling tendencies?

Fourth, assessing the ways in which task aversiveness impact on-the-hour scheduling might also be relevant. Task aversiveness has previously been linked to procrastination (Blunt & Pychyl, 2000; Pychyl & Flett, 2012), which may, in turn, impact the way aversive tasks are scheduled in comparison to more enjoyable ones.

Finally, it would be interesting to assess the difference in on-the-hour scheduling for tasks involving others versus tasks not involving others. It could be assumed that when scheduling tasks involving others (e.g., a meeting), one might prefer to schedule on-the-hour because this is what is considered “normal” in society, whereas if others aren’t involved, the scheduler may be more willing to schedule off-the-hour. This might also relate to conscientiousness, where those high in conscientiousness might want to make it easier for others and schedule more tasks on-the-hour when others are involved.

Conclusions

This set of studies has shed light on general scheduling tendencies finding a strong preference for scheduling tasks to start on-the-hour. Evidence so far has shown neither consistent benefits or detriments of this scheduling tendency.
References


Appendices

Appendix A: Study Materials for Study 1a

Part 1. Hypothetical scheduling

To start off, we would like for you to put yourself in this hypothetical situation: Imagine you just woke up on a regular weekday. You want to do the following tasks today:

*deadline and no deadline conditions will be counterbalanced.
*no deadline condition
*randomize order in which these are presented.
  - Put away dishes & clean up the kitchen (approximately 20 minutes)
  - Call a friend about planning an upcoming meet-up (approximately 35 minutes)
  - Watch a recorded TV show from last night (approximately 55 minutes)
  - Write a report for work (approximately 45 minutes)
  - Answer a work email (approximately 15 minutes)
  - Read up on work regulations in preparation for a meeting at work (approximately 20 minutes)

When would you schedule these tasks into your day? We would like for you to schedule these tasks at times in which you predict you will be most motivated to start them. In other words, make a realistic schedule that will favor the starting of each task.
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

*with deadline condition
*randomize order in which these are presented.
  - Put away dishes & clean up the kitchen (approximately 20 minutes). You want to do this before 8 pm.
  - Call a friend about planning an upcoming meet-up (approximately 35 minutes). You want to do this before 9 pm.
  - Watch a recorded TV show from last night (approximately 55 minutes). You want to do this before 10 pm.
  - Write a report for work (approximately 45 minutes). You want to do this before 5 pm.
  - Answer a work email (approximately 15 minutes). You want to do this before 4 pm.
  - Read up on work regulations in preparation for a meeting at work (approximately 20 minutes.) You want to do this before 3 pm.

When would you schedule these tasks into your day? We would like for you to schedule these tasks at times in which you predict you will be most motivated to start them. In other words, make a realistic schedule that will favor the starting of each task.
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

Now, we are interested in how the time of the day affects motivation. Below, we will ask you to imagine it is a certain time of day and to predict how motivated you would be to begin these hypothetical tasks at these times.

Imagine it is [insert time: choose randomly from a set of 12 off-the-hour times and 12 on-the-hour times; from 8am to 10pm].
*present odd or even times for each task via an analog image of a clock (examples below)

![Clock images](image)

How motivated you would be at this time to … [task] *present the 6 hypothetical tasks in random order.
1 = Not at all motivated to start right now to 7 = Extremely motivated to start right now.

**Part 3. Attention check and general info**

When scheduling tasks in your day-to-day life, what are some of the reasons that determine when to schedule them? [textbox]
Appendix B: Additional results from Study 1a

Participants also completed additional measures meant to assess their motivation levels for hypothetical tasks. They were asked how motivated they would be to complete each of the hypothetical tasks at a certain time (shown via an analog clock face). The times varied between showing on-the-hour and off-the-hour clock faces. There were no differences in motivation, $t_s < 1.60$, $p_s > .11$, $d_s < .24$ between on-the-hour and off-the-hour times. The average motivation by time condition is presented in the table below.

