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The Effects of Interpersonal Relations in the Workplace on Cognitive Performance: Does Working with Irritating People Decrease your Performance?

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THE EFFECTS OF INTERPERSONAL RELATIONS IN THE WORKPLACE ON COGNITIVE PERFORMANCE:

DOES WORKING WITH IRRITATING PEOPLE DECREASE YOUR PERFORMANCE?

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Abstract

The present study examined how individuals' emotions from interpersonal interactions in the workplace influenced their cognitive performance. Fifty-two participants were randomly assigned to either think about a coworker who has made them feel content or a coworker that has made them feel irritated. The findings showed that participants who thought about an irritating coworker not only felt more irritated and less content than their counterparts, but they also ruminated more about the coworker, felt that it would more difficult to work with the coworker, and experienced more negative affect. However, the results showed that there were no differences on cognitive performance between those thinking about a coworker who makes them feel irritated compared to one who makes them feel content. Implications of the findings are discussed.

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Introduction

She took your stapler and never gave it back. He has the most annoying voice and you are not sure how much more you can listen to it. She never thinks much of your brilliant suggestions. He always seems to undermine your abilities. She makes you feel unwelcome at the organization. His efforts are minimal, yet somehow he manages to be continually praised by your supervisor. She is frequently rude to you. Can you put a face to any of these descriptions? Chances are, in places that individuals have worked, volunteered, or studied, they have met someone who resembles these descriptions in one way or another. In the workplace, you are forced to have daily interactions with individuals that annoy or irritate you. In some cases, you are on the same team as them and have to work towards a common goal. They occasionally make you wonder how a person could be so senseless, how they could have gotten so far in their life, or how many people could possibly be worse than them. You go back to your work only to find that you cannot stop thinking about them and their actions or that your thoughts are resulting in distracting emotions such as irritation or even anger. However, life goes on, you continue working with them, and wait for the clock to strike five o'clock so you can vent to someone about this individual.

You may think that these individuals only affect your daily life in the sense of being a bother, but the case may be that they have a much greater effect in that they impact your work performance. In the present study, I propose that emotions caused by interpersonal interactions may affect cognitive performance. More specifically, the interactions with people who are perceived as annoying or irritating will cause a greater decrease in performance compared to those perceived as pleasant.

To my knowledge, there is a gap in the literature regarding whether experiencing different social emotions has different consequences on cognitive tasks, specifically, tasks involving math skills and memory. Previous research has not explored the effects of experiencing emotions from social interactions on individuals' cognitive performance. Rather, the literature has focused on emotional suppression and neurological damage as potential factors affecting cognitive performance. In the review below, I discuss possible explanations for why emotions that arise from social interactions may have an effect on cognitive performance.

Ego Depletion, Emotions, and Cognitive Performance

Ego depletion may be one factor that explains why emotions from social interactions might affect cognitive performance. Research suggests that ego depletion is very similar to mental fatigue in that they both involve the exertion of continuous effort accompanied by some negative feelings and subjective reports of fatigue (Inzlicht, Schmeichel, & Macrae, 2014). In addition, both mental fatigue and ego depletion can lead to decreases in performance, but both can be overcome when there is sufficient motivation (e.g., Boksem, Meijman, & Lorist, 2006). When individuals engage in an interaction that elicits some sort of emotion, it may lead to ego-depletion and affect their performance on a subsequent task. According to the process model of ego depletion, there are two processes that may be at play to explain why exerting self-control at Time 1 may lead to ego depletion at Time 2 (Inzlicht & Schmeichel, 2012).

First, people may experience a shift in their motivational orientation from an avoidance orientation at Time 1 to an approach orientation at Time 2. They may go from suppressing their desires and wants (e.g., interacting nicely with a person who is irritating) to satisfying their desires and wants (e.g., ignoring or yelling at a person who is irritating). Combined with this shift in motivation may also be a shift in attentional focus during a subsequent task at Time 2.

Second, people may experience a shift in their attentional focus at Time 2 in which they become attuned to cues relating to self-gratification rather than self-control. Therefore, interacting with an individual who is irritating may require self-control to refrain from responding inappropriately. This may lead to ego depletion, and in turn, may lead to shifts in motivation and attention resulting in less desirable outcomes on a subsequent task. However, when individuals interact with someone who makes them feel content, ego-depletion may be less likely to occur because there is less need to suppress a desired response (e.g., being nice to the person).

