Situational Cues in Thoughts About the Future: Relationships With Self-Reported and Actual Self-Regulation Success

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Abstract

Based on stimulus-response learning accounts, we argue that including situational cues in thought about intended actions is an important aspect of self-regulation success in general and in successfully implementing delayed intentions. Accordingly, in Study 1 ($N = 328$) we replicate a previous study and show a positive relationship between the self-reported inclusion of situational cues in thoughts about intended actions and beliefs of self-regulation success. In Study 2 ($N = 136$) we find a similar tendency when measuring self-regulation success with an assigned task to be completed within one week. Our results fit with if-then planning perspectives on how to facilitate novel behavior and recent perspectives that attribute self-regulation success to beneficial habits.

Keywords: self-regulation, stimulus-response learning, habit, if-then planning

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Actual Self-regulation Success

Self-regulation success refers to behavior in line with one's standards or goals (Freund & Hennecke, 2015), and includes both the avoidance of undesired behavior (e.g., not eating junk food) and the enactment of desired behavior (e.g., eating fruit). Failure to regulate behavior can come with personal costs (e.g., reduced individual well-being; Brunstein, 1993) and societal costs (e.g., increased health care spending from a population's failure to adhere to a medication schedule; Kleinsinger, 2018). While research has linked different personality traits to higher self-regulation success in different domains (e.g., Tett et al., 2021), the mechanisms behind how these traits contribute to self-regulation require further investigation. In the present research we investigated a mechanism that may contribute to an individual's overall self-regulation success by facilitating the enactment of intended behaviors in the future. More specifically, we investigated the relevance of including situational cues in thoughts about intended novel behaviors.

Successful Self-Regulation Through Habits

Self-regulation success is often explained by one's ability to effortfully control oneself to avoid behavior that is perceived to interfere with long-term goals (e.g., Gillebaart, 2018). However, recent research supports the idea that self-regulation success is instead a consequence of effortless, habit-like behaviors (Adriaanse et al., 2014; Galla & Duckworth, 2015; Good et al., 2020; Grund & Carstens, 2019). Habits are associations between a situational cue and a behavior. They are acquired through repetition (Wood & Rünger, 2016), such that the cue triggers the associated behavior efficiently and effortlessly. A meta-analysis by de Ridder et al. (2012) revealed a positive relationship between beneficial habits and the successful regulation of behavior. Importantly, this relationship was stronger than the relationship between effortfully controlling behavior and self-regulation success. The novel

perspective that self-control and self-regulation success are driven by *having* beneficial habits highlights the relevance of understanding how novel behaviors are successfully implemented in a given situation so that they may turn into beneficial habits. In the next section we will introduce one specific mechanism that has been shown to facilitate the implementation of novel behaviors.

How to Facilitate Novel Behavior

While habits are useful for maintaining previously-expressed behavior, they offer no benefits for explaining novel behavior. Thus, the question arises of how novel intended behaviors are initially facilitated so that they can become beneficial habits. One potential answer is that processing verbal information that includes a stimulus and a response acts as a substitute for the direct stimulus-response experiences that typically lead to habit formation (Gollwitzer, 1999; Martiny-Huenger et al., 2015, 2017; see also Damanskyy et al., 2022). For example, verbal situation-response links in the form of if-then action plans (e.g., "When I enter the grocery store, then I will go to the fruit and vegetable section") have been shown to facilitate the implementation of novel behavior in the specified situation (implementation intentions; reviewed by Bieleke et al., 2021; Gollwitzer & Crosby 2018; Gollwitzer & Sheeran, 2006). We build upon this idea in the present research but with a focus on the spontaneous use of thought in a situation-response format.

Self-Regulation Success by Habitually Thinking of Situational Cues

Whereas previous research indicates that the implementation of novel behavior can be facilitated by outfitting participants with specific if-then plans or training them to construct the plans themselves (e.g., Armitage, 2007), recent research has investigated the impact of spontaneously including situational cues when thinking about intentions (Martiny-Huenger et al., 2022; see also Martiny-Huenger et al., 2017). The authors asked participants about their tendency to envision situational cues when thinking about intended future actions. In other

words, from the perspective of implementation-intention research, they measured the degree to which participants tend to think about intended actions in the form of mere intentions ("I need to do R"; no situational cue included) or in the form of if-then plans (When I see S, then I'll do R; Gollwitzer, 1999; situational cue included). Participants who were more likely to link intended responses to situational cues in thought reported more overall self-regulation success. Thus, habitually including situational cues in thought about intended actions may provide a mechanism for the implementation of (novel) delayed intentions – by establishing beneficial stimulus-response links – and it serves as a possible explanation for individual differences in self-regulation success.

The Present Research

While presenting a novel approach to understanding self-regulation outcomes, a problem with the previously mentioned study (Martiny-Huenger et al., 2022) is that the relationship between including situational cues in thoughts about future actions and self-regulation success was only partially supported by the analyses. The authors attributed this to a methodological artifact: one questionnaire included reverse-scored items, whereas the others did not. Exploratory post-hoc analyses supported this assumption, leading the authors to conclude that the study provided support for their hypothesis. However, due to the uncertainties related to such post-hoc reasoning, in Study 1, we replicated these findings (using self-reported self-regulation success) with an updated methodology. Another issue is the use of self-reported beliefs about self-regulation success. Such beliefs may not reflect actual success in self-regulation in general or success in implementing delayed intentions. Thus, in Study 2, we substantiated the previous results by objectively measuring self-regulation success on an assigned task as a direct behavioral measurement of successfully implementing a single, novel delayed intention.

Study 1: A Validation of Prior Self-Report Findings

The aim of Study 1 was to replicate Martiny-Huenger et al. (2022). Their ambiguous results may have been caused by some questionnaires only including positively formulated items (the cue-thought questionnaire and self-efficacy beliefs) while the other included reverse-scored items (self-control beliefs). Invariant responders (i.e., participants responding mostly with the same high or low value) could artificially increase observed relationships between the questionnaires that included only positively formulated items, but artificially reduce the relationship with the questionnaire that included reverse-scored items. In the present study, all questionnaires were modified to include a 50% split of normal and reverse-scored items. As in the original study, self-regulation success is operationalized as self-reported self-efficacy and self-control beliefs. Self-reports on these questionnaires are thought to reflect actual mastery experiences (Bandura, 2010; Locke et al., 1984). Thus, they should to some extent reflect a person's objective self-regulation success. If the reasoning about reverse-scored items is valid, we should find comparable results to the post-hoc analyses in Martiny-Huenger et al. (2022): a positive relationship between habitually including situational cues in thoughts about future actions and self-regulation success. In addition, we also tested whether habitually including situational cues in thoughts about future actions mediated the relationship between conscientiousness – an individual's propensity to stick to routines and make plans – and self-regulation success as suggested by previous exploratory analyses (Martiny-Huenger et al., 2022).

Methods

Participants and Design

Sample size, data treatment, and hypotheses were pre-registered on OSF (Open Science Framework) before data collection (https://osf.io/wdaun) and ethics approval was received from the first author's departmental ethics board. Participants from the United Kingdom were recruited through a European-based company (Toluna, 2022) in return for a

monetary compensation. No power analysis was done. Instead, based on Martiny-Huenger et al. (2022), the sample size was set to at least 400 participants. No analyses were performed before the complete reported sample was obtained. The data collection took place in June 2021; after one week 407 participants had fulfilled the minimum criterion of spending at least 7 minutes on the questionnaire. The resulting sample has an age range of 19 - 81 ($M = 45.76$; $SD = 15.54$) and consists of 198 who identified as male, 206 who identified as female, one who responded with the "other" option, and two who chose not to indicate their gender. Data cleaning in line with the pre-registration resulted in the exclusion of 79 participants (see Data Preparation section for details). The final analyzed sample consists of 328 participants (157 male, 170 female, 1 no response), with an age range of 19 - 81 ($M = 47.70$, $SD = 15.48$).

