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DOI 10.1007/s11031-017-9625-7

ORIGINAL PAPER

You can do it if you really try: The effects of motivation on thinking for pleasure

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Abstract People find it difficult to enjoy their own thoughts when asked to do so, but what happens when they are asked to think about whatever they want? Do they find thinking more or less enjoyable? In the present studies, we show that people are more successful in enjoying their thoughts when instructed to do so. We present evidence in support of four reasons why this is: without instructions people do not realize how enjoyable it will be to think for pleasure, they do not realize how personally meaningful it will be to do so, they believe that thinking for pleasure will be effortful, and they believe it would be more worthwhile to engage in planning than to try to enjoy their thoughts. We discuss the practical implications of thinking for pleasure for promoting alternatives to the use of technology.

Keywords Motivation · Emotion regulation · Enjoyment of thought · Conscious thought · Affective forecasting

Introduction

> "Oh, the THINKS you can think up if you only try!"
> Dr. Seuss (1975)

Smartphones and other electronic devices have become an omnipresent part of modern life and much has been written about the downsides of these devices, such as taking time away from contemplation (e.g., Alter 2017; Carr 2011; Kushlev et al 2015; Powers 2010; Wayne 2016). The average American adult spends more than 10 h a day on electronic devices (Nielsen 2016), and teenagers in the United States spend more time consuming media than they do sleeping (an average of 9 h a day, Census 2015). These numbers are especially striking when compared to the amount of time Americans spend on a readily available alternative, namely thinking or contemplation. On a survey of how Americans spend their time, 83% of respondents did not report engaging in any "relaxing, thinking" in the previous 24 h, even though 95% reported that they performed at least one leisure activity, such as watching television or reading for pleasure (American Time Use Survey, 2012).[1]

One explanation of why people prefer electronic devices to "just thinking" is that the former involve less effort and are more enjoyable. Indeed, participants asked to spend 6–15 min enjoying their thoughts, either in an unadorned laboratory room or at home when they were by themselves and had time to spare, found it difficult to concentrate and reported that it was somewhat boring and only somewhat enjoyable. And, participants randomly assigned to spend 12 min entertaining themselves with their thoughts reported substantially less enjoyment than did participants

Supplemental materials for the studies reported here can be found at: https://osf.io/6bsh2/?view_only=12a38c0ccc9741fca3856df01d0f6014.

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[1] Interestingly, the American Time Use Survey, administered yearly by the National Bureau of Labor Statistics, does not include a category of just thinking. The closest category is one called "relaxing, thinking," which includes not only times people spend reflecting or fantasizing but also times they are engaged in social interactions, such as "watching wife garden/watching husband cook dinner" (American Time Use Survey Activity Lexicon 2012, p. 35).

randomly assigned to spend the same amount of time on everyday external distractions such as playing with their smart phone, watching a video, or reading (Buttrick et al. 2017; Wilson et al. 2014, Study 8; see also; Smith and Frank 2015).

Despite this evidence, we believe that there may be some value to thinking for pleasure, perhaps more so than people realize (which would help explain why they seldom choose to do it). In the studies just mentioned, participants did not *hate* being alone with their thoughts. Is it possible that by virtue of being told to try to enjoy their thoughts, they were succeeding to some degree? The answer to this question is unknown, because to date there have not been any studies that have compared instructions to enjoy one's thoughts with no instructions, that is, with a condition in which people are not given the goal of enjoyment.[2]

Recent research suggests that people can enjoy their thoughts, at least to some extent, under the right conditions. Enjoying one's thoughts is a skill, like any other, that requires both ability and motivation: People must have the requisite resources and must want to do it in order to succeed (Westgate and Wilson 2017). Westgate et al. (2017) examined the role of ability, showing that people enjoyed their thoughts more when given a "thinking aid" that made the task easier. In those studies, all participants generated eight enjoyable topics and were then asked to think about these topics while alone for 4–6 min. In one condition, participants received reminders of their topics during the "thinking period," whereas in another they did not. Participants enjoyed the thinking period more in the reminder condition because they found it easier to concentrate on the topics and their minds wandered less. Thus, these studies supported the hypothesis that ability (having sufficient resources) matters to thought enjoyment. The purpose of the present studies was to examine the role of motivation.

As mentioned, in previous studies, participants in all thinking conditions were given the goal to entertain themselves with their thoughts, which presumably motivated them to try. Absent was a comparison condition in which people were asked simply to think about whatever they wanted. If enjoyable thought is a desirable and easy activity, then there should be no difference between these conditions, because participants should, like Thoreau (1854/2009) at Walden Pond, welcome the opportunity to spend time in pleasant reverie. In contrast, we hypothesized that without instructions to do so, participants would not have the goal to enjoy their thoughts and would thus enjoy thinking less. Such a result could have important practical implications by suggesting that people can intentionally enjoy their thoughts, at least to some degree, if motivated to do so.

But why, exactly, would people decide not to try to think for pleasure, absent instructions to do so? There are at least four reasons. First, people might fail to appreciate how much they could enjoy thinking if they tried. That is, people might make an affective forecasting error by underestimating how much they would enjoy thinking for pleasure (Gilbert and Wilson 2007; Wilson and Gilbert 2003). Second, even if they recognized that they could enjoy their thoughts, people might fail to appreciate other benefits, such as the possibility that they would find it to be personally meaningful. Third, people might know that thinking for pleasure would be enjoyable and meaningful, but avoid doing so because they expect it to be effortful. Fourth, people might know the benefits of thinking for pleasure but have other priorities, such as engaging in planning. That is, they may prioritize instrumental goals (e.g., planning for the future) over hedonic goals (Tamir 2016). These possibilities are not mutually exclusive; e.g., people could underestimate how much they would enjoy thinking for pleasure and prioritize other goals. Indeed, we will present evidence consistent with all of these reasons why people asked to think about whatever they want do not elect to think for pleasure.

Lastly, the present studies examined the role of possible moderators of thought enjoyment, such as people's initial mood and level of physical activity while thinking. In fact, in the interest of full disclosure, we note that the initial purpose of some of the studies was to test these potential moderators of the conditions under which people enjoy thinking. But, as will be seen, few of these moderators had significant effects. Instead, what emerged from these studies was the powerful effect of motivating people to try to enjoy their thoughts. We first demonstrate this effect in four studies that manipulated thought instructions. We then report a study that tested why people who are asked to think about whatever they want do not choose to think for pleasure.

Study 1

Method

Power

The effect sizes of various manipulations on thinking enjoyment vary widely in this area of research depending on the comparison of interest, from null effects of manipulations that prompt people to generate topics in advance

[2] An exception is Studies 1 and 2 of Wilson et al. (2014), which included a condition in which participants were asked to think about whatever they wanted. There was not a clear comparison condition, however, in which participants were given the general goal of entertaining themselves with their thoughts.

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(Wilson et al. 2014), to large differences in the enjoyment of everyday external activities versus thinking (*d*s = 1.83 and 0.98 in Wilson et al. 2014 and; Buttrick et al. 2017, respectively). Power analyses thus yielded highly variable sample sizes. We decided to try to run at least 50 participants per experimental condition, which would give us an 80% chance of detecting a medium effect size of $d = 0.5$ at $p < .05$ (one-tailed). We were able to exceed that number in some studies, whereas in others we fell somewhat short because of the lack of availability of participants. When considered together, however, Studies 1–4 had very high power to detect our hypothesized effect of thought instructions.

Participants

Participants were 160 undergraduate psychology students. After the study was completed, we determined that five of these students had previously participated in another of our thinking studies. Because they had been debriefed about the purpose of this line of research we dropped them from the analyses, though doing so had very little impact on the results.[3] The remaining sample consisted of 155 participants (115 female, 39 male, 1 unspecified) aged 18–22 ($M = 18.46$, $SD = 0.74$). Sixty percent identified as White/Caucasian, 27% as Asian, 5% as African American, 3% as Hispanic, 1% as Pacific Islander, and 5% as other. Participants received course credit for their participation.

Procedure

Participants stored all of their personal belongings (e.g., mobile phones, watches, and backpacks) and then completed the study alone on a computer in an unadorned room. The instructions and dependent measures were delivered via a Qualtrics program (Qualtrics, Provo, UT). Participants first completed two filler questions about the number of experiments and psychology courses they had completed, indicated their mood by rating how much they were currently experiencing six emotions (happy, bored, irritable, stressed out, attentive, cheerful) on 5-point Likert scales from 1 = *very slightly or not at all* to 5 = *extremely*, and reported how many hours they had slept the previous night.