Previous research suggests that there are a variety of tasks that can result in ego depletion, such as clerical tasks in which participants need to cross out a certain letter on a page of text according to particular rules (Baumeister, Bratslavsky, Muraven, & Tice, 1998), write essays, especially those in which participants are not allowed to use words with certain letters (Schmeichel, 2007), use a mirror to trace objects (Fennis, Janssen, & Vohs, 2009), and refrain from eating sweets (Baumeister et al., 1998). Social interactions can also lead to ego depletion. For instance, when individuals are envious of another person, their preoccupation with that person may lead to ego depletion (Hill, DelPriore, & Vaughan, 2011). Additionally, trying to be fair in the workplace can affect subsequent self-regulation (Johnson, Lanaj, & Barnes, 2014). The desire to be fair may involve actions of suppressing biases and purposefully trying to demonstrate justice. In regards to the consequences of ego depletion, people may become less inclined to help others (Dewall, Baumeister, Gailliot, & Maner, 2007), more susceptible to persuasion in terms of sales tactics (Fennis et al., 2009), and find it harder to resist the temptation of cheating (Mead, Baumeister, Gino, Schweitzer, & Ariely, 2009). These are only a handful of consequences of ego depletion.

Individuals' emotional experiences may also lead to ego depletion, which may affect their cognitive performance on a subsequent task. Individuals who are required to interact with someone who they dislike or are irritated by, may feel the need to engage in emotional suppression (appearing less emotional than the person actually feels) so that they do not respond inappropriately. Past research has shown that emotion regulation can be costly in terms of cognitive resources (Mauss, Evers, Wilhelm, & Gross, 2006). Bonanno, Papa, Lalande, Westphal, and Coifman (2004) showed that emotional suppression can cause a working memory deficit due to its cognitive load. Richards and Gross (1999) also showed that emotional suppression has cognitive consequences. More specifically, they found that incidental memory, which involves information that is being processed during a period of suppression, was impaired. Richards and Gross state that the resulting memory impairment may be due to the additional psychological arousal that is experienced when one engages in suppression, which may alter cognitive performance. Another reason may be that the act of suppression changes self-monitoring and self-focus within an individual, which takes away from resources that would be used for encoding information (Richards & Gross, 1999).

When individuals are in the workplace and are required to interact with a person who is irritating or annoying, they may engage in emotional suppression because the things they may want to say or do are unacceptable to share in the workplace. On the other hand, people who experience interactions with those that make them feel content are not faced with having to suppress their emotions because what they feel is positive and usually accepted in the workplace. Therefore, individuals who must interact with irritating people may face greater instances of decreased cognitive performance because they have to engage in suppression more frequently.

For example, individuals may have a harder time recalling information or they may encode information incorrectly when they are suppressing their emotions.

Similarly, Kaplan, Van Damme, Levine, and Loftus (2016) found that emotions leave people susceptible to misremembering events. Pregoal emotions, those that are felt before goal attainment or failure, may narrow individuals' focus in terms of attention. This can lead to peripheral details being missed or misremembered. Additionally, increases in emotional arousal can result in narrowing individuals' attention to points of central importance, which decreases attention to peripheral details (Christianson & Loftus, 1991). According to Kaplan et al. (2016), situations of high emotional arousal can lead people to focus primarily on survival and regulation of emotion. This shows that a difference in emotional arousal may result in different outcomes. Perhaps feelings of irritation have greater arousal than feelings of being content. The additional arousal that individuals feel when they are irritated may serve as a distraction and decrease cognitive performance compared to when they are content.

Historically, there have been a handful of dimensional models of emotions that divide emotions according to dimensions of valence (pleasantness) and arousal (intensity). Rubin and Talarico (2009) analyzed and compared these models. The circumplex model is comprised of two axes: activation-deactivation and pleasant-unpleasant and graphs emotion words in a circle with its center at the intersection of the axes. For example, "content" would be placed on the imaginary coordinates of (4, -1) while "tense" is placed at (-1, -4). The vector model is made of two vectors that begin at zero arousal and neutral valence. One line goes in a positive direction while the other goes in a negative direction. The two axes used by the positive activation-negative activation (PANA) model are positive activation and negative activation (Watson & Tellegen, 1985). The positive activation axis has words such as "active" and "elated" on one end

and words such as “drowsy” and “dull” on the other. The negative activation axis has words such as “distressed” and “nervous” on one side and “calm” and “at rest” on the other. Lower arousal words tend to have more neutral valence while higher arousal leads to higher positive affect. All of these models separated content words from irritation words. Due to these models, people that feel annoyed or irritated may in fact experience more arousal than those who feel content. Therefore, those who interact with someone who elicits irritation may be more distracted when they try to focus on a task at hand.