Mean motivation to do tasks on-the-hour vs off-the-hour (standard deviations in parentheses)

<table>
<thead>
<tr>
<th>Hypothetical task shown</th>
<th>On-the-hour Clockface</th>
<th>Off-the-hour Clockface</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st *</td>
<td>4.43 (1.85)</td>
<td>4.19 (1.86)</td>
</tr>
<tr>
<td>2nd *</td>
<td>4.14 (2.02)</td>
<td>4.59 (1.78)</td>
</tr>
<tr>
<td>3rd *</td>
<td>4.42 (1.97)</td>
<td>4.01 (1.97)</td>
</tr>
<tr>
<td>4th *</td>
<td>4.35 (1.81)</td>
<td>4.43 (1.74)</td>
</tr>
<tr>
<td>5th *</td>
<td>4.41 (2.08)</td>
<td>4.38 (1.79)</td>
</tr>
<tr>
<td>6th *</td>
<td>4.33 (1.90)</td>
<td>4.41 (1.90)</td>
</tr>
</tbody>
</table>

* task randomly drawn from the list of six hypothetical tasks for each participant
Appendix C: Study Materials for Study 1b

*Participants will be randomly assigned to one of the two conditions (deadline or no deadline)

*no deadline condition

Please take a moment to write down 6 tasks you will have to do or want to do tomorrow. These tasks can be work or school-related, can be household tasks or hobbies and physical activity, etc.:
(1)
(2)
(3)
(4)
(5)
(6)

Tell us about when you would schedule these tasks into your day. When will you start these tasks?
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

*deadline condition

For each task, we would also like for you to give yourself a deadline (i.e., a time by which you want to have the task completed by).

Task 1:
Deadline: (h/min/am-pm).

Task 2:
Deadline: (h/min/am-pm).

Task 3:
Deadline: (h/min/am-pm).

Task 4:
Deadline: (h/min/am-pm).

Task 5:
Deadline: (h/min/am-pm).

Task 6:
Deadline: (h/min/am-pm).

Tell us about when you would schedule these tasks into your day. When will you start these tasks?
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

*deadline and no deadline condition

How motivated are to complete each of these tasks tomorrow?

Task 1:

i. Not at all motivated

ii. Slightly motivated

iii. Somewhat motivated
iv. *Very motivated*

v. *Extremely motivated*

[same questions for Task 1 through Task 6]

Task 6:

i. *Not at all motivated*

ii. *Slightly motivated*

iii. *Somewhat motivated*

iv. *Very motivated*

v. *Extremely motivated*

**Attention Check**

When scheduling tasks into your day-to-day life, what are some of the reasons that determine when to schedule them? [textbox].
Appendix D: Study Materials for Study 2

Survey #1

Thank you for participating in this study about schedules. First, we’d like to know a little more about you.

What is your age? _____
Gender? Male/Female/Other
Are you employed (yes part-time/ yes full-time/ no)

Do you use a schedule to organize your daily/weekly/monthly tasks? 1 = Never – 7 = Every day
Overall, how stressed do you feel right now? 1 = Not at all – 7 = Extremely

***
*Make a plan control condition*

Now, we would like for you to write down all tasks you expect to work on tomorrow (Saturday). These could be work-related tasks, hobbies, exercising, caretaking tasks.
Here’s a quick example of what your plan could resemble: ‘write a report – 45 minutes’, ‘make lunch – 15 minutes’, ‘go for a walk – 30 minutes’, etc.
(Only complete as many lines as needed. That is if you only plan to do three tasks tomorrow, only fill in three lines).

Task 1:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 2:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 3:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 4:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 5:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 6:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 7:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 8:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 9:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 10:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
***

*Schedule condition – start times*

We would like for you to make a list for all tasks you expect to work on tomorrow (Saturday). These could be work-related tasks, hobbies, exercising, caretaking tasks.

Here’s a quick example of what your to-do list could resemble:
- Write a report (45 minutes): Begin at x am.
- Make lunch (15 minutes): Begin at x pm.
- Go for a walk (30 minutes): Begin at x pm.