Participants were then told that there would be a 6-min "Thinking Period" and that during this time they should remain in their chair without sleeping. Those randomly assigned to the no instructions condition were told that they could "think about whatever you want" during this time. Those randomly assigned to the enjoy condition were asked to entertain themselves with their thoughts during the thinking period, and that to prepare themselves for this, to list eight topics on index cards that they would enjoy thinking about. Examples were provided, e.g., "A specific memory you would enjoy thinking about (e.g., your first kiss, a family event, an academic or athletic accomplishment)," "something in the future you are looking forward to (e.g., an upcoming social occasion, date, meeting with a friend, or vacation)." Participants were asked to take their time in generating pleasant topics because "what you write may be repeated back to you later in the study." After listing eight topics, participants in the enjoy condition were reminded that they should spend the thinking period entertaining themselves with their thoughts, and that their goal should be "to have a pleasant experience, as opposed to spending the time focusing on everyday activities or negative things."

Participants in both conditions answered comprehension questions to make sure that the instructions were clear. If they answered a question incorrectly, the instructions were repeated. They were then asked to press a key to begin the thinking period and to spend that time sitting in a chair on the other side of the room that was away from the computer. They were told that after 6 min the computer would beep to signal the end of the thinking period, after which they should return to the computer and answer some questions. Participants in the enjoy condition were instructed to leave their index cards (on which they had written thought topics) in a box and not to look at them during the thinking period.[4]

Dependent measures Participants rated how enjoyable, entertaining, and boring the thinking period was on 9-point scales labeled *1 = not at all* [*enjoyable, entertaining, boring*], *5 = somewhat* [*enjoyable, entertaining, boring*], *and 9 = extremely* [*enjoyable, entertaining, boring*]. They also rated the extent to which their minds wandered during the thinking period and how hard it had been to concentrate on what they chose to think about, both on 9-point scales labeled *1 = not at all, 5 = somewhat*, and *9 = very much*. In addition, participants in the enjoy condition rated the extent to which they thought about the eight topics listed at the beginning of the study versus other topics (*1 = only about other topics,*

[3] Our strategy for inclusion or exclusion of participants in all studies was to adopt the approach that would be least likely to support our hypotheses.

[4] We ran another version of the enjoy condition in which participants took their index cards with them and consulted them during the thinking period. This condition was not relevant to the current hypotheses. It was reported by Westgate et al. (2017) in their meta analysis of studies that used "thinking aids" to improve thinking enjoyment.

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Table 1 No instructions versus enjoy conditions in Studies 1–4

Measure	Study 1		Study 2		Study 3		Studies 4a and 4b	
	No instructions ($n=77$)	Enjoy ($n=78$)	No instructions ($n=60$)	Enjoy ($n=64$)	No instructions ($n=76$)	Enjoy ($n=75$)	No instructions ($n=103$)	Enjoy ($n=100$)
Enjoyability index	5.06^{a} (1.66)	5.97^{b} (1.80)	4.38^{a} (1.32)	5.79^{b} (1.37)	4.29^{a} (1.56)	5.85^{b} (1.60)	3.88^{a} (1.77)	4.94^{b} (1.74)
Mind wandered	6.58^{a} (2.02)	5.86^{b} (1.82)	6.53 (1.92)	6.20 (1.88)	6.80^{a} (2.07)	5.92^{b} (1.89)	5.51 (2.37)	5.52 (2.16)
Hard to concentrate	5.00 (2.31)	4.96 (2.17)	3.70^{a} (2.10)	4.78^{b} (2.03)	5.15 (2.31)	4.96 (2.12)	3.14^{a} (2.24)	4.36^{b} (2.15)
Goal to make plans	6.10^{a} (2.49)	3.71^{b} (2.47)	n/a	n/a	5.68 (2.77)	4.87 (2.47)	6.19 (2.57)	5.65 (2.56)
Goal pleasant thoughts	5.31^{a} (2.48)	7.01^{b} (1.70)	n/a	n/a	5.13^{a} (2.55)	7.29^{b} (1.27)	4.59^{a} (2.25)	6.36^{b} (1.86)
Letting thoughts flow	5.97^{a} (2.15)	5.21^{b} (2.07)	6.92^{a} (2.00)	6.11^{b} (1.85)	6.01 (2.44)	5.96 (1.93)	6.14^{a} (2.11)	5.25^{b} (2.34)
Control thoughts	4.47^{a} (2.30)	5.29^{b} (2.08)	n/a	n/a	5.12 (2.44)	5.48 (1.96)	4.12^{a} (2.08)	5.82^{b} (2.12)

Standard deviations are in parentheses. Means that have different superscripts within a study differ at $p<.05$

9=only about the 8 topics), and all participants rated how surprised they were by the thoughts that came to mind; the extent to which their goal had been to make plans for what they would do later; the extent to which their goal had been to think about things that were pleasant or entertaining; the extent to which they were letting their thoughts flow; the extent to which they were trying to control the direction of their thoughts; how interesting the thinking period was, all on 9-point scales with appropriate labels. Participants then indicated how much they would prefer to spend the next 3 min "thinking like they did in the Thinking Period" or doing a proofreading task, on a 5-point scale (*1=very much prefer to spend 3 min thinking, 5=very much prefer to spend 3 min doing the proofreading task*). After describing what they had thought about during the thinking period and indicating whether they had fallen asleep or gotten up from their chair, participants answered these questions about their experience during the thinking period: how psychologically "rich," complex, novel, personally meaningful, and thought provoking it had been, all on 9-point scales labeled *1=not at all, 5=somewhat*, and *9=extremely*.

Results and discussion

Participants' ratings of how enjoyable, entertaining, and boring (reverse scored) were highly correlated, thus we averaged these ratings to form an enjoyability index (Cronbach's alpha=0.89). We predicted that participants in the enjoy condition would enjoy the thinking period more than would participants asked to think about whatever they wanted. This prediction was confirmed, $t(153)=3.25$, $p=.001$, $d=0.53$ (see means in Table 1). Table 1 also displays the means of variables that were included in at least three of Studies 1–4. As seen there, participants in the enjoy condition of Study 1, compared to the no instructions condition, reported that their minds wandered significantly less, that their goal was less to make plans and more to have pleasant thoughts, that they let their thoughts flow more and tried to control their thoughts less, and that their thoughts were more surprising, ts(153)=2.35, 6.03, 4.99, 2.27, 2.35, 2.11, ps=0.02, <0.001, <0.001, 0.03, 0.02, 0.04, respectively. Participants in the enjoy condition of Study 1 also reported that the thinking period was more interesting, Ms=6.01 versus 5.47 (SDs=1.71, 1.57), $t(153)=2.07$, $p=.04$ and that their experiences were more personally meaningful, psychologically rich, and thought provoking the differences on these last three measures were not significant at the 0.05 level, $t(153)=1.64$, $t(153)=1.75$, and $t(152)=1.64$, ps=0.10, 0.08, and 0.10, respectively.

Later we will present the results of mediation analyses on the results combined across Studies 1–4. To anticipate, several of the variables just mentioned (e.g., mind wandering and the goal to have pleasant thoughts) significantly mediated the effects of the instructions manipulation on enjoyment. That is, the instructions to enjoy their thoughts caused participants to have more of a goal to have pleasant thoughts and to experience less mind wandering, and to the extent that this was true, participants enjoyed the thinking period more.

It might be argued that the effect of the instructions manipulation was due to demand characteristics, namely that participants who were asked to enjoy their thoughts only said they did in order to be cooperative. There is evidence, however, that participants in the enjoy condition did more than check different numbers on self-report scales. First, although we did not find an effect of condition on the activity participants preferred to do next (more thinking or proofreading, $t(153)<1$), this may have been due to unpopularity of proofreading (73% of participants preferred thinking or had no preference). Preference for thinking was,

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however, significantly correlated with reported enjoyability of thinking, $r(153) = 0.44$, $p < .001$.

Second, all participants wrote what they had thought about during the thinking period, and those in the enjoy condition reported different types of thoughts than those in the no instructions condition. Participants' thoughts were analyzed with the LIWC text analysis software (Pennebaker et al. 2007), which revealed significant differences between conditions on several thought categories, some of which significantly mediated the effects of the instructions manipulation on enjoyment of the thinking period. We will discuss these results in detail when we report the analyses collapsed across the reported thoughts in all studies. We note here that it would be carrying a demand characteristic interpretation to extremes to say that participants reported that their goal was to think about pleasurable topics (even though it wasn't), that they enjoyed their thoughts more and found them more interesting (even though they didn't), and that they had thoughts about topics that they had actually not thought about.