We used a correlational design with the self-reported habitual inclusion of situational cues in thoughts about intended actions (i.e., cue-thought habits) as the primary predictor and self-efficacy and self-control beliefs as the primary outcome variables. In the mediation analysis, we included conscientiousness as a predictor, self-efficacy and self-control as outcomes, and cue-thought habits as the mediator variable.

Materials and Procedure

Participants completed the online questionnaire on a personal computer at a time of their own choice. Questionnaires were presented in the following order: the cue-thought habit questionnaire, the self-efficacy scale which included the first attention check ("If you are still following, click button three"), the self-control scale, and the measure of conscientiousness and neuroticism from the Big 5 personality trait inventory which included the second attention check. This was followed by two questions measuring participants' comprehension of the concepts "intended action" and "situational cues" (e.g., "I believe I understood what was meant by thinking about *future actions*" and "I believe I understood what was meant by thinking about future actions in a format that included *situations* in which the action could be

performed"). Finally, participants were asked whether they answered the questions honestly, their age, and their gender before they were debriefed.

Cue-Thought Habit Questionnaire. We used the cue-thought habit questionnaire from Martiny-Huenger et al. (2022), which is an adapted version of Verplanken et al.'s (2007) mental habit questionnaire. For each item participants first read "Thinking about situations when thinking about future actions is something...". This was followed by 8 phrases, one at a time, to complete the sentence ("... I rarely do", "… I do every day", "... I have been doing for a long time", "... I would need to be reminded to do", "... I start doing before I realize I'm doing it", "... I would find hard to do", "... that feels sort of natural to me", "... that is not typically me"). Participants responded on a 7-point Likert scale, from 1 (Not at all true) to 7 (Exactly true) to each item. The original questionnaire (Martiny-Huenger et al., 2022) contained only positively formulated items. To obtain a 50% split of positive and reversed items we modified half of the items. We modified "I do frequently" to "I rarely do," "That is typically me" to "That is not typically me," "I would find hard not to do" to "I would find hard to do," and "I do automatically" to "I would need to be reminded to do." We also excluded one of the original items to reach an even split. We decided to exclude the item "I do unintentionally," as it might be misconstrued as unintentionally thinking about intended actions rather than situational cues. The final questionnaire included 8 items, of which 4 were worded so that higher responses reflected higher scores, and 4 were worded so that higher responses reflected lower scores (see Appendix A). The latter were reverse scored before the data analysis.

Self-Efficacy Beliefs. The English version of the 10-item Brief Self-Efficacy Scale (Schwarzer et al., 1997) was used. Each item was rated on a 7-point Likert scale, from 1 (Not at all true) to 7 (Exactly true). The original questionnaire contains only positively formulated items. We reversed item directions for half of the items. For example, we changed "I remain

calm when facing difficulties because I can rely on my coping abilities" to "I get stressed when facing difficulties because I don't trust my coping abilities," and "When I am confronted with a problem, I can usually find several solutions" to "When I am confronted with a problem, I often have trouble finding solutions." The final questionnaire included 10 items, of which 5 were worded such that higher responses reflected higher scores, and 5 were worded so that higher responses reflected lower scores (see Appendix B). The latter were reverse scored before the data analysis.

Self-Control Beliefs. We used the Brief Self-Control Scale (Tangney et al., 2004). Each item was rated on a 7-point Likert scale, from 1 (Not at all true) to 7 (Exactly true). The scale consists of 13 items, of which only 4 are positively formulated and 9 are reversed. Therefore, we modified some reversed items to reach a 50% split of positive and reversed items. We changed "I wish I had more self-discipline" to "I have good self-discipline," and "I have trouble concentrating" to "I am good at concentrating." In addition, we excluded one item because we believed that it resembled the opposite of the cue-thought construct too closely ("I often act without thinking through all the alternatives"). The final questionnaire included 12 items, of which 6 were worded such that higher responses reflected higher scores, and 6 were worded so that higher responses reflected lower scores (see Appendix C). The latter were reverse scored before the data analysis.

Big Five Personality Trait Inventory. We used the conscientiousness and neuroticism subscales form the Mini-IPIP (Donnellan et al., 2006). The subscale for each trait included four items each. Each item was rated on a 7-point Likert scale, from 1 (Not at all true) to 7 (Exactly true). We made no changes to the items because they already consisted of 50% reverse-scored items (see Appendix D)

Paired-Associates Task. Participants also did a paired-associates task at the start and end of the survey, adapted from Williams and Pearlberg (2006). The task is designed to measure a person's ability to establish associations by having participants memorize and recollect a list of word pairs. However, the distribution of test scores was extremely skewed, preventing a correlation analysis. For this reason, we did not include any further information in the main body of the manuscript. See Appendix E for details.

Data Preparation

We excluded participants following pre-registered criteria (https://osf.io/wdaun). Twenty-two participants admitted to not answering all questions honestly and were excluded. Furthermore, we excluded the data of 57 participants for failing both attention checks. We used the Tukey boxplot method (Tukey, 1977) to investigate extreme scores that fell beyond three times the interquartile range on the two comprehension questions regarding participants' understanding of the concepts of a situational cue ($M = 5.68$, $SD = 1.19$) and an intended action ($M = 5.59$, $SD = 1.19$). No extreme scores were identified on either scale. One pre-registered criterion was only relevant to the paired-associates task (removing participants that reported using a strategy like pen and paper during the task). However, since we do not use the paired associates task data in our analysis because of the extremely skewed distribution (see section Materials and Procedure and Appendix E for details), these participants were included in the analyzed sample. This resulted in a sample of 328 participants. Internal consistency was acceptable for all the questionnaires (Cronbach's alpha >= 0.656, see Table 1). We therefore created mean scores for each participant and each questionnaire to use in the analyses.

Results

Cue-Thought Habit and Self-Regulation Success (Primary Hypothesis)

Pearson's correlation coefficients between cue-thought habits and our main outcome variables self-efficacy and self-control beliefs were in line with our primary hypothesis (see Table 1 and Figure 1, top two lines). A higher score on the cue-thought habit questionnaire was significantly related to higher scores on the self-efficacy and self-control scales.

Table 1.

Correlation Table of Variables in Main Analysis with Cronbach's Alpha on the Diagonal

	1	2	3	4	5
1. CTH [a]	**0.734**				
2. Effic.[b]	0.393***	**0.858**			
3. Cont.[c]	0.248***	0.510***	**0.826**		
4. Cons.[d]	0.352***	0.427***	0.572***	**0.656**	
5. Neur.[e]	-0.097	-0.534***	-0.419***	-0.350***	**0.776**

Notes. [a] Cue-thought habit. [b] Self-efficacy. [c] Self-control. [d] Conscientiousness. [e] Neuroticism.
*** $p < 0.001$.

Mediation Analyses

In line with the exploratory analyses in Martiny-Huenger et al. (2022), we investigated the potential mediation of cue-thought habits in the relation between conscientiousness and self-regulation success. We used the Hayes PROCESS macro (Hayes, 2022) in R (R Core Team, 2022) to conduct two mediation analyses. We ran the models with 10,000 bootstrapped confidence intervals. We found a significant indirect effect of cue-thought habits on the relationship between conscientiousness and self-efficacy, as the confidence interval does not include zero (*std. b* = 0.097, 95% CI [0.049, 0.153]). We did not find a significant indirect effect in the same analysis with self-control as dependent variable (*std b.* = 0.019, 95% CI [-0.020, 0.058]). This indicates that cue-thought habits partially mediate the relationship between conscientiousness and the self-efficacy scale but not the self-control scale.