(Only complete as many lines as needed. That is if you only plan to do three tasks tomorrow, only fill in three lines).

Task 1:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 2:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 3:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 4:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 5:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 6:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 7:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 8:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 9:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 10:
Estimated amount of time you predict it will take (in minutes): [drop down menu]

Please schedule these tasks into your day tomorrow. When will you start each task? [Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

*Schedule condition – with deadline*

We would like for you to make a list for all tasks you expect to work on tomorrow. These could be work-related tasks, hobbies, exercising, caretaking tasks.

Here’s a quick example of what your list could resemble:
- Write a report (45 minutes): Begin at x am - finish by: x am
- Make lunch (15 minutes): Begin at x pm - finish by: x pm
- Go for a walk (30 minutes): Begin at x pm - finish by: x pm.
(Only complete as many lines as needed. That is if you only plan to do three tasks tomorrow, only fill in three lines).

Task 1:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 2:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 3:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 4:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 5:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 6:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 7:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 8:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 9:
Estimated amount of time you predict it will take (in minutes): [drop down menu]
Task 10:
Estimated amount of time you predict it will take (in minutes): [drop down menu]

For each task, please give yourself a deadline. The deadline is the time that you would like to have completed the task by.
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm].

Please schedule these tasks into your day tomorrow. When will you start each task?
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

***

[Questions to all participants]
How many tasks will you do tomorrow? (1 = Very few – 7 = A lot)
How much free time will you have between tasks tomorrow? (1 = Very few – 7 = A lot)
How stressed do you feel right now? (1 = Very few – 7 = A lot)

***
(Attention check)
Why do you think scheduling tasks into your day can be beneficial?
[textbox]
Survey #2

Thank you for signing back on to the second survey! You participation is greatly appreciated.

***

How stressed do you feel right now? (1 = Not at all – 7 = Extremely)
How many tasks did you do two days ago (Saturday)? (1 = Very Few – 7 = A lot)
How much free time did you have between tasks two days ago (Saturday)? (1 = Very little – 7 = A lot)

***

In our first survey, we asked you to list the tasks you wanted to complete two days ago (Saturday). These could be work-related tasks, hobbies, exercising, care-taking tasks.

Now we would like to know whether and when you completed these tasks. Please list all of the tasks that you wanted to complete yesterday (as brief keywords).

{enter tasks}

For each task on your list, please tell us how long the task took, when you started and finished it.

Task 1:____ duration:__ Start:__ - Finish by___ (or put n/a if unfinished)
Task 2:____ duration:__ Start:__ - Finish by___ (or put n/a if unfinished)
Task 3:____ duration:__ Start:__ - Finish by___ (or put n/a if unfinished)
Task 4:____ duration:__ Start:__ - Finish by___ (or put n/a if unfinished)
...
Task 10:____ duration:__ Start:__ - Finish by___ (or put n/a if unfinished)

****

(Perceived Procrastination/Downtime)
How much time did you spend procrastinating Saturday? (1 = None – 7 = A lot)
How much time did you spend ‘killing time’ between tasks? (1 = None – 7 = A lot)
How often did you find yourself on a break between tasks? (1 = Not at all – 7 = A lot)

(Perceived Productivity)
How efficient did you feel two days ago (Saturday)? (1 = Not at all – 7 = Extremely)
How productive did you feel Saturday? (1 = Not at all – 7 = Extremely)
Are you satisfied with how much you got done on Saturday? (1 = Not at all – 7 = Extremely)

(Perceived stress)
Overall, how stressed did you feel Saturday? 1 = Not at all – 7 = Extremely
Overall, how busy did you feel Saturday? 1 = Not at all – 7 = Extremely
How overwhelmed did you feel by tasks Saturday? 1 = Not at all – 7 = Extremely

***

(Attention check)
When scheduling tasks in your day-to-day life, what are some of the reasons that determine when to schedule them? [textbox]
Appendix E: Additional Results from Study 2

I also examined actual (reported) start times, to see whether scheduling on-the-hour was also reflected in a tendency to actually start on-the-hour, too. At Time 2, participants were asked to recall, as precisely as possible, the time they started working on each completed task. They wrote the start times in an open-ended text box (rather than selecting the start time from a drop-down menu). I computed the percentage of tasks started on-the-hour for each participant (coding :00 as on-the hour and everything else as off-the-hour).