Study 1 provides preliminary evidence for the role of motivation in the enjoyment of one's own thoughts: People experienced greater enjoyment when they tried to enjoy their thoughts than when asked to think about whatever they wanted. It could be argued, however, that we stacked the deck in favor of thought enjoyment, by not only asking people to do it, but by making it easy for them to do so. For example, giving participants examples of topics to think about and asking them to write down eight topics of their own may have contributed to the positive outcome in the enjoy condition. To find out, in Study 2 we asked participants to try to enjoy their thoughts but did not give them any examples of topics or ask them to generate their own examples in advance of the thinking period.

Study 2 had two other purposes: to examine thinking under more natural circumstances and to test the role of a potential moderator, physical activity. In previous studies, the goal of enjoying one's thoughts has been framed as the point of the study, which participants might find odd or unnatural. In Study 2 participants believed they were taking part in a "baseline" period, meant to put everyone in the same state before the experiment proper began. During this time, participants were either asked to entertain themselves with their thoughts or given no instructions.

Study 2 also examined another possible determinant of thought enjoyment, namely whether people were seated (as in past studies) or engaged in mild physical activity, walking at a comfortable pace on a treadmill. Many people report that they enjoy thinking when they are doing something else, such as walking or fidgeting with something. When Thomas Edison was at his Florida estate and wanted to ponder something, for example, he is said to have sat on his dock with a fishing line in the water (Solomon 2001). Although we have previously found that giving people an object to fiddle with had no effect on their enjoyment of their own thoughts (Study 4 in Wilson et al. 2014), we reasoned that mild physical activity, such as walking, might free the mind to wander more easily and reduce self-consciousness about having nothing to do but think, thereby making it easier to enjoy one's thoughts. Study 2 thus employed a 2 (Instructions: enjoy vs. no instructions) x 2 (Activity: treadmill vs. chair) design, with the prediction that we would find a significant main effect of Instructions and Activity.

Study 2

Method

Participants

Participants were 129 undergraduate psychology students. Five were unable to complete the study because of a lost internet connection. The remaining sample consisted of 124 participants (87 female, 35 male, 2 unspecified) ages 17–23 ($M = 19.02$, $SD = 1.09$). Sixty-four percent identified as White/Caucasian, 25% as Asian, 4% as African American, 4% as Hispanic, 1% as Native American, and 2% as other. Participants received course credit or a payment of $10 for their participation.

Procedure

When participants signed up for the study they were asked to report to a university fitness center in clothes in which they could comfortably move. Upon arrival the experimenter seated them at a table in a relatively quiet corner of the gym and explained that the study would begin with a 5-min baseline period, so that everyone would begin the study in the same physical state. Those randomly assigned to the treadmill condition were told that they would be asked to walk at a "comfortable stroll" on the treadmill during this time. Those randomly assigned to the seated condition were told that they would remain in the chair. The experimenter then asked the participant to read additional instructions on a computer.

The computer program randomly assigned participants to the enjoy or no instructions condition. In the enjoy condition participants were asked to spend the baseline period "entertaining yourself with your thoughts as best you can." "That is," the instructions read, "your goal should be to have a pleasant experience, as opposed to spending the time focusing on everyday activities or negative things." Participants were not given any examples of thought topics or asked to generate topics on their own. In the no instructions

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condition, these directions were omitted. Participants then answered some comprehension check questions to make sure they understood the instructions.

The experimenter, who was unaware of whether participants were in the enjoy or no instructions condition, then told participants that the baseline period would begin. In the treadmill condition, the experimenter showed participants how to operate the treadmill, reiterated that they should walk at a "comfortable stroll," and told them they could adjust the speed of the machine within a specified range (between 1 and 2 mph). In the seated condition, the experimenter reiterated that participants should not get up or move the chair during the 5 min. During the baseline period the experimenter remained out of view of the participant but was able to make two assessments of possible distractions. First, he/she counted the number of people who walked through the area during the baseline period. Second, he/she recorded noise levels, using computer software to measure ambient sound pressure (Electroacoustics Toolbox, Faber Acoustical; and LAMA, LAMA Audio). Due to equipment failure, noise was not recorded for eight participants. After 5 min, the experimenter asked participants to answer some questions on the computer.

Dependent measures Participants rated how enjoyable, entertaining, and boring the baseline period was on the same scales as used in Study 1. Because aspects of the baseline period (e.g., walking) might influence overall enjoyment independently of what participants were thinking about, we then asked participants the same three questions specifically about their thoughts (e.g., "How enjoyable did you find your thoughts to be during the baseline period?), rated on the same 9-point scales. Participants then rated how much their mind wandered during the baseline period and how hard it was to concentrate on their thoughts, on the same scales as in Study 1, and described what they had thought about during the baseline period. Next, participants answered these questions about the baseline period: the extent to which they were letting their thoughts "flow in whatever direction they happened to go," the extent to which they were distracted by what was going on around them, and how "winded or out of breath" they felt, all on 9-point scales with appropriate labels. Lastly they answered a manipulation check question about what instructions they had received (enjoy vs. none), questions about their typical gym use, demographics, and prior experience with psychology studies. Participants were then fully debriefed and encouraged to remain in the gym and work out if they wished.

Results and discussion

Participants answered three questions about how much they enjoyed the baseline period and three about how much they enjoyed their thoughts. Because answers to all six of these questions were highly correlated, we averaged them (after reverse scoring the questions about boredom) to form an enjoyability index (Cronbach's alpha = 0.90). We performed a 2 (Instructions: enjoy vs. no instructions) x 2 (Activity: treadmill vs. chair) analysis of variance (ANOVA) on these ratings to test our hypothesis that participants in the enjoy condition would have the highest scores on the enjoyability index (which would result in a main effect of the instructions manipulation) and that it would be easier to think for pleasure while walking than sitting (which would result in a main effect of the Activity manipulation).

Effects of instructions manipulation Consistent with predictions the ANOVA revealed a strong main effect of instructions, reflecting the fact that participants in the enjoy condition reported greater enjoyment than did participants in the no instructions condition, $F(1, 120) = 33.90$, $p < .001$, $\eta_p^2 = 0.22$ (see means in Table 1). As in Study 1, participants in the enjoy condition reported less of a tendency to let their thoughts flow. Unlike in Study 1, participants in the enjoy condition did not report that their mind wandered less but did report that it was harder to concentrate on their thoughts, $F(1, 120) = 8.27$, $p = .005$, $\eta_p^2 = 0.07$ (see means in Table 1). There were no significant differences between conditions in the number of people who walked through the area during the baseline periods ($M = 3.01$, $SD = 2.43$), Fs(1, 119) = 0.74, $p = .39$, or in the amount of noise recorded, $M_{log} = 3.94$, $SD = 1.48$, Fs(1, 112) = 0.38, $p = .54$.

Effects of walking on the treadmill Contrary to predictions, whether people were seated or walked on the treadmill had no effect on reported enjoyment and did not interact with the instructions manipulation, Fs(1, 120) = 0.29, $p = .59$. Nor did walking on the treadmill significantly affect any of the other dependent measures. The only exception was a significant Instructions x Activity interaction on participants' reports of how much they were letting their thoughts flow, $F(1, 120) = 3.99$, $p = .048$, $\eta_p^2 = 0.03$. Among participants who were seated, the instructions manipulation had little effect on reported flow, Ms = 6.46 versus 6.36 in the no instructions versus enjoy conditions, respectively. Among participants on the treadmill, those given no instructions reported more flow than those in the enjoy condition, Ms = 7.31 versus 5.84, respectively. But again, this was the only significant effect of walking on the treadmill on any of the dependent measures, and flow was not correlated with enjoyment of the baseline period, $r(122) = -0.04$, $p = .68$.

Study 2 replicated the basic effect of Study 1, namely that people instructed to enjoy their thoughts enjoyed the baseline period more than people given no instructions. It is notable that this occurred in a naturalistic setting (a gym, as opposed to the laboratory), that participants did

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not think that enjoying their thoughts was the main point of the study, and participants were not given any examples of topics to think about. Interestingly, there was no detectable effect of walking on a treadmill on thought enjoyment. We cannot rule out that other forms of distraction facilitate thinking, of course, but at this point there is no evidence for the hypothesis that engaging in other activities frees the mind to think about enjoyable topics.