Discussion

Previous results (Martiny-Huenger et al., 2022) could not unambiguously be interpreted as evidence for a positive relationship between participants' inclusion of situational cues in thought about intended future action and self-regulation success. This ambiguity may have been caused by testing relationships between the cue-thought habit questionnaire and questionnaires that included (self-control) or did not include (self-efficacy) reverse-scored items. In the present replication, we resolved this issue a priori by adjusting all questionnaires to include a 50% split of normally and reverse-scored items. The results replicate and confirm the conclusions from Martiny-Huenger et al. (2022). We found that participants who reported more habitually including situational cues in thought about future actions also reported higher self-regulation success as measured by both the self-efficacy scale and self-control scale (primary pre-registered hypotheses).

Furthermore, in line with Martiny-Huenger et al. (2022; our secondary pre-registered hypotheses), we found that cue-thought habits partially mediated the relationship between conscientiousness and the self-efficacy scale as the dependent variable. In contrast, in this first study, we found no evidence of a mediation effect with the self-control scale as the dependent variable. This mirrors the more ambiguous results from Martiny-Huenger et al. However, we will revisit this conclusion when discussing the combined results from Study 1 and Study 2 in the General Discussion section.

Finally, we must note some deviations from the pre-registered analysis approach. First, we could not evaluate the other secondary hypothesis related to the associative-learning capacity as the measure resulted in an extremely skewed distribution of test scores. Second, we had planned to use regression analyses to test the central relationships. As these regression analyses (between two variables) are identical to the reported correlation analyses, we omitted

the additional regression analyses. Similarly, for the mediation analyses we reported the more state-of-the-art PROCESS macro approach (Hayes, 2022).

Study 2: Measuring Self-Regulation Success Through Actual Behavior

Study 1 provided additional evidence for a positive relationship between the extent to which participants report including situational cues in thoughts about future actions and self-reported self-regulation success. In Study 2, we investigated this relationship using a behavioral measure of self-regulation success. For this purpose, we presented participants with a task to complete within one week and analyzed the relationship between the self-reported habitual inclusion of situational cues in thought about intended action and actual task-completion. Participants were instructed to take a picture of a hand sanitizer from a local public place and upload it to our website. As we were interested in the completion of a delayed intention, we designed the task so that it was unlikely that participants could complete it during the survey or immediately afterwards. In addition, to exclude participants who somehow managed to have the required image ready during or right after completing the survey, we pre-registered to not include participant data related to images uploaded within two hours after completing the survey.

In general, we hypothesized that while reading the task instructions or when remembering the task in a situation where it could not be completed, participants who habitually include situations in thoughts about future actions would think of a situation where they could complete the delayed image upload task (e.g., "next time I go to my local store I should take the picture"). As such, they should be more likely to create beneficial situation-response links that facilitate the completion of the task compared to participants who do not typically include situational cues in thoughts about future actions (e.g., "I must remember to take that picture"). Consequently, our central prediction was that a greater self-reported

tendency to include situations in thoughts about future actions (i.e., cue-thought habits) would relate to a higher likelihood of completing the delayed image upload task.

To provide an additional replication of the relationships reported in the first study, we also assessed self-efficacy and self-control beliefs, and the personality traits conscientiousness and neuroticism. Furthermore, prior studies on strategic if-then planning showed that participants who created if-then plans complete an assigned task closer to a specified critical situation compared to participants who did not create if-then plans (Gollwitzer & Brandstätter, 1997; Koole & Spijker 2000; Szarras-Kudzia & Niedźwieńska, 2022). Our study design did not allow us to measure the timing between the intended and actual completion of the assigned task. However, as both the time of completing the task instructions and uploading the image were available, we also tested whether high cue-thought participants would upload a picture sooner compared to low cue-thought participants.

Methods

Participants and Design

Sample size, data treatment, and hypotheses were pre-registered on OSF (Open Science Framework) before data collection (https://osf.io/kwx96) and ethics approval was received from the first author's departmental ethics board. Norwegian participants were recruited through the European-based company Toluna (Toluna, 2022). Sample size was determined through a power analysis conducted in the software GPower (Faul et al., 2009) based on Bamberg (2000), which used a similar assigned task and found an effect of $b = 0.22$. With an effect size of 0.22, an alpha level of 0.05 and a power of 95%, the power analysis indicated that we needed 215 participants. Prior experience led us to expect relatively high exclusion rates based on the pre-registered data-cleaning criteria. Thus, we aimed to collect 400 participants. The survey was conducted online. Participants were given a monetary compensation from the recruitment company for completing the survey. No additional

incentive was given for successful image uploads during the week after completing the survey. We continuously monitored the completion rate based on the minimum criterion of having a survey completion time greater than 6 minutes. The data collection took place in February of 2022 and was stopped after 4 weeks when further recruitment efforts remained unsuccessful. No data analysis was conducted before the determination of the recruitment. Initial data screening removing unusable data (see the Data Preparation section for details) resulted in a full sample of 339 participants. The sample had an age range of 18-76 ($M =$ 39.87, $SD =$ 13.99), and included 140 participants who identified as male, 194 participants who identified as female and five participants who responded with the "other" option. Pre-registered data cleaning led to the exclusion of 203 participants. The sample based on the pre-registered criteria consists of 136 participants, with an age range of 19-70 ($M =$ 40.53, $SD =$ 12.55), in which 41 identified as male, 92 identified as female and three responded with the "other" option. Because of the high exclusion rate based on one pre-registered criteria (i.e., the test image upload during the instructions), we also provide the results for all central analyses from a sample that did not follow this technical criterion ($N =$ 292) (See Data Preparation section for further details).

We used a correlational design. The primary predictor is the self-reported tendency to include situational cues in thoughts about future actions (i.e., cue-thought habits). The primary outcome is the delayed image upload task, recorded as a binary variable (0 for no image upload and 1 for successful image upload). Additionally assessed variables are the time between survey completion and image upload, self-efficacy and self-control beliefs, and the personality traits of conscientiousness and neuroticism.

Materials and Procedure

Participants completed the online questionnaire on a personal computer at a time of their own choice. The survey began with an explanation of the delayed image upload task. As

a cover story we told participants that hand sanitizer dispensers are placed in public spaces to attract attention, and by sending us a picture of a dispenser they can help us investigate factors related to everyday attention. Thereafter, participants received step-by-step information on how to store the link to the website where they could upload the picture to our server. They were then instructed to create a participant code to anonymously link the survey responses with the uploaded images. Following this, participants were instructed to upload a test image to our server using their smartphone to confirm that they knew how to upload an image. A summary of the delayed image upload task followed, and participants were asked to indicate on a Likert scale from 1 (completely disagree) to 7 (fully agree) if they understood the image upload instructions and if they intended to upload an image. Following this, the participants were presented with the four questionnaires used in Study 1 in the following order: BIG 5 conscientiousness and neuroticism subscales (Donnellan et al., 2006), cue-thought habits (Martiny-Huenger et al., 2022), self-efficacy (Schwarzer et al., 1997), and self-control (Tangney et al., 2004). The questionnaires were the same as described in Study 1, except that all items were translated into Norwegian by the first author (see Appendix F). At the end of the survey, participants were asked for their age and gender, and if they answered all questions honestly.

Data Preparation

Initial data screening identified two participants who indicated an age below 18. The data of these participants was deleted. Furthermore, we found that five participants spent 10.4, 24.9, 27.0, 69.4 and 79.0 hours on the survey (median = 9.61 minutes). As these participants could have kept the survey browser window open during this time, this may have influenced their image upload task performance by reminding them of the task. Therefore, the data of these five participants was removed. There were also 17 duplicate participant codes, which

made linking the survey data and the image-upload data impossible. Additionally removing the data of these participants resulted in a full sample of 339.