On average, 95.6 percent of tasks were reportedly started on-the-hour, demonstrating an on-the-hour actual start preference as strong or stronger than the on-the-hour scheduling preference. I then examined whether scheduling on-the-hour actually led to on-the-hour actual start times. The percentage of tasks scheduled on-the-hour was marginally correlated with the percentage of completed tasks actually started on-the-hour, \( r(228) = .11, p = .086 \). This suggests that on-the-hour scheduling is reflected only somewhat in reported on-the-hour start times. However, since the percentage of actual on-the-hour start times was so high, this result should be interpreted with caution – there may simply not have been enough variation to detect a link between this variable and any others.
Appendix F: Study Materials for Study 3

Survey #1

Thank you for participating in this study about scheduling and task performance. First, we’d like to know a little more about you.

What is your age? _____
Gender? Male/female/other
What is your ethnicity? _________
Are you employed (yes part-time/ yes full-time/ no)
Will you be working tomorrow? (yes / no / maybe)

***

*control condition*

Please take a moment to write down 6 tasks you will have to do or want to do tomorrow. These tasks can be work or school-related, can be household tasks or hobbies, physical activity, etc.
In addition, we would also like for you to rate how enjoyable it will be to do each task.
(1) (1 = Not enjoyable at all – 7 = Very enjoyable)
(2) (1 = Not enjoyable at all – 7 = Very enjoyable)
(3) (1 = Not enjoyable at all – 7 = Very enjoyable)
(4) (1 = Not enjoyable at all – 7 = Very enjoyable)
(5) (1 = Not enjoyable at all – 7 = Very enjoyable)
(6) (1 = Not enjoyable at all – 7 = Very enjoyable)

Next we would like for you to schedule each task into your day tomorrow. Schedule the time you plan on starting each of the tasks.
[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

*off-the-hour scheduling condition*

Please take a moment to write down 6 tasks you will have to do or want to do tomorrow. These tasks can be work or school-related, can be household tasks or hobbies, physical activity, etc.
In addition, we would also like for you to rate how enjoyable it will be to do each task.
(1) (1 = Not enjoyable at all – 7 = Very enjoyable)
(2) (1 = Not enjoyable at all – 7 = Very enjoyable)
(3) (1 = Not enjoyable at all – 7 = Very enjoyable)
(4) (1 = Not enjoyable at all – 7 = Very enjoyable)
(5) (1 = Not enjoyable at all – 7 = Very enjoyable)
(6) (1 = Not enjoyable at all – 7 = Very enjoyable)

Next, we would like for you to schedule each task into your day tomorrow. Schedule the time you plan on starting each of the tasks. Normally, people prefer to schedule tasks on-the-hour (for
example, 9:00 or 11:00). However, for tomorrow, we’d like you to consider scheduling tasks off-the-hour (e.g., 9:15 or 11:10) to allow for new tasks starting right after another task is finished (i.e., scheduling tasks back-to-back). Please use the full range of possible times to plan when you will begin each task.”.

[Select task from list] [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

***

[Questions to all participants]

*Expected Productivity*
How productive do you expect you will be tomorrow? (1 = Not at all – 7 = Extremely)
How effective do you expect to be tomorrow? (1 = Not at all – 7 = Extremely)
How satisfied do you expect you will be with what you will get done tomorrow? (1 = Not at all – 7 = Extremely)

*Expected Procrastination*
Tomorrow, I expect to procrastinate… (1 = Not at all – 7 = A lot)
Tomorrow, I expect to delay working on tasks from the time I intended to start them (1 = Never – 7 = Always)
Tomorrow, I expect to delay the start of tasks for no good reason (1 = Never – 7 = Always)

When scheduling the tasks for tomorrow, did you consider how long the tasks will take?
Not at all (1) – (Absolutely (7)

When scheduling the tasks for tomorrow, did you consider when the tasks would be finished?
Not at all (1) – (Absolutely (7)

(Attention check)
Why do you think scheduling tasks into your day can be beneficial?
[textbox]

Survey #2

Hello!