The purpose of Study 3 was to explore the potential role of a different moderator, namely mood. Are people in a negative mood more or less likely to enjoy their thoughts? Our theoretical approach makes rival predictions. On the one hand, those in a negative mood should be more motivated to try to think about pleasant topics in order to make themselves feel better. This hypothesis is consistent with a large literature on mood repair that documents people's efforts to lift themselves out of a bad mood (e.g., Gross et al. 2006; Koole 2009). On the other hand, negative thoughts might be distracting and make it more difficult for people to concentrate on pleasant topics. Research shows that negative feelings act as "stop signals," causing people to engage in more systematic processing of their current circumstances, which might add cognitive load to an already taxing task (Huntsinger et al. 2014).

We thus manipulated mood on an exploratory basis, with these rival hypotheses in mind. Study 3 employed a 2 (Instructions: enjoy vs. no instructions) x 2 (Mood: hassles vs. no hassles) factorial design. The instructions manipulation was similar to the one employed in Study 1. For the mood manipulation, participants were or were not asked to describe recent "hassles" in their lives. All participants then participated in a 3-min "thinking period."

Study 3

Method

Participants

Participants were 153 undergraduate students. After the study was completed, we determined that two of these students had previously participated in a study closely related to this one. Because they had been debriefed about the purpose of this line of research, we dropped them from the analyses, though doing so had very little impact on the results. The final sample consisted of 151 participants (96 females, 54 males, one unspecified), of ages 17–24 ($M = 18.4$, $SD = 0.94$). Sixty-five percent identified as White/Caucasian, 18% as Asian, 9% as African American, 3% as Hispanic, and 5% as other. Participants received course credit for their participation.

Procedure

As in Study 1, participants signed a consent form, stored their belongings, and completed the study on a computer in a room by themselves. The first questions were filler items about the number of psychology experiments participants had completed and what psychology classes they had taken. Participants in the enjoy condition (randomly assigned) were then told that they would be asked to spend 3 min "entertaining yourself with your thoughts." To prepare for this, they were asked to list three topics they would enjoy thinking about, and given examples of topics (e.g., specific memories, something in the future they were looking forward to, an enjoyable fantasy). Participants in the no instructions condition were told that they would spend 3 min thinking about whatever they wanted.

Participants were then randomly assigned to the hassles or no-hassles condition. Participants in the hassles condition were asked to write about a current hassle in their life. "At one time or another," they read, "everyone experiences hassles, irritations, or worries in their lives, such as difficulties with friends or roommates, concerns about classes, not having enough time to get everything done, concerns about staying in shape, problems at a job, financial concerns, or something else." They were asked to answer a series of questions about "something you are currently worried about or irritated by," with the qualification that they were not to write about major life events or "anything too upsetting," but rather "everyday kinds of hassles and concerns." Participants were then asked to describe their current hassle and write about what it was that they found "irritating or worrisome" and the feelings that came to mind when they thought about the events. Lastly, they rated the extent to which the events were ongoing or resolved on a 5-point scale where *1 = ongoing issue* and *5 = resolved*. Participants in the no-hassles condition did not complete this task. All participants then rated their current mood, indicating the extent to which they were currently experiencing eight feelings and emotions: happy, bored, irritable, stressed out, alert, cheerful, angry, and worried, all on 5-point scales (*1 = very slightly or not at all, 2 = a little*, *3 = moderately, 4 = quite a bit*, and *5 = extremely*).

Participants were then told that the thinking period was about to begin, reminded that it would last for 3 min, and told that they should remain in their chair without getting up to walk around. Participants in the enjoy condition were reminded of the three topics they had listed earlier as ones they would enjoy thinking about, whereas participants in the no instructions condition were reminded that they could think about whatever they wanted. When participants advanced the page the words "thinking period" were displayed. This page automatically advanced to the dependent measures after 3 min.

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Dependent measures

Participants rated how enjoyable, entertaining, and boring the thinking period was on the same scales used in Study 1. They also answered the same questions as in Study 1 about how much their minds had wandered, how hard it was to concentrate on their thoughts, the extent to which their goal had been to make plans and to think about pleasant things, how much they let their thoughts flow, how much they were trying to control the direction of their thoughts, and to what extent they would prefer to spend another 3 min thinking or doing a proofreading task. At the conclusion of the study, participants were asked to describe something in their life that they were currently thankful for in order to mitigate any lasting effects of the mood manipulation.

Results and discussion

Manipulation check As a check on the mood manipulation, participants rated the extent to which they were experiencing eight emotions immediately prior to the thinking period. Based on a factor analysis with a varimax rotation we created three mood indices: negative affect (mean of irritable, stressed, angry, and worried; 39% of the variance; minimum loading 0.68, maximum cross-loading 0.28), positive affect (mean of happy, alert, and cheerful; 17% of the variance; minimum loading 0.72, maximum cross-loading −0.40), and boredom (14% of the variance; loading of 0.92, maximum cross-loading 0.12). A 2 (Instructions: enjoy vs. none) x 2 (Hassles: hassles vs. none) ANOVA revealed significant a main effect of the mood manipulation on negative affect, $F(1, 147) = 42.87$, $p < .001$, $\eta_p^2 = 0.23$, reflecting the fact that participants in the hassles condition were in a more negative mood than participants in the no hassles condition, *M*s = 2.56 versus 1.75 (*SD*s = 0.89, 0.61). Neither the main effect of instructions nor the interaction were significant, *F*s(1, 147) < 1. Similarly, there was a significant main effect of the mood manipulation on the index of positive affect, such that those who wrote about hassles reported less positive affect, *F*s(1, 147) = 11.69, $p = .001$. This effect was qualified by significant Hassles x Instructions interactions, $F(1, 147) = 4.28$, $p = .04$, $\eta_p^2 = 0.03$, reflecting the fact that the mood manipulation reduced positive affect more in the enjoy than no instructions condition.

Effects of instructions to enjoy thoughts Once again we created an enjoyment index by averaging participants' ratings of how enjoyable, entertaining, and boring (reverse-scored) the thinking period was (Cronbach's alpha = 0.89). As in Studies 1–2, participants in the enjoy condition reported greater enjoyment of the thinking period than did participants in the no instructions condition, $F(1,147) = 36.57$, $p < .001$, $\eta_p^2 = 0.20$ (see means in Table 1). As in Study 1, there was no effect of the instructions manipulation on people's preference to engage in more thinking versus proof reading, *F*s(1, 146) = 0.04, $p = .84$; again, this may be due to the fact that proofreading was an unpopular task: 71% of participants preferred thinking or had no preference. The more participants reported that they enjoyed the thinking period, however, the more they preferred to continue thinking; $r(148) = -0.35$, $p < .001$. Also as in Study 1, participants in the enjoy condition reported that their minds wandered less and that their goal had been to think about pleasant topics more than did participants in the no instructions condition (see Table 1).

Effects of mood manipulation Interestingly, neither the main effect of the mood manipulation nor the interaction was significant on any of the dependent measures. The only exception was that thinking about hassles made it harder for people to concentrate on their thoughts, $F(1, 146) = 5.78$, $p = .02$, $\eta_p^2 = 0.04$, *M*s = 5.49 versus 4.64 in the hassles and no hassles condition, respectively, which is consistent with the idea that negative moods increase cognitive load. The Instructions x Mood interaction was not significant, $F(1, 146) = 0.01$, $p = .93$.

Studies 1–3 provide strong evidence that people asked to try to enjoy their thoughts succeed in doing so, in a variety of settings (a psychology laboratory and a college fitness center) and circumstances (sitting, walking on a treadmill, in good moods, in bad moods). Although it was not the case in Study 3 that participants in a bad mood were better at enjoying their thoughts, it is important to note that nor were they worse. It is encouraging that when given the goal to have pleasant thoughts, those who had just thought about hassles in their lives were able to do so as successfully as those who did not think about hassles.

In Study 4, we examined whether people can succeed in enjoying their thoughts under a different kind of unpleasant circumstance. Rather than asking people to write about hassles in their lives, we interrupted them from engaging in a pleasant activity and then asked them to enjoy their thoughts or gave them no instructions about what to think about. People often experience annoying interruptions in everyday life, such as being stuck at a traffic light or having to watch a commercial before viewing a YouTube video. Study 4 tested whether people could pass such times more enjoyably if they tried to have pleasant thoughts.