Pre-Registered Sample. Starting with the full sample ($N = 339$), we excluded participants based on the following pre-registered criteria (https://osf.io/kwx96). The data of six participants were excluded for indicating that they did not answer all questions honestly. The data of another 12 participants were excluded for failing both attention checks. Based on a manual check of the images, five pictures were not of a hand sanitizer dispenser and the data of these participants were therefore excluded. The data of an additional 11 participants were excluded for uploading an image within 2 hours after completing the survey. We investigated extreme scores that fell beyond three times the interquartile range (boxplot; Tukey, 1977) on the following two questions: No extreme scores were identified for the question "I intend to send a picture of a hand sanitizer" (7-point scale; $M = 5.55$; $SD = 2.12$). The data of 14 participants were identified as extreme scores on the question "I understood the instructions" (7-point scale) and excluded (scores of 2 or below in the full sample mean of 6.17, $SD = 1.46$). Lastly, the data of 156 participants were excluded for not uploading a test image during the instruction portion of the study. This resulted in a pre-registered sample of 136.

Quality Criteria Sample (Not Pre-registered). Because of the large number of participants who did not upload a test image ($N = 156$), we provide additional analyses without excluding these participants. This sample passed all pre-registered data quality criteria (see previous section) but did not necessarily upload a test image. The results of this sample ($N = 292$) are labeled the "quality criteria" sample.

Internal Consistency. Internal consistency was at a minimum acceptable for all the questionnaires (see Table 2; lowest Cronbach's alpha = 0.637). Thus, participants' mean scores were used in the analyses for each questionnaire.

Delayed Image Upload Task. Ninety-three images were uploaded to our website. Eleven images lacked a corresponding participant code in the survey file and therefore could not be linked to the survey data. Two participants uploaded several images. Only the first uploaded image was considered. Thus, the final number of participants who completed the task in the preregistered sample ($N = 136$) was 47 (34.6 %) and the final number in the quality criteria sample ($N = 292$) was 55 (18.8%).
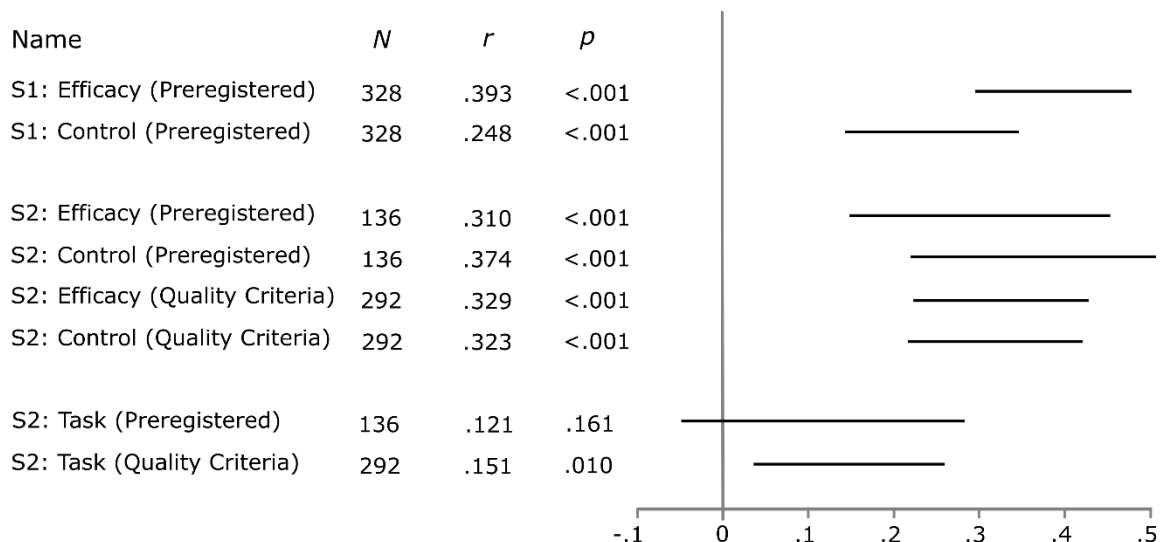
Results

Cue-thought Habits and Delayed Image Upload (Primary Analyses)

The point biserial correlation indicates a positive but non-significant correlation between cue-thought habits and delayed image upload in the pre-registered sample and a significant positive correlation in the quality criteria sample (see Figure 1, the two bottom lines and Table 2).

Figure 1.

Forest Plot of all Tests of the Central Cue-Thought Habit Relationship with Self-Regulation Success

Name	N	r	p
S1: Efficacy (Preregistered)	328	.393	<.001
S1: Control (Preregistered)	328	.248	<.001
S2: Efficacy (Preregistered)	136	.310	<.001
S2: Control (Preregistered)	136	.374	<.001
S2: Efficacy (Quality Criteria)	292	.329	<.001
S2: Control (Quality Criteria)	292	.323	<.001
S2: Task (Preregistered)	136	.121	.161
S2: Task (Quality Criteria)	292	.151	.010

Note. S1 = Study 1; S2 = Study 2; Efficacy and Control refers to self-efficacy and self-control questionnaires (measuring self-reported self-regulation success) and Task refers to the

delayed image upload (as a behavioral measure of self-regulation success). *P*-values represent two-sided tests.

Table 2.

Correlations Between the Main Variables with Cronbach's Alpha on the Diagonal

	1	2	3	4	5	6
1. CTH [a]	**0.834** **[0.791]**					
2. Effic. [b]	0.310*** [0.329***]	**0.862** **[0.821]**				
3. Cont. [c]	0.374*** [0.323***]	0.564*** [0.571***]	**0.835** **[0.816]**			
4. Cons. [d]	0.390*** [0.354***]	0.384*** [0.500***]	0.671*** [0.590***]	**0.667** **[0.637]**		
5. Neur. [e]	-0.112 [-0.100]	-0.321*** [-0.320***]	-0.292*** [-0.374***]	-0.134 [-0.260***]	**0.710** **[0.677]**	
6. Task [f]	0.121 [0.151**]	0.101 [0.087]	-0.005 [-0.034]	0.099 [0.108]	-0.113 [-0.024]	-
7. Time [g]	0.023 [-0.050]	-0.152 [-0.270*]	-0.085 [-0.106]	0.072 [0.075]	0.148 [0.220]	NA

Note. Pre-registered sample: *N* = 136; quality criteria sample: *N* = 292, in square brackets.

[a] Cue-Thought Habit. [b] Self-efficacy. [c] Self-control. [d] Conscientiousness. [e] Neuroticism. [f] Delayed image upload. [g] The time between completing the survey and uploading a picture. The correlation for Time can only be calculated for the participants who successfully completed the task (preregistered sample: *n* = 47) [quality criteria sample: *n* = 55].