You completed the first part of the study: “Task scheduling and productivity” two days ago. We contact you today to invite you to participate in the second part (10 min, $1).

We need as many people as possible to do this follow-up survey and it would really help us out if you participate!
Corey (Principle Investigator, Master Student)

***

Thank you for signing back on to the second survey! You participation is greatly appreciated.

Here are the 6 tasks you listed at the first time of measure.

Please use the slide bar to mention the progress made towards completing each task. For example, for a completed task, the slide bar would go to 100. For a partially completed task, the slide bar would go to the approximate percentage of completion of the task.

(1) Slider (0---100)
(2) Slider (0---100)
(3) Slider (0---100)
(4) Slider (0---100)
(5) Slider (0---100)
(6) Slider (0---100)

We would also like for you to list the time you started each task. Please try to be as precise as possible.

(1) [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]
(2) [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]
(3) [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]
(4) [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]
(5) [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]
(6) [Select hour from list: 1-12] [Select minutes from list: 00-60] [Select am/pm]

**

Adapted version of the Multifaceted Measure of Academic Procrastination: Procrastination Behaviour Scale (MMAP-PBS)

Instructions: Please choose the appropriate response for each item:

Response options:
1 = Never  
2 = Almost never  
3 = Occasionally  
4 = Often  
5 = Very often  
6 = Always

1. Yesterday, when tasks needed to be completed, I told myself that I would not start them late, but I ended up delaying them without a good reason.
2. Yesterday, I didn’t intend or plan to work on tasks, and I did other fun things instead.
3. Yesterday, I kept putting off tasks until later without any rational reason.
4. Yesterday, I was not interested in starting tasks ahead of time because I preferred to do more enjoyable things instead.
5. Yesterday, I needlessly delayed working on tasks despite the fact that I knew I would not be happy about doing so later.
6. Yesterday, I intentionally filled my time with a lot of fun and exciting activities as opposed to planning on working on other school/work related tasks.
7. Despite my intention to start and finish tasks on time, yesterday, I engaged in other unnecessary activities instead.
8. Yesterday, I chose to do tasks at the last minute so I would have more time for fun stuff instead.
9. Yesterday, I planned to complete tasks ahead of time, but I needlessly delayed starting them.
10. Yesterday, I was focused on fun and enjoyable activities and did not bother myself with more important tasks until the last minute.

*Adapted Endicott Productivity Scale (5 item)*
Scale: 1 (Never) to 5 (Almost Always)

1. Yesterday, how often were you doing nothing when you were expected to be working/completing tasks?
2. Yesterday, how often did you find yourself daydreaming, worrying, or staring into space when you should have been working/completing tasks?
3. Yesterday, did you find your efficiency for the time spent working/completing tasks was lower than you expected?
4. Yesterday, did you find your productivity for the time spent working/completing tasks was lower than you expected?
5. Yesterday, did you find it difficult to concentrate on the task at hand?

*Subjective Productivity*
How efficient did you feel yesterday? (1 = Not at all – 7 = Extremely)
How productive did you feel yesterday? (1 = Not at all – 7 = Extremely)
How satisfied are you with how much you got done yesterday? (1 = Not at all – 7 = Extremely)

*Subjective Procrastination*
Yesterday, I procrastinated… (1 = Not at all – 7 A lot)
Yesterday, I delayed working on tasks from the time I intended to start them (1 = \textit{Never} – 7 = \textit{Always})
Yesterday, I frequently delayed starting tasks for no good reason. (1 = \textit{Never} – 7 = \textit{Always})

***

\textbf{Thank you for doing the second part of our study! Your participation is greatly appreciated!}