A second purpose to Study 4 was to compare our standard "enjoy" and "no instructions" conditions to a third condition in which participants were asked to spend the time planning what they would be doing over the next 48 h. On the one hand, participants might find it more productive and enjoyable to pass the time in this manner, rather than explicitly trying to enjoy their thoughts. In Studies 1 and 3, on the other hand, participants in the no instructions

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conditions reported more of a goal to engage in planning than did participants in the enjoy conditions, and reported lower enjoyment of the thinking periods. We thus predicted that participants asked to engage in planning would report similar levels of enjoyment compared to participants in the no instructions condition.

We conducted two versions of Study 4 that varied in minor ways. For example, there were two thinking periods in Study 4a and one in Study 4b; Study 4b dropped the planning condition; and Study 4b manipulated how long the thinking period lasted (1.5 min vs. 3 min). Because these variations made little difference to the results, we present the two studies together.

Studies 4a and 4b

Method

Participants

After the study was completed we discovered that 17 of the 145 participants in Study 4a had taken part in a similar study we were conducting the same semester, before participating in this one. Because these participants had been debriefed in the prior study and were thus less naïve about the purpose of the present study, we removed them from all analyses (the results are very similar when these participants are included). The remaining participants in Study 4a were 145 undergraduate psychology students (99 female, 44 male, 2 unspecified) ages 17–24 ($M = 18.57$, $SD = 1.04$). Fifty-nine percent identified as White/Caucasian, 26% as Asian, 6% as African American, 3% as Hispanic, and 5% as other (1% unspecified). Participants in Study 4b were 122 undergraduate students (79 female, 41 male, 2 unspecified) ages 18–22 ($M = 19.04$, $SD = 0.99$). Sixty-eight percent identified as White/Caucasian, 16% as Asian, 6% as African American, 2% as Hispanic, 1% as Pacific Islander, and 6% as other (2% unspecified). Participants received course credit for their participation.

Materials

Participants played an open source videogame called RatMaze II (http://pixeljam.com/ratmaze2/), which we chose because pilot participants found it to be enjoyable and because it was in an open-source format that could be embedded into Qualtrics, the survey software used to deliver all instructions and measure all dependent variables. The game involves using the keyboard arrow keys to move a rat through a maze. The goal of the game is to accrue as many points as possible by collecting pieces of "cheese" dispersed throughout the maze and by capturing the letters that spell RatMaze.

Procedure

As in Studies 1 and 3, participants completed the experiment alone on a computer in an unadorned laboratory room, after storing all of their belongings. The experimenter first opened a site with the RatMaze II videogame, demonstrated how to play the game, let participants practice for 90 s, and answered any questions. Participants were instructed to keep track of their score, which was displayed on the screen. The experimenter then left the room and participants completed the remainder of the study by themselves.

Participants first completed similar filler questions and mood items to those used in Study 1, except that in this study they rated the extent to which they were currently experiencing 14 emotions (happy, interested, distressed, excited, bored, enthusiastic, irritable, stressed out, alert, nervous, attentive, jittery, cheerful) on a 5-point Likert scale from 1 = *very slightly or not at all* to 5 = *extremely*. Participants then read that the study was about "people's thought processes in everyday life while they do common activities," that they would be playing the RatMaze videogame, that the game would be interrupted with a "time out period," and that they would receive further instructions about what to do at that time. After being reminded to keep track of their score while they played the game, and answering some comprehension questions to make sure they understood the instructions, participants played the videogame for 2 min 15 s. At that point the game was interrupted and participants were asked to record their score.

Time out instructions Participants randomly assigned to the enjoy condition were instructed to spend the time out period "entertaining yourself with your thoughts as best you can" while remaining in their chair. They were asked to list three topics unrelated to the video game they would enjoy thinking about, after reading some examples (e.g., a specific memory, something in the future they were looking forward to, an enjoyable fantasy). Participants were told that the time out period would last 1–3 min, reminded to think about the topics they had just listed or "any other pleasant topics that come to mind," and instructed to advance the page to begin. Once they did, the words "time out period" appeared on the screen.

Participants randomly assigned to the planning condition (Study 4a only) received identical instructions, except that instead of being asked to entertain themselves with their thoughts, they were instructed to spend the time "planning what you will be doing over the next 48 h." They were asked to list three activities that

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they would be doing after reading some examples (e.g., classes they would be attending, assignments that were due, working at a job, extracurricular activities).

Participants randomly assigned to the no instructions condition did not receive any instructions about what to do during the time out period, other than to remain in their chair and to "think about whatever you want." As in the other conditions, they were told that the time out period would last for 1–3 min and that after that, they would be asked to answer a few questions before returning to the videogame.

In Study 4a, the time out period lasted for 1.5 min, whereas in Study 4b, the time out period lasted 1.5 min or 3 min (randomly assigned). At the conclusion of the time out period participants answered questions about their enjoyment of the time out period (detailed below) then played the video game again, after being told that the game would start over and reminded to keep track of their score.

In Study 4a, the game was interrupted with a second 90-s time out period. Participants were given the same instructions they had received earlier about how to spend the time. For example, those in the enjoy condition were again asked to entertain themselves with their thoughts, after listing three topics they would enjoy thinking about that were the same or different from the topics they had listed earlier. Participants in the planning condition were again asked to spend the time planning what they would be doing, this time over the next week instead of the next 48 h. Participants in the no instructions condition were again instructed to think about whatever they wanted. Participants then answered questions about their enjoyment of the second time out period (detailed below), played the video game again for 2 min 30 s, and completed some final dependent measures. In Study 4b, participants played the video game again after the first time out period and then answered the same final dependent measures as in Study 4a (that is, there was not a second time out period).

Dependent measures After each time out period, participants answered these questions: "How enjoyable was the time out period that just ended?" (9-point scale, with 1 = *not at all enjoyable*, 5 = *somewhat enjoyable*, and 9 = *extremely enjoyable*); "How frustrated did you feel during the time out period that just ended?" (9-point scale, with 1 = *not at all frustrated*, 5 = *somewhat frustrated*, and 9 = *extremely frustrating*); "How hard was it to concentrate during the time out period that just ended?" (9-point scale, with 1 = *not at all*, 5 = *somewhat*, and 9 = *extremely*); and "How much are you enjoying the videogame so far?" (9-point Likert scale, with 1 = *not at all*, 5 = *somewhat*, and 9 = *extremely*). Participants also indicated their current mood on the same measures completed at the beginning of the study.

After playing the video game for the final time participants answered the following questions about their overall experience: "How much did you enjoy the videogame you played today?", "How well do you think you performed on the videogame?", "How annoying was it to have to stop playing the game for the time out periods?", and "How enjoyable were the time out periods?", all on 9-point scales with appropriate labels at the midpoint and endpoints. Participants then rated their current mood again on the same measure as before and answered two questions about mind wandering ("To what extent did you find your mind wandering from the task you were focusing on during the time out periods," "How hard was it to concentrate on what you chose to think about during the time out periods?"), both on 9-point scales, with 1 = *not at all*, 5 = *somewhat*, and 9 = *very much*. Next participants estimated how long each of the time out periods had been and described what they had thought about during each period.

Participants then answered the following additional questions: "How frequently did you fidget, make small movements (tapping feet or fingers, etc.) during the time out periods?", "How surprised were you by the thoughts that came into your head during the time out periods?" "During the time out periods, how much did you close your eyes?", "During the time out periods, to what extent was your goal to make plans for what you would do later on?", "During the time out periods, to what extent was your goal to think about things that were pleasant or entertaining?", "During the time out periods, to what extent were you letting your thoughts flow in whatever direction they happened to go?", "During the time out periods, to what extent were you deliberately trying to control the direction your thoughts went?", and "What did you feel the speed of your thoughts was during the time out periods?" Participants answered all of these questions on 9-point scales with appropriate labels at the endpoints and midpoint.

Results and discussion

As predicted, participants in the enjoy condition reported greater enjoyment of the time out periods than did participants in the no instructions or planning conditions. As seen in Table 2, this difference was significant in each of the variations of the procedures in Studies 4a and 4b. Also as predicted, participants in the plan condition reported similar levels of enjoyment to those in the no instructions condition in Study 4a.