* *p* < 0.05. ** *p* < 0.01. *** *p* < 0.001.
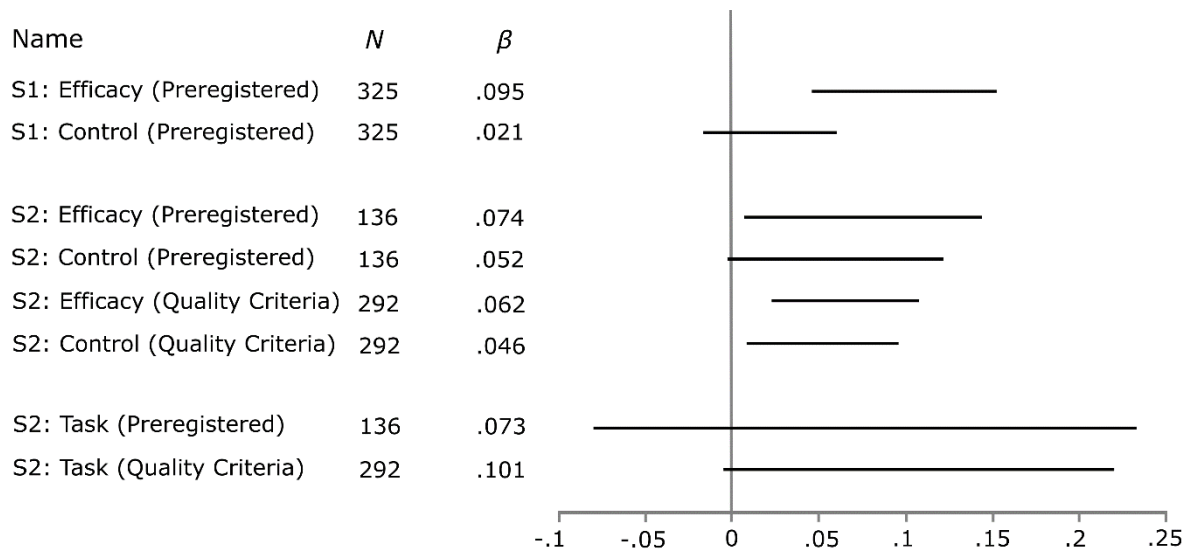
Secondary Analyses

Time of Completion and Cue-Thought Habits. The median time between finishing the survey and completing the task was 18.7 hours. Pearson's correlation coefficient was used

to investigate the relationship between cue-thought habits and upload time. We found no significant relationship ($p = 0.881$; quality criteria sample: $p = 0.715$; see Table 2).

Mediation Analysis. We used the Hayes PROCESS macro (Hayes, 2022) in R (R Core Team, 2022) to conduct a mediation analysis to investigate indirect effects. All models were run with 10,000 bootstrapped confidence intervals. We investigated if cue-thoughts mediated the relationship between conscientiousness and completing the delayed image upload task. There was no significant indirect effect of cue-thought habits, as the confidence interval contained zero (0.073, 95% CI [-0.080, 0.235]; quality criteria sample: 0.101, 95% CI [-0.004, 0.222]; see Figure 2, two bottom lines). As in Study 1, we investigated whether the cue-thought habit questionnaire scores partially mediate the relationship between conscientiousness and self-reported self-efficacy. There was a significant indirect effect of cue-thought habits on this relationship, as the confidence interval does not contain zero (*std. b* = 0.074, 95% CI [0.006, 0.146]). Similar to Study 1, there was no significant indirect effect of cue-thought habits on the relationship between conscientiousness and self-reported self-control (*std. b* = 0.05, 95% CI [-0.002, 0.123]). In sum, the mediation analyses based on the behavioral task and self-reported self-control do not show significant mediation effects, but the test based on the self-reported self-efficacy beliefs does. Nonetheless, the confidence intervals indicate that the non-significant effects are trending in the same direction as the significant effect for self-efficacy (Figure 2).

Figure 2.

Forest Plot of the Mediation Analysis Showing the Indirect Effects of Cue-Thoughts on the Relationship Between Conscientiousness and Self-Regulation Outcomes

Name	N	β
S1: Efficacy (Preregistered)	325	.095
S1: Control (Preregistered)	325	.021
S2: Efficacy (Preregistered)	136	.074
S2: Control (Preregistered)	136	.052
S2: Efficacy (Quality Criteria)	292	.062
S2: Control (Quality Criteria)	292	.046
S2: Task (Preregistered)	136	.073
S2: Task (Quality Criteria)	292	.101

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-.1   -.05    0    .05    .1    .15    .2    .25
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Note. S1 = Study 1; S2 = Study 2; Efficacy and Control refer to self-efficacy and self-control beliefs (measuring self-reported self-regulation success) and Task refers to the delayed image upload (as a behavioral measure of self-regulation success). Despite the directional hypotheses, *p*-values represent two-sided tests.

Self-Efficacy/Self-Control and Delayed Image Upload. Point biserial correlations indicate that there are no significant relationships between self-efficacy or self-control and the completion of the delayed image upload task (see Table 2).

Cue-thought Habits and Self-Reported Self-Regulation Success. We analyzed the relationship between cue-thought habits and self-regulation success operationalized as self-reported self-efficacy and self-control. As in Study 1, Pearson's correlation coefficients indicated significant, positive relationships between cue-thought habits and self-efficacy and self-control (see Table 2).

Discussion

The central aim of the present second study was to test for a positive relationship between self-reported cue-thought habits and self-regulation success in an assigned, delayed behavioral task. In line with our primary pre-registered hypothesis, we found an overall tendency for participants who are more likely to include situational cues in thought about

intended actions to complete the assigned task within one week. This relationship was only statistically significant in the sample ($N = 292$) that did not exclude participants who failed to upload an image during the instruction phase. This technical criterion led to an unexpectedly high number of data exclusions (46%). When including this instruction, we imagined participants would read the instructions on a computer screen and have a smartphone available as a second device. However, many participants may have completed the survey on a smartphone and were therefore not able to follow these instructions. For the much smaller sample that excluded these participants ($N = 136$), the descriptively positive relationship between cue-thought habit and successful task completion did not reach the conventional significant level. This finding, along with the significant effect in the more inclusive sample, highlight the need for a large-scale replication to consolidate this evidence.

Previous studies have shown that participants with if-then plans finished assigned tasks closer to a specific planned time (Gollwitzer & Brandstätter, 1997; Koole & Spijker 2000) or planned event (Szarras-Kudzia & Niedźwieńska, 2022) than participants not forming if-then plans. We measured whether there was a relationship between the cue-thought questionnaire and task completion speed. We did not find a positive relationship (pre-registered hypothesis). This may appear to conflict with the research mentioned previously. However, prior if-then planning studies calculated time as the discrepancy between an instructed time or event and actual task completion. In contrast, participants in our second study did not receive instructions for a target time when the hand sanitizer image should be taken (except for a deadline of one week), and we merely measured time between receiving the instructions and uploading the image. Consequently, we do not have the information necessary to calculate the time between planned and completed execution of the task that was the focus of previous studies (e.g., Gollwitzer & Brandstätter, 1997; Koole & Spijker 2000).

Besides the primary pre-registered hypotheses, as secondary hypotheses, we pre-registered and found positive relationships between the self-report questionnaires. In line with Study 1, we found a positive relationship between cue-thought habits and both the self-efficacy and self-control scales. Again, a higher self-reported likelihood of including situational cues in thought about intended actions related to higher self-reported self-efficacy and self-control. Similarly, we found further evidence that cue-thought habits act as a mediator between conscientiousness and self-efficacy beliefs. Although the mediation analysis with the self-control scale as the dependent variable was again not statistically significant in this second study, it is the third independent test (e.g., Martiny-Huenger et al., 2022; Study 1) showing a trend in the expected direction as illustrated in the confidence intervals in Figure 2. Thus, we conducted a meta-analysis using the method described in Neyeloff et al. (2012), including the self-control questionnaire data from Martiny-Huenger et al. (2022) and our current two studies. We found a significant summary effect, 0.027, 95% CI [0.004, 0.051], providing evidence for an indirect effect of including situational cues in thoughts about future actions in the relationship between conscientiousness and self-control.

The only analyses that did not line up with our pre-registration are the relationship between self-efficacy and self-control as predictors of successful task completion. While this relationship is descriptively in the expected direction for self-efficacy, there is no evidence at all for self-control. This may be explained by a mismatch between the levels of measurement–global self-efficacy/control beliefs and a "local", very specific, single instance of behavioral self-regulation success (Ajzen & Fishbein, 1997). We will discuss this issue in relation to the primary hypotheses in more detail in the General Discussion section.