Other research suggests that even people’s moods, longer lasting and more generalized experiences than emotions, may also interfere with cognitive processes (e.g., Frijda, 2009). For example, Schwarz and Clore (2003) argue that individuals experiencing bad moods tend to need more explanation about why they feel that particular way than when they experience good moods. They suggested that when people try to explain their mood and internally answer questions such as “Why do I feel so irritated?” it competes with resources that are needed for the task at hand. As such, individuals who interact with an irritating person daily may experience an adverse, long-term impact on their workplace performance. This decreased performance may be due to the negative feelings harboured toward the individual which unconsciously affect their motivation for other tasks.

Stress and Cognition

Another factor in cognition, aside from ego depletion and emotional arousal, is stress. Feelings of irritation or annoyance in the workplace may increase individuals’ stress and this may make one feel an action or emotion that should be suppressed. As such, there may be a link between stress and cognitive performance. Stress has the ability to influence memory due to the release of glucocorticoid hormones (Luethi, Meier, & Sandi, 2009). Brain areas involving

cognition and emotion have a high amount of glucocorticoid receptors. When there is an influx of the hormone, the brain area's normal function becomes impaired.

Luethi and colleagues (2009) studied the effects of stress on different types of memory, such as verbal and spatial explicit memory, implicit memory, and working memory. Although a certain level of stress increased spatial memory, working memory was impaired with stress. The task used in their study was a modified version of the reading span task. Participants read aloud sentences and had to say whether they were meaningful or not. They were also instructed to memorize the last word of each sentence and to recall them in order at the end of the reading task. The reading task was comprised of five reading sets, each with five trials. Each new set increased the number of sentences with the first set containing two sentences and the last set containing six sentences. If a participant correctly recalled all of the words in at least one trial, they moved on to the next set. The highest set they were able to complete successfully represented their reading span. The findings showed that those in the stress group had lower reading span scores and a lower total amount of correct scores compared to the control group in which stress was not experienced.

In a time when a significant amount of the population is stressed due to their work, this research has important implications. Business leaders have a high interest in increased productivity, which may lead to stress among employees trying to meet expectations. The reviewed research shows that stress may be detrimental to productivity. Because working memory holds, processes, and manipulates information, it is essential to tasks that require multitasking and applying information. Stress appears to have a negative impact on working memory and may lead to impaired memory recall thereby increasing mistakes and decreasing productivity. It is plausible that stress may be induced when individuals are required to work

with someone who elicits negative emotions, such as irritability, which subsequently affects performance.

Overview of the Present Research

The present research examined whether thinking about a coworker who elicits either positive or negative emotions can have different effects on cognitive performance. Specifically, participants who had a previous experience in working or volunteering environments were randomly assigned to think about a coworker who either elicited feelings of irritability or being content and to describe a past experience that supported their thoughts of the person. Participants then imagined working with this person on a project. Participants indicated their current mood and then completed a cognitive task, which required utilizing their working memory.

Based on the reviewed research, I expected that positive or negative emotions directed at an individual, such as feeling content or irritated by him or her respectively, may affect cognitive performance. Specifically, individuals who have to interact with someone who irritates them may feel the need to suppress those feelings, whereas when individuals interact with someone who makes them feel content, they do not have to suppress those feelings. I predicted that feelings of irritability would decrease cognitive performance compared to feelings of being content. This effect was expected due to the following: 1) emotional suppression may lead to ego depletion which results in a shift of motivational and attentional focus, which does not enable individuals to focus on a subsequent task, 2) the level of arousal for feelings of irritability may be higher than those of being content, which may be distracting to the task at hand, 3) emotions, specifically negative ones, may have a negative effect on cognitive processes, and 4) stress, which may result from working with people that irritate you, which can impair working memory.

Method

Participants

Participants for the present study included 57 undergraduate students from Huron University College, a liberal arts university located in southwestern Ontario. Participants were recruited from campus through posters or a mass recruitment email sent to students registered in the Psychology program and were given the opportunity to enter a draw for five $10 gift cards to either Bulk Barn, Tim Hortons, or Chil Frozen Yogurt Bar. Participants were also recruited from first-year introductory psychology classes and received one research participation credit toward their course. Data from five participants was excluded for various reasons. One was unable to do the cognitive task, two incorrectly wrote their answers on the answer form, and two did not follow instructions. The final sample was comprised of 52 participants (28 females and 24 males) with a mean age of 19.86 (age range: 18-26 years, *SD* = 1.75).