Results combined across Studies 4a and 4b Because the variations in procedures across the studies made little difference in the results, we combined the data in the no instruction and enjoy conditions across Studies 4a and 4b for all subsequent analyses. Participants in the enjoy condition reported

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Table 2 Rating of enjoyment of the time out periods in Studies 4a and 4b

		No instructions	Enjoy	Plan
Study 4a (1.5 min) Time out 1	*M*	3.95[a]	4.85[b]	3.69[a]
	SD	1.89	1.59	1.69
	n	42	41	45
Study 4a (1.5 min) Time out 2	*M*	3.67[a]	4.56[b]	3.55[a]
	SD	1.71	1.50	1.80
	n	42	41	44
Study 4b (1.5 min) Time out 1	*M*	4.06[a]	5.19[b]	n/a
	SD	1.59	1.80	
	n	31	31	
Study 4b (3.0 min) Time out 1	*M*	3.60[a]	4.79[b]	n/a
	SD	1.81	1.91	
	n	30	28	

Means within a row with different superscripts differ at $p < .05$

that it was more difficult to concentrate on their thoughts, they had more of a goal to think about pleasant thoughts, they were less likely to let their thoughts flow, and more likely to try to control their thoughts, ts(201) > 2.70, ps < 0.008, than did participants in the no instructions condition (see means in Table 1). In addition, participants in the enjoy condition reported more positive affect right after the time out period, Ms = 2.55 versus 2.28 (SDs = 0.89, 0.76), $F(1, 200) = 14.53$, $p = .001$, and at the end of the study, Ms = 2.41 versus 2.20 (SDs = 0.90, 0.80), $F(1, 200) = 7.90$, $p = .005$.[5] Participants in the enjoy condition also reported that they enjoyed the video game more, both right after the time out period and at the end of the study, ts(201) > 2.88, $p < .005$, suggesting that the improved experience of the time out period extended to their game play. The enjoy instructions did not, however, improve actual play of the game: There were no significant differences in reported game scores, ts(201) < 1. Nor were their significant effects of instructions on how frustrating people said the interruption was, how surprised they were by their thoughts, how much they fidgeted, or how fast their thoughts were, ts(201) < 1.04, ps > 0.30. Interestingly, participants in the enjoy condition reported that they were more annoyed by the time out period, Ms = 5.00 versus 4.29, (SDs = 2.21, 2.16), $t(201) = 2.31$ $p = .02$, in addition to reporting greater enjoyment and more positive affect.

There were few differences in Study 4a between those asked to plan their next 48 h and those given no instructions. The only exceptions were that those in the plan condition reported more of an effort to control their thoughts, Ms = 5.35 versus 4.19 (SDs = 1.90, 1.82), $t(123) = 2.67$, $p = .009$, and less of a tendency to let their thoughts flow, Ms = 5.28 versus 6.38 (SDs = 2.06, 1.90), $t(123) = 2.41$ $p = .02$ than those given no instructions. The bottom line is that participants told how to think during the time out period (either to enjoy or to plan) reported that it was difficult, but this paid off with greater enjoyment only in the enjoy condition.

Did the game interruption lower overall enjoyment? The main result of Studies 1–3 was replicated in both Studies 4a and 4b: Participants instructed to entertain themselves with their thoughts did, indeed, enjoy themselves more than participants asked to think about whatever they wanted. As seen in Table 1, however, overall enjoyment was lower in Study 4 than in any of the previous studies, possibly because participants found the interruption of a fun activity (playing a video game) particularly vexing. To see if this was the case, we ran an additional study that included three versions of the enjoy condition: One that was identical to that used in Studies 4a and 4b, and two others in which participants did not view the time out period as an interruption from the game but simply as another task. Participants in the first, replication version enjoyed the time out period significantly less, supporting the hypothesis that perceiving the thinking period as an interruption of the game play lowered enjoyment. Details of this study can be found in the supplemental materials.

Mediation analyses

To summarize thus far, instructing participants to enjoy their thoughts was effective in a variety of circumstances: while experiencing the frustration of having to stop an enjoyable activity (Studies 4a and 4b), after writing about hassles in one's life (Study 3), while walking on a treadmill or sitting (Study 2), and while in the gym or in the lab. The magnitude of this effect was not trivial: ds = 0.52 (95% CI = 0.20, 0.84), 1.05 (95% CI = 0.67, 1.42), 0.99 (95% CI = 0.65, 1.33), and 0.60 (95% CI = 0.32, 0.88) in Studies 1–4, respectively. Collapsing across all studies, $d = 0.72$ (95% CI = 0.56, 0.88). Why did this effect occur? To address this question we conducted mediation analyses on the data collapsed across Studies 1–4. The general patterns were similar in each individual study (see supplementary materials).

Mediators of the effects of instruction on enjoyment As seen in Table 3, three variables significantly mediated the effects of the instructions manipulation: Participants in the enjoy condition were less likely to say that their minds wandered, less likely to say that their goal was to make plans,

[5] The positive mood index is based on factor analyses of the mood ratings at the outset of the study and right after the time out period, with varimax rotations, and is the average of participants' ratings of happy, interested, excited, joyful, enthusiastic, and cheerful (Cronbach's alphas = 0.92 and 0.93). These analyses are adjusted for participants' initial mood.

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Table 3 Mediation analyses on effects of instructions on enjoyment: data summed across Studies 1–4

Measure	*a (se)*	*b (se)*	*c (se)*	*c' (se)*	*ab (se) [95% CI]*
Mind wandered	−0.44** (0.17)	−0.15*** (0.03)	1.21*** (0.13)	1.15*** (0.13)	0.07 (0.03) [0.02, 0.14]
Goal to make plans	−1.20*** (0.23)	−0.08** (0.03)	1.16*** (0.16)	1.07*** (0.16)	0.09 (0.04) [0.03, 0.19]
Goal pleasant thoughts	1.87*** (0.19)	0.21*** (0.04)	1.16*** (0.16)	0.78*** (0.17)	0.39 (0.08) [0.24, 0.56]
Hard to concentrate	0.56** (0.18)	−0.22*** (0.03)	1.21*** (0.13)	1.34* (0.13)	−0.12 (0.04) [−0.22, −0.05]
Flow	-00.64*** (0.17)	0.00 (0.03)	1.21*** (0.14)	1.21*** (0.13)	0.00 (0.02) [−0.04, 0.05]
Control thoughts	1.04*** (0.19)	0.01 (0.04)	1.16*** (0.16)	1.15*** (0.16)	0.02 (0.04) [−0.06, 0.09]
Surprising thoughts	0.38* (0.17)	−0.07 (0.06)	1.00*** (0.19)	1.03*** (0.19)	−0.03 (0.03) [−0.10, 0.01]
LIWC variables					
Word count	15.26*** (3.95)	0.01*** (0.001)	1.21*** (0.13)	1.11*** (0.13)	0.10 (0.03) [0.05, 0.18]
Social words	1.22* (0.55)	0.03** (0.01)	1.21*** (0.13)	1.17*** (0.13)	0.04 (0.03) [0.0002, 0.10]
Family and friends	0.94*** (0.18)	0.09** (0.03)	1.21*** (0.13)	1.12*** (0.14)	0.09 (0.04) [0.02, 0.17]
Affective processes	1.46*** (0.32)	0.05** (0.02)	1.21*** (0.13)	1.13*** (0.14)	0.08 (0.03) [0.03, 0.15]
Positive emotions	1.67*** (0.37)	0.10*** (0.02)	1.21*** (0.13)	1.04*** (0.14)	0.17 (0.04) [0.10, 0.26]
Inclusive (e.g., with, around, along)	0.88** (0.32)	0.04* (0.02)	1.21*** (0.13)	1.18*** (0.13)	0.03 (0.02) [0.005, 0.09]
Sexual	0.12** (0.04)	0.37* (0.15)	1.21*** (0.13)	1.16*** (0.13)	0.04 (0.02) [0.01, 0.08]
Function words	−1.59* (0.73)	−0.01 (0.007)	1.21*** (0.13)	1.19*** (0.13)	0.02 (0.01) [0.0005, 0.05]
Verbs	−1.13* (0.45)	−0.03* (0.01)	1.21*** (0.13)	1.18*** (0.13)	0.03 (0.02) [0.005, 0.09]

a is the regression coefficient of the instructions manipulation on the mediator. *b* is the regression coefficient of the mediator on enjoyment, adjusted for the instructions manipulation. *c* is the regression coefficient of the instructions manipulation on enjoyment, and *c'* is the regression coefficient of the instructions manipulation on the enjoyment, adjusted for the mediator. The results that are bolded in the far right column represent significant mediation, because the 95% confidence intervals do not include zero

*$p < .05$ **$p < .01$ ***$p < .001$

and more likely to say that their goal was to have pleasant thoughts; and to the extent that each of these was true, the more participants enjoyed their thoughts.