General Discussion

We present two studies testing the potential benefits of including situational cues in thought about intended actions. Both studies included a successful replication of Martiny-

Huenger et al. (2022), in which general self-regulation success was measured as self-reported self-efficacy and self-control beliefs. Across both studies we found further evidence for a positive relationship between habitually including situational cues in thoughts about future actions and self-reported general self-regulation success.

In Study 2, we introduced a behavioral measure (delayed image upload) to complement the measurement of self-regulation success as self-reported beliefs. Interpreted in isolation, the behavioral evidence for the predicted positive relationship between the cue-thought questionnaire and the completion of the delayed intention is not strong. The relationship is only statistically significant in the larger sample that deviated from the pre-registered analysis approach in one exclusion criterion. However, categorical p-value interpretation is problematic when dealing with multiple measurements, particularly if the values vary around the p-value cutoff (Gelman & Stern, 2006). To present the behavioral results in the context of our other analyses, we provide a forest plot of the confidence intervals from all tests of the central relationship between participants' self-reported tendency to include situational cues in thoughts about future actions and their self-regulation success, operationalized as self-reported beliefs and the behavioral measure (Figure 1). The analyses based on self-reported success indicate a stronger effect than the behavior-based measure. The confidence intervals of the self-report measures do not contain zero, and there is little overlap of the confidence intervals between self-report and behavior-based measures. In addition, although the confidence intervals for the behavior-based measure contain zero in the pre-registered sample, both samples indicate a trend in the same direction as the self-report measures.

The weak relationship for the behavioral measurement is reminiscent of the mismatch between the specificity level of two measurements discussed in research on the attitude-behavior relationship (the correspondence principle; Ajzen & Fishbein, 1997). There is a

specificity fit in the self-report measurements (cue-thought and self-efficacy/control beliefs) in that both are global measurements of beliefs about the self. Reporting these beliefs, the participants could draw from a broad range of their individual experiences and weigh what is important for them (i.e., inferring self-regulation success only from domains that they consider important). In contrast, there is a mismatch in the specificity level for the behavioral measurement. While the cue-thought questionnaire is a global belief assessment, the behavioral measurement was a single and very specific – researcher-defined – behavior (e.g., with no indication of whether the behavior was important for the participant). In research on the attitude-behavior link, it is common to find smaller relationships for such mismatches between – in the attitude case – global attitude measures and very specific behaviors (e.g., the attitude towards medical services and getting a yearly physical checkup; Ajzen & Timko, 1986). The solution in attitude research is to align the attitude measure more closely to the specific target behavior (i.e., measurement correspondence). Likewise, in subsequent research on the present topic it may be beneficial to adjust the measurement of the habitual inclusion of situational cues in thought about intended action more closely to the behavior of interest.

Cue-thought Habits and Conscientiousness

For the self-reported measures, mediation analyses across both studies indicate that habitually including situational cues in thoughts about future actions partially mediate the relationship between conscientiousness and self-regulation success (Figure 2). This is evident in all analyses where self-efficacy scores approximate self-regulation success and in the meta-analysis combining all available data for the self-control score. The same trend is present for the behavioral measurement as dependent variable, although to a lesser degree. Overall, however, the present data supports the idea that the inclusion of situational cues in thought about intended actions is one aspect that characterizes individuals high in conscientiousness and it may contribute to them being more successful self-regulators. This, however, can only

be a preliminary conclusion because the causal claim must be validated with mediation

analyses on longitudinal data (c.f. Maxwell & Cole, 2007).

Relation to Research on Self-Regulation and Planning

Overall, our studies provide further evidence in favor of the idea that including

situational cues in thought about intended future actions is beneficial to the actual

implementation of such intentions. This is in line with research on strategic if-then action

planning (reviewed by Bieleke et al., 2021; Gollwitzer & Crosby, 2018; Gollwitzer &

Sheeran, 2006). A central – but not the only – aspect of this self-regulation strategy is also to

link an intended action to a situational cue. The notable difference between research on

strategic if-then action planning and our studies is that research on the former topic explicitly

provides participants with the situation-response thought (i.e., an if-then action plan) or trains

them to create such plans themselves. In contrast, we aimed to measure "naturally" occurring

thought in a situation-response format without any intervention. Interventions have

shortcomings because they can be effective due to unintended mechanisms (e.g., placebo

effects) in addition to the intended mechanism (e.g., creating stimulus-response links). Our

present study's observations do not have such issues. However, they have other shortcomings.

Because we do not manipulate participants' way of thinking about future actions, our analyses

are limited to testing correlations rather than causation. In combination, however, both

approaches – experimental interventions (if-then planning research) and observations (the

present studies) – supplement each other and both highlight the relevance of including

situational cues in thought about intended actions.

Some prior studies have been labeled as investigating "spontaneous implementation

intentions" (e.g., Churchill & Jessop, 2010; Luszczynska & Schwarzer, 2003). However, the

implemented "if-then" planning measurements entailed assessing "when, where, and how" to

do something, often including a certain time (e.g., Thursday, 5pm) instead of perceivable

situational cues. The relevance of making a distinction between time-based and situation-based cues is that time-based cues are less likely to be good anchors for associatively linked responses (McDaniel & Einstein, 2000; Orbell & Verplanken, 2020). Thus, we categorize these studies as research on planning in a broad sense (committing to a timeline, making commitment public); potentially mediated by many cognitive and motivational mechanisms. In contrast, the aim and the value of our present and previous research (Martiny-Huenger et al., 2022) is in isolating the specific aspect of the inclusion of perceivable situational cues in thought about intended action.

A new questionnaire assesses individual differences in relation to the use of if-then planning (If-Then Planning Scale; ITPS; Bieleke & Keller, 2021). The questionnaire includes items related to our present focus on situational cues (e.g., "I envisage what obstacles could arise"). However, it also includes many other aspects relating to the if-then planning research agenda in general (e.g., seizing opportunities versus overcoming obstacles). In conclusion, although there are similarities between components of the ITPS and our present research, our focus is not on developing a questionnaire that can aid predicting people's planning success. Instead, based on the theoretical perspective introduced earlier, we investigated a specific mechanism (stimulus-response learning) and a specific aspect of that mechanism (inclusion of the "stimulus") to test its relevance in predicting behavioral outcomes.

Finally, participants' "naturally" occurring thoughts have been investigated in relation to future-reality patterns (i.e., spontaneous mental contrasting; mentally contrasting a desired future with reality). Research finds that these patterns predict successful self-regulation (Sevincer & Oettingen, 2013), and relate to higher conscientiousness (Sevincer et al., 2017). In parallel to our present focus, spontaneous mental contrasting might be another mechanism by which higher conscientiousness is related to better self-regulation via specific patterns in participants' habitual thought patterns.

Implications for Self-Regulation and Habit Research

Recent research provides evidence that self-regulation success depends on effortless, habit-like behaviors (Adriaanse et al., 2014; Galla & Duckworth, 2015; Good et al., 2020; meta-analysis by De Ridder et al., 2012). Our present theoretical background incorporates this novel perspective. More importantly, we provide a central missing aspect to that idea: How are these beneficial habits formed in the first place? Habitually thinking about future actions along with relevant situational cues may establish beneficial stimulus-response links (like habits) that facilitate the expression of novel behavior in the presence of the situational cue (Martiny-Huenger et al., 2015, 2017; see also Damanskyy et al., 2022). Although our present empirical focus (Study 2) was on the execution of a novel situation-behavior relation, any habit formation requires this first step. Arguably, this first execution of a planned behavior may be particularly problematic as it cannot draw from any prior direct experiences with that situation-response configuration. However, the flexibility of language and thought allows us to mentally link novel stimulus-response configurations. As soon as a novel behavior is expressed in the presence of the situational cue, traditional learning should reinforce that behavior (Wood & Rünger, 2016). However, future research may also investigate how repetitive stimulus-response execution and habit formation is influenced by parallel repetitive thought in a stimulus-response format. There is the potential that individuals who habitually include situational cues in thoughts about future actions might be more likely to experience the necessary conditions for establishing beneficial habits.