A fourth variable, how hard participants said it was to concentrate on their thoughts, also was a significant mediator, but in a different way than the other variables. Participants in the enjoy condition reported that it was significantly more difficult to concentrate than did participants in the no instructions condition, but difficulty in concentrating was negatively correlated with enjoyment. The direct effect of condition on enjoyment was *higher* when adjusted for difficulty in concentrating, $c' = 1.34$ than when it was not, $c = 1.21$ (see Table 3). In other words, the effects of instructions on concentration suppressed the positive effects of instructions on enjoyment. Or, put differently, motivating people to try to enjoy their thoughts was difficult—it made it hard to concentrate, at a cost to enjoyment—but this was outweighed by the positive benefits, such as less mind wandering.[6] Lastly, it can be seen that the instructions to.enjoy one's thoughts significantly reduced participants' reports of flow, increased efforts to control their thoughts, and increased the frequency of surprising thoughts, but none of these variables mediated the effects of condition on enjoyment.

LIWC coding of reported thoughts Earlier we discussed the possibility that demand characteristics could account for the results: Perhaps participants in the enjoy condition reported that they enjoyed their thoughts in order to be cooperative, not because they really did. To address this possibility, we analyzed participants' reported thoughts during the thinking periods, using LIWC text analysis software (Pennebaker et al. 2007), again collapsed across Studies 1–4. In Table 3, we report the LIWC variables that differed by condition and significantly mediated the effects of condition on enjoyment. As can be seen, participants in the enjoy condition wrote more about their thoughts and reported thinking more about social topics, family and friends, affect, positive emotions, inclusive topics, and sexual topics, and used more function words and verbs. And, to the extent that each of these was true, participants reported greater enjoyment of the thinking period. These results help rule out demand characteristics, because it is unlikely that participants went so far as to make up thoughts that they had not actually had.

[6] As one might expect, reported difficultly in concentrating and mind wandering were positively correlated, $r(673) = 0.52$, $p < .001$ (collapsed across studies). This is consistent with the view that instructing people to enjoy their thoughts had competing effects: it made it harder for people to concentrate on their thoughts, which lowered enjoyment, but to the extent that people succeeded in concentrating, they experienced less mind wandering and greater enjoyment.

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The results are also consistent with prior findings that people who think about social and inclusive topics enjoy thinking more (Wilson et al. 2014).

To summarize the mediation analyses, participants instructed to entertain themselves with their thoughts enjoyed the thinking periods much more than participants given no instructions, at least in part because they (a) had more of a goal to think for pleasure, (b) less of a goal to make plans, (c) their minds wandered less, and (d) they thought about different topics, such as thoughts about family and friends. These results help explain why participants instructed to enjoy their thoughts succeeded in doing so, whereas other studies have found that instructing people to be happy can be difficult or even backfire (Mauss et al. 2011; Schooler et al. 2003). Participants in our studies had the latitude to adopt specific strategies that increased their enjoyment, e.g., recruiting thoughts about their family and friends. Participants in previous studies were more constrained because they were induced to value happiness about a specific external stimulus (e.g., a film), which may have made it more difficult to find a specific strategy that would have increased their enjoyment.

The meta analyses do not speak to the issue, however, of why participants in the no instructions condition did not try to enjoy their thoughts. After all, they were free to think about whatever they wanted and they could have opted to try to think for pleasure and select topics such as their family and friends—just as participants in the enjoy conditions did. Earlier we noted that there are at least four reasons why people given no instructions might not opt to think for pleasure: they might underestimate how much they could enjoy their own thoughts; they might fail to appreciate other benefits such as finding the experience personally meaningful; they might expect it to be effortful; and/or they might have other priorities, such as engaging in planning. We tested each of these possibilities in Study 5 by asking participants to imagine that they experienced a thinking period in a psychology study, to predict what their goals would be, and to forecast how they would feel if they were given various instructions.

Study 5

Method

Participants

Forecaster participants were 74 undergraduate psychology students. One person participated twice; we eliminated her second set of data. The final sample consisted of 52 women and 22 men aged 18–28 ($M = 19.12$, $SD = 1.42$). Sixty-eight percent identified as White/Caucasian, 22% as Asian, 4% as African American, 1% as Hispanic, and 4% as other. Participants received course credit or a payment of $5 for their participation.

Procedure

Participants signed up for an online study. When they clicked the link they were asked to sign a consent form and instructed to complete the study only if they were able to devote their full attention to it free of distractions. Participants then learned that they would read about a psychology study, that they should imagine that they were a participant in it, and to predict how they would respond. They were told that the study involved thought processes in everyday life, that participants were asked to store all of their belongings before participating, and that they completed the remainder of the study on a computer, alone in an unadorned room. After answering some comprehension questions to make sure they understood the instructions, participants were told that in the study participants were asked to "spend some time thinking during what we call the Thinking Period." Half of the forecasters were told that the thinking period would last 3 min, half that it would last 6 min. This manipulation did not significantly influence any of the dependent measures and thus will not be discussed further.

Predicted goals The instructions then asked forecasters to suppose that they could use the thinking period to "think about whatever you want," and asked them to indicate the extent to which their goal would be to "make plans for what I would do later on," "entertain myself with my thoughts so that it is an enjoyable experience," "to think about personally meaningful topics," and "to try to solve problems in my life," all on 9-point scales where *1 = not at all, 5 = somewhat*, and *9 = very much*. Forecasters also indicated whether they would have another thinking goal (and if so, what), and described what they would think about during the thinking period.

Forecasted reactions to different thinking instructions Forecasters were then asked to predict their responses if they were instructed to spend the thinking period in each of three ways: entertaining themselves with their thoughts, thinking about whatever they wanted, and planning what they would be doing over the next 48 h, in random order (there were no significant effects of order on participants' responses). For each thinking instruction, they rated how enjoyable, entertaining, and boring the thinking period would be and how much their minds would wander and how hard it would be to concentrate, on scales identical to those used in Study 2. Participants also rated how good a use of their time it would be to think in each way (e.g., entertain themselves with their thoughts), how personally meaningful the experience would

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Table 4 Study 5: participants' forecasted responses

Predictions	Entertainment	No instructions	Planning	Omnibus F(2, 146)
Enjoyment	5.85 (1.97)[a]	5.46 (1.87)[a]	4.91 (1.59)[b]	6.27***
Mind wandering	7.24 (1.81)[a]	7.32 (1.67)[a]	5.34 (2.00)[b]	37.01***
Difficulty concentrating	5.57 (2.54)[a]	5.69 (2.23)[a]	4.39 (2.01)[b]	9.97**
Good use of time	3.84 (2.11)[a]	4.42 (2.26)[b]	6.42 (1.64)[c]	43.37***
Personally meaningful	4.31 (2.01)[a]	4.77 (2.07)[b]	4.91 (2.08)[b]	3.41*
Difficult	4.54 (2.34)[a]	3.69 (2.38)[b]	3.81 (1.62)[b]	4.79*
Effortful	4.51 (2.06)[a]	3.82 (2.25)[b]	4.55 (1.73)[a]	4.13*

The sample size was $n = 74$. Means that have different superscripts within a row differ significantly at $p < .05$

be, how difficult it would be, and how much effort it would take, all on 9-point scales with appropriate labels. Participants then indicated how they would spend their time in various ways in their everyday lives if they had 5 min to spare (entertain themselves with their thoughts, plan what they would be doing over the next 48 h, think in some other way, do something on their phones, and watch television), and how worthwhile each of these activities would be.

Results and discussion

Did forecasters anticipate that trying to think for pleasure would be more enjoyable than thinking about whatever they wanted? As seen in the first two columns of Table 4, they reported that trying to entertain themselves would be somewhat more enjoyable than having no instructions, $t(73) = 1.77$, $p = .08$, $d = 0.21$ (95% CI = −0.02, 0.44), but this difference was considerably smaller than what we obtained in Studies 1–4 ($d = 0.72$). Because the confidence interval of d for the predicted difference did not overlap with the confidence interval for the actual effect of enjoyment instructions in Studies 1–4 (95% CI = 0.56, 0.88), we can conclude that forecasters significantly underestimated how enjoyable thinking for pleasure would be.[7] On the other hand, we found in an additional forecasting study that when participants were given a detailed description of the procedures of Study 1, complete with examples of topics they might think about, they more accurately predicted how enjoyable it would be (this study is reported in the supplemental materials). In other words, people did not fully appreciate how enjoyable thinking for pleasure would be when asked to imagine doing so in the abstract, but when participants were given a detailed description of what it would be like to do so, including examples of topics they could think about, they make more accurate forecasts. Thus, the evidence that participants misforecasted their enjoyment of thinking for pleasure is tentative.

Did forecasters anticipate other benefits of thinking for pleasure, such as how personally meaningful it would be? As seen in Table 4, forecasters predicted that they would find thinking about whatever they wanted, as compared to trying to enjoy their thoughts, to be *more* personally meaningful, $t(73) = 2.15$, $p = .035$. Note that this forecast is in the opposite direction of actual differences in meaningfulness found in Study 1: In that study, participants in the no instructions condition found the experience to be *less* meaningful than did participants in the enjoy condition. Although this difference was not significant, $p = .10$, it has been replicated in two subsequent studies (Wilson et al. 2017). Thus, one reason participants in the no instructions condition chose not to think for pleasure may be that they underestimated how meaningful that experience would be.

Did forecasters anticipate that thinking for pleasure would be more effortful than thinking about whatever they wanted? As seen in Table 4 they did, reporting that thinking for pleasure would be both more effortful and more difficult, $t(73) = 3.05$, $p = .003$ and $t(73) = 3.68$, $p < .001$, respectively. Thus, another reason why participants in the no instructions condition chose not to think for pleasure may be that they did not want to expend the effort.

Lastly, did forecasters report that engaging in other types of thinking, such as planning, would be more valuable than thinking for pleasure? As seen in Table 4, they anticipated that planning would be less enjoyable than thinking for pleasure, but also more personally meaningful, less difficult, and a better use of their time. And, when asked what their goal would be during the thinking period, if they were free to do whatever they wanted, forecasters showed a strong preference to engage in planning, as seen in Table 5.

[7] Comparing the means in Table 4 to the means in Table 5 suggests that people overestimated how enjoyable it would be to think with no instructions more than they underestimated how enjoyable it would be to try to entertain themselves with their thoughts. It is difficult to make absolute comparisons, however, given that forecasters were not given a detailed description of the methods of each study. The main point is that participants underestimated the relative difference between being given no instructions and being asked to think for pleasure.

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The goal to make plans was rated significantly higher than each of the other three goals, $Fs(1, 73) > 13.64$, $ps < 0.001$. There were no significant differences between the ratings of the other three goals, $Fs(2, 146) = 203$, $p = .14$.

In other words, forecasters clearly believed that their time would be better spent planning, even if this mental activity was less enjoyable. Consistent with this result, participants in the no instructions conditions of Studies 1–4 reported that their goal was to plan more so than did participants in the enjoy condition (see Table 1). But were participants correct that planning is, on balance, a better way to spend their time than thinking for pleasure? Although the present studies cannot definitively answer this question, we can point to at least one way in which participants appear to be overestimating the value of planning: how personally meaningful it will be. In a subsequent study, participants were randomly assigned to spend spare moments during the day enjoying their thoughts, engaging in planning, or doing what they normally do at such times (Wilson et al. 2017). Participants in the enjoy condition reported that this experience was significantly more personally meaningful than did participants in the planning or normal activity conditions, suggesting that not only were forecasters in Study 5 incorrect in their predictions about how meaningful planning would be, these predictions were in the opposite direction to the true effect.

General discussion

Sometimes people find themselves temporarily blocked from pursuing their goals, such as when they just miss a traffic light, have to wait in line at the department of motor vehicles, or can't fall asleep at night. Other times, people simply have a few minutes to spare. Studies 1–4 found that people enjoyed such times more if they were given the goal to entertain themselves with their thoughts than if they were given no instructions. This effect occurred in a wide range of circumstances, including when people were walking or sitting (Study 2), in a neutral or bad mood (Study 3), and after a frustrating interruption of a fun activity (Study 4).

In many ways, the most striking result of Studies 1–4 is how little people enjoyed themselves when given the freedom to think about whatever they wanted. One possible reason for this is that participants knew exactly what they could gain by thinking for pleasure but believed that it would be more worthwhile to engage in a different mental activity, namely planning. Consistent with this view, participants in the no instructions conditions of Studies 1–4 reported that their goal was to plan more than it was to enjoy their thoughts (see Table 1), and forecasters in Study 5 predicted that planning would be less difficult and a better use of their time than thinking for pleasure. The results of Study 5 also suggested, however, that forecasters underestimated how personally meaningful it would be to think for pleasure and (to some extent) how enjoyable it would be.

Indeed, in a subsequent study, participants who were randomly assigned to try to enjoy their thoughts during spare times in a day, as compared to participants randomly assigned to engage in planning, reported that the experience was more enjoyable, more relaxing, more personally meaningful, and no less worthwhile (Wilson et al. 2017). Although there may well be benefits to planning over thinking for pleasure, these results show that thinking for pleasure has benefits that planning does not, suggesting that if participants really knew what it would be like to think for pleasure, they might be more inclined to try it on their own.

To be sure, the absolute level of enjoyment of thinking for pleasure was not very high in the present studies. Consistent with previous studies of "just thinking," the mean ratings of enjoyment in this condition were in the 5–6 range on the 9-point scale (see Table 1). And, it is important to note that these ratings are lower than the enjoyment people get from engaging in everyday activities such as playing with their phones, reading, or watching television (Buttrick et al. 2017; Smith and Frank 2015; Wilson et al. 2014, Study 8). Thus, if people's goal is purely hedonic, the choice is clear: Avoid thinking altogether and turn on the television or reach for the smart phone (Franklin et al. 2013; Killingsworth and Gilbert 2010; Song and Wang 2012).

Sometimes external activities are unavailable or undesirable, however, such as when people are lying in bed trying to sleep. Further, much has been written about how something is lost by becoming too reliant on electronic devices (e.g., Carr 2011; Kushlev et al. 2015; Powers 2010; Wayne 2016). Often this debate is about the virtues of technology versus other types of engagement with the world, such as reading or social interaction (e.g., Carr 2011), rather than a comparison of engaging in external activities with "just thinking." Are there virtues to thinking as compared to surfing the web or watching television?

Table 5 Study 5: Rated goals during the thinking period

Goal	Mean (*SD*)
Make plans	7.11 (1.68)
Entertain myself with thoughts	5.77 (2.21)
Solve problems in my life	5.26 (1.92)
Personally meaningful topics	5.18 (2.00)

The sample size was $n = 74$. The extent to which people would have each goal was rated on a 9-point scale where *1 = not at all, 5 = somewhat, 9 = very much*

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Table 6 Study 5: Predictions about how enjoyable and worthwhile everyday activities would be

Activity	How enjoyable	How worthwhile
Entertain with thoughts	5.54[a] (2.04)	4.32[a] (2.05)
Think in some other way	5.12[a] (1.67)	5.38[b] (1.95)
Something on phone	6.49[b] (1.82)	4.30[a] (2.14)
Watch TV	6.39[b] (2.16)	3.39[c] (2.03)
Planning 48 hours	5.39[a] (1.89)	7.31[d] (1.57)

Means within a column that do not share a superscript differ at $p < .05$

The sample size was $n = 74$. Enjoyment was rated on a 9-point scale where *1 = not at all enjoyable, 5 = somewhat enjoyable*, and *9 = extremely enjoyable*. How worthwhile was rated on a 9-point scale where *1 = not at all worthwhile, 5 = somewhat worthwhile*, and *9 = extremely worthwhile*

Although research on this question is sparse, our participants had an opinion about the answer. In Study 5, we asked participants to imagine that they were by themselves and had 5 min with nothing to do, and then to rate how enjoyable and worthwhile they would find a variety of activities, including entertaining themselves with their thoughts. As seen in Table 6, participants indicated that they would find it more enjoyable to do something on their phones or watch television than to try to enjoy their thoughts or think in some other way. When asked how *worthwhile* each activity would be, however, defined as being a good use of their time, participants rated playing with their phones and watching television as less worthwhile than various kinds of thinking (see Table 6). Thus, participants seemed to view playing with their phones and watching television as "guilty pleasures" that were fun but not a good use of their time. In contrast, thinking was viewed as less enjoyable but a better use of their time.

It will take more research to untangle the conditions under which people are willing to put aside their electronic devices to just think and to determine the exact value of different kinds of thought. The present studies suggest that thinking for pleasure may be undervalued, however, and may be a viable alternative to "device obsession," especially if people's goal is to find meaning as well as pleasure.

Acknowledgements The research reported here was supported by National Science Foundation Grant BCS-1423747. We thank Doug Tannen and Jeramy Spitzer for assistance with Study 2.

Compliance with ethical standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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