Limitations

A central concern with our present research is that participants may have a hard time judging how much they tend to think of situations when thinking about intended actions (e.g., Nisbett & Wilson, 1977). We aimed to minimize this problem by thoroughly explaining the topic of our research, using simple examples that highlight the differences between including

a situational cue versus not including a cue. Furthermore, in Study 1 we asked participants about their understanding of "future actions" and "situational cues," and only 2% of participants reported not understanding the concepts (i.e., 1 or 2 on a 7-point Likert scale).

Secondly, it is possible that the meaning of the questionnaire items that we reverse-scored deviate from the original questionnaire items. For example, "I have trouble coming up with solutions" (reverse scored) is not exactly the opposite of "I usually find several solutions" (original). The former may measure the ease of finding one or two solutions, whereas the latter may measure the ease of finding many solutions. However, we believe that this is an acceptable trade-off in avoiding the issues with comparing questionnaires that either contain or do not contain reverse-scored items (Martiny-Huenger et al., 2022).

Thirdly, we embedded our present research in the context of habit formation and how beneficial habits may facilitate self-regulation success. We acknowledge that our present research (Study 2) merely investigated the first execution of a novel behavior-situation relation. Thus, we cannot yet discuss how including situational cues in thought about intended future actions may facilitate the formation of beneficial habits. However, all habit formation starts with a first execution of a behavior in a given situation. Future research should examine how the inclusion of a situational cue in thought about an intended action influences the maintenance and repetitive execution of the behavior.

Finally, we limited our research to a trait-like measure to test our prediction that including situational cues in thought about intended action leads to better self-regulation outcomes. Future research could also examine whether self-regulation success is impacted by domain- or state-specific differences in the inclination to include situational cues (e.g., differences in emotional states; Maglio et al., 2014).

Conclusion

Contemporary research on self-regulation emphasizes that "controlled" behavior is less relevant for success than previously assumed and self-regulation success is more strongly related to effortless, habitual behavior. We contribute to this perspective by providing a potential answer for how beneficial habits may be established. Embedded in ideas of stimulus-response learning, we provide additional evidence regarding the relevance of including situational cues (stimuli) in thought about future actions (responses). The inclusion of situational cues in thought about future actions may be one mechanism that facilitates the implementation of novel behaviors.

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Appendix

A. Cue-thought Habits Questionnaire

Changes are marked in italic. Reverse scored items are marked by (r).

"When thinking about future actions, thinking about specific situations where I can do that action is something …"

50% reverse scored items	Original items
1. I rarely do (r)	I do frequently
2. I do every day	
3. I have been doing for a long time	
4. I would need to be reminded to do (r)	I do automatically
5. I start doing before I realize I'm doing it	
6. I would find hard to do (r)	I would find hard not to do
7. That feels sort of natural to me	
8. That is not typically me (r)	That is typically me

B. Self-efficacy Questionnaire

Changes are marked in italic. Reverse scored items are marked by (r).

50% reverse scored items	Original items
1. I can always manage to solve difficult problems if I try hard enough	
2. Even when I invest a lot of effort I often fail to solve problems (r)	I can solve most problems if I invest the necessary effort
3. If someone opposes me, I can find means and ways to get what I want	
4. I am confident that I could deal efficiently with unexpected events	
5. Thanks to my resourcefulness, I know how to handle unforeseen situations	

6. I get stressed when facing difficulties because I don't trust my coping abilities (r)	I remain calm when facing difficulties because I can rely on my coping abilities
7. When I am confronted with a problem, I often have trouble finding solutions (r)	When I am confronted with a problem, I can usually find several solutions
8. If I am in a bind, I often cannot think of something to do (r)	If I am in a bind, I can usually think of something to do
9. No matter what comes my way, I am usually able to handle it.	
10. It is hard for me to stick to my aims and accomplish my goals (r)	It is easy for me to stick to my aims and accomplish my goals

C. Self-control Questionnaire

Changes are marked in italics. Reverse scored items are marked by (r).

50% reverse scored items	Original items
1. I am good at resisting temptation	
2. I refuse things that are bad for me	
3. People would say that I have iron self-discipline	
4. I am able to work effectively towards long-term goals.	
5. I have good self-discipline	I wish I had more self-discipline
6. I am good at concentrating	I have trouble concentrating
7. I say inappropriate things (r)	
8. I have a hard time breaking bad habits (r)	
9. I do certain things that are bad for me, if they are fun. (r)	
10. Pleasure and fun sometimes keep me from getting work done (r)	
11. Sometimes I can't stop myself from doing something, even if I know it is wrong (r)	

12. I am lazy (r)

D. Personality Questionnaire

Reverse scored items are marked by (r).

1. I get chores done right away. (conscientiousness)

2. I have frequent mood swings. (neuroticism)

3. I often forget to put things back in their proper place. (conscientiousness) (r)

4. I am relaxed most of the time. (neuroticism) (r)

5.. I like order. (conscientiousness)

6. I get upset easily. (neuroticism)

7. I make a mess of things. (conscientiousness) (r)

8. I seldom feel blue. (neuroticism) (r)

E. Paired Associates Task

The task started with a learning phase. First a single cue-word was shown for 2.5 seconds, before a pair-word was added and both words were displayed for an additional 2.5 seconds. There was a 0.4 second gap between trials. The test phase began after all 20-word pairs had been shown together. In the test phase the cue-word was shown again, and the participants had to type the pair-word.

Williams & Pearlberg (2006) used 30 trials across 4 blocks. We shortened the test to only 20 trials and 2 blocks, one at the start and one at the end of the experiment, out of concern that the test might be too tedious and lead to high drop-out rates.
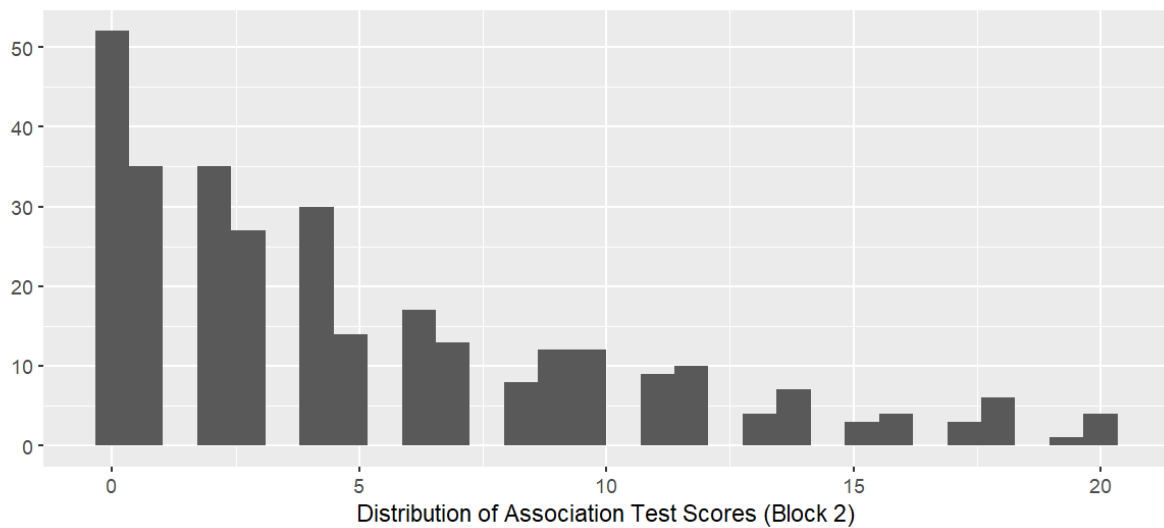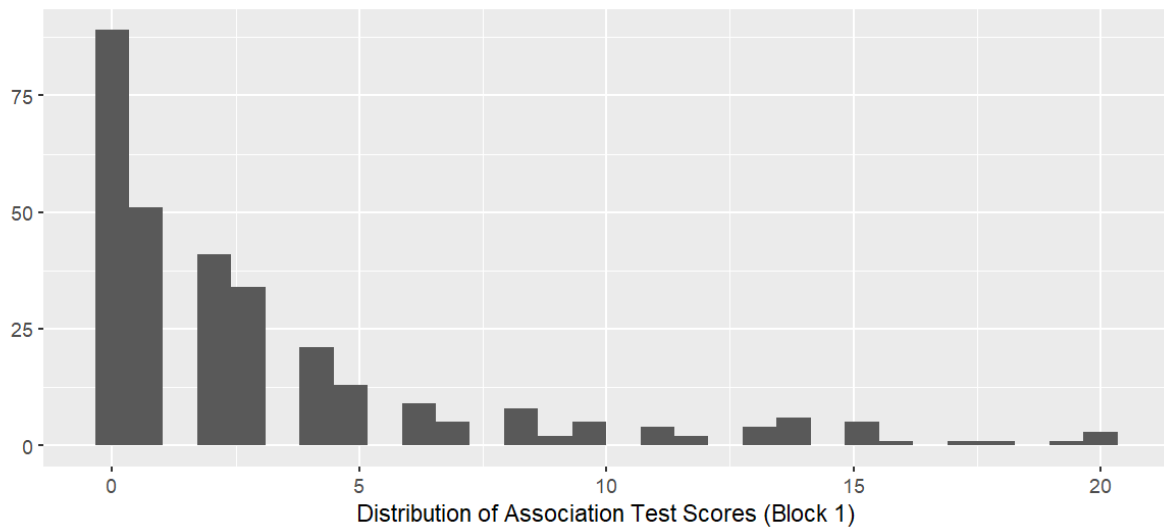
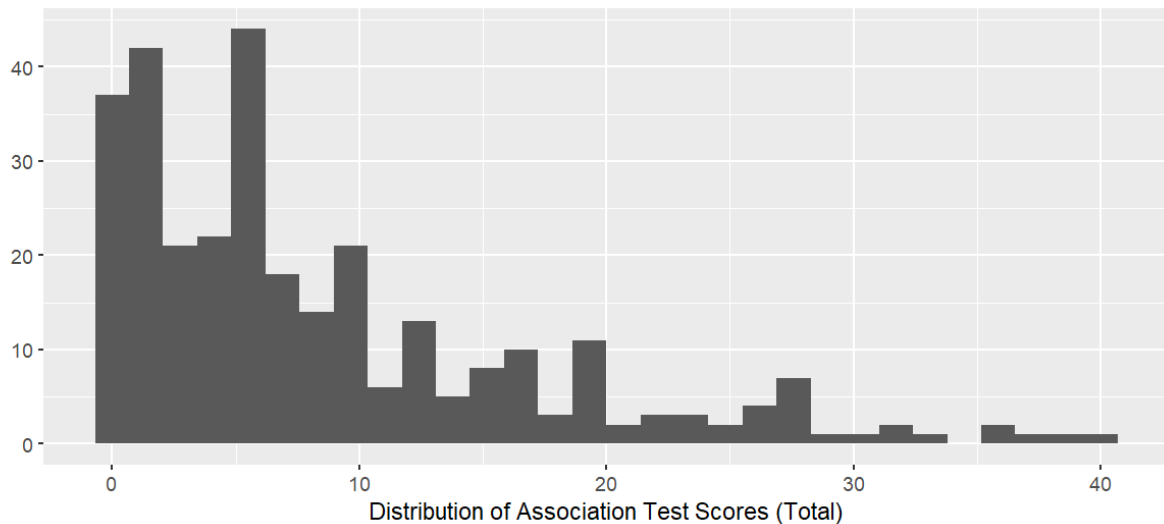*Descriptive statistics and skewness of association test.*

	M (SD)	Range	Skewness	Kurtosis
Block 1	3.31 (4.34)	0 - 20	1.88	6.14
Block 2	5.22 (5.09)	0 - 20	1.07	3.33
Total	8.53 (8.46)	0 - 40	1.42	4.60

Note. $N = 306$

Distribution of test scores

Distribution of Association Test Scores (Block 1)

Distribution of Association Test Scores (Block 2)

Distribution of Association Test Scores (Total)

F. Norwegian Translations of Questionnaires (Study 2)

Reverse scored items are marked by (r).

Cue-thought habits

Å tenke på spesifikke situasjoner når jeg tenker på fremtidige handlinger er noe…

1. Jeg ville hatt vansker med å gjøre (r)

2. Jeg starter å gjøre før jeg legger merke til at jeg gjør det

3. Jeg har gjort lenge

4. Som føles nesten naturlig ut for meg

5. Jeg ville trengt en påminnelse for å gjøre (r)

6. Som ikke er typisk "meg". (r)

7. Jeg sjeldent gjør. (r)

8. Jeg gjør hver dag.

Big 5

Conscientiousness:

1. Jeg glemmer ofte å legge ting tilbake der de hører hjemme (r)

2. Jeg roter til ting (r)

3. Jeg liker orden

4. Jeg får plikter unnagjort med en gang.

Neuroticism:

1. Jeg blir fort opprørt

2. Jeg er avslappet mesteparten av tiden (r)

3. Jeg har ofte humørsvingninger

4. Jeg føler meg sjeldent nedstemt (r)

Self-efficacy

1. Selv når jeg gir mye innsats klarer jeg ofte ikke å løse problemer (r)

2. Jeg blir stresset når jeg møter på hindringer fordi jeg ikke har tillit til mine mestringsevner.

(r)

3. Når jeg møter på et problem har jeg ofte vansker med å finne en løsning. (r)

4. Uansett hvilke utfordringer jeg møter på så klarer jeg vanligvis å håndtere det.

5. Jeg har vanskelig for å holde meg til planen og nå mine mål. (r)

6. Takket være min ressursstyrke vet jeg hvordan jeg skal håndtere uforutsette situasjoner.

7. Hvis jeg er i en knipe er det ofte jeg ikke klarer å tenke på noe jeg kan gjøre (r)

8. Jeg er sikker på at jeg klarer å håndtere uforventede hendelser godt

9. Jeg klarer alltid å løse vanskelige problemer dersom jeg prøver hardt nok.

10. Hvis noen sier meg imot klarer jeg å finne måter å få det som jeg vil.

Self-control

1. Jeg er god til å konsentrere meg.

2. Noen ganger klarer jeg ikke stoppe meg selv fra å gjøre noe som jeg vet jeg ikke burde gjøre. (r)

3. Jeg har vansker med å bryte med dårlige vaner. (r)

4. Av og til kan fornøyelser og moro holde meg fra å få gjort det jeg skal. (r)

5. Jeg avstår fra ting som er dårlig for meg.

6. Folk ville sagt jeg har en jernvilje.

7. Jeg har god selvdisiplin

8. Jeg er i stand til å arbeide effektivt mot langsiktige mål.

9. Jeg er lat. (r)

10. Jeg gjør visse ting som er dårlig for meg, hvis de er gøy. (r)

11. Jeg sier upassende ting. (r)

12. Jeg er god til å motstå fristelser.