Materials and Procedure

The study was conducted in a lab room with individual computer cubicles. Sessions included one to three participants. Each cubicle was prepared with a consent form, an answer sheet for the cognitive task, and an online survey. Before the participants entered, a participant number was assigned to their online survey, which corresponded with their answer sheet, so that the participants' survey responses could be paired with their responses on the cognitive task anonymously. Participants entered the lab, sat at a station, and were requested to read the letter of information and to sign the consent form if they felt comfortable proceeding. They were then instructed to complete the survey until they reached a page that said "Please call over the experimenter."

The online survey was presented via Qualtrics, and was programed to randomly assign participants to either the irritated or content condition. Participants were asked to think of someone who they have worked with, such as a boss or coworker, who has made them feel irritated or content and to write down that individual's initials. They were then asked questions about the nature and length of their employment. Participants then recalled and described an event in which the target person had made them feel either irritated or content.

As a manipulation check, participants rated on a five-point Likert-type scale (ranging from 1 "Not at all" to 5 "A lot") how that target person made them feel on a variety of emotions. The emotions included "irritated", "content", "annoyed", "happy", "bothered", and "at ease." If participants were in the irritated condition, "irritated" was presented first in the list while "content" was presented first in the list for the participants in the content condition.

Participants were then asked to imagine working with the target person on a project that involves frequent in-person and electronic communication and to describe how the project would go and how difficult it would be to work with him or her. This was meant to increase the participants' level of feelings relevant to their assigned condition. For example, participants in the irritated condition would experience more negative feelings and would feel more irritated thinking about working with people who irritate them.

Following their descriptions, participants in both conditions were asked how much the person made them feel irritated and content in the described event. They were also asked how much they ruminated about the person, how much they felt they had to hide their feelings from the person, and how easy or difficult it would be to work with the targeted individual. Participants rated their responses on a five-point Likert-type scale ranging from 1 "Not at all" to 5 "A lot".

The survey concluded with the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to assess participants' current feelings on a five-point Likert-type scale ranging from 1 "Very slightly or not at all" to 5 "Extremely". The survey includes 20 emotions. 10 are positive and 10 are negative feelings. Examples include "interested", "excited", "attentive", "afraid", "nervous", "upset". "Content" was added to the end of the list while "irritable" is already included in the original version. All of the positive affect words were summed to form an overall positive affect score (Cronbach's alpha = .92) and all of the negative affect words were summed to form an overall negative affect score (Cronbach's alpha = .89).

Once the online survey portion of the study was complete, participants proceeded to the Paced Auditory Serial Addition Test (PASAT; Gronwall, 1977), which is a measure of cognitive function for processing speed and calculation ability. There is a three second and two second condition, each with two versions. The present study used one version from the two second condition. In this condition, a single digit number is presented once every two seconds. Participants are to add each new presented number to the immediate previous one. They are not keeping a running total. For example, the presented number series began with "4, 3, 7, 2, 5". The participant would add 4 and 3 and write down 7, then add 3 and 7 and write down 10, then add 7 and 2 and write down 9, and then add 2 and 5 and write down 7. The test comprises of 60 questions. There are three components to each session of the PASAT: instructions, practice, and test.

The researcher read the instructions for the PASAT which were slightly modified. Typically, participants give their answers verbally. In the present study, participants were asked to write down their answers. Participants were then instructed to flip over to the blank side of their answer sheet to write down their answers for the practice round which comprised of 10

questions. As in the standard version, the number series for both the practice and test sessions were presented via a recording. The practice session recording was then played. Once the tape was completed, the correct answers were read out and participants were asked if they would like to do the practice round again. They were able to do the practice round up to three times. If there was more than one participant in a session, the practice round was replayed when at least one participant requested it. To prevent participants from feeling uncomfortable by asking to do the practice test again, the practice round was repeated as soon as it seemed as though a participant was unsure by their comments or body language or if there was silence. For example, some participants made commentary such as "I have no idea what's going on" or they did not write anything down or did not say they were ready to move on. Following the practice round, participants were instructed to flip over their paper to the answer side. The test session recording was then played. Upon completion of the PASAT, participants returned to their online survey to provide their demographic information, such as their age and gender. They were then debriefed and dismissed.

Results

Work-Related Information

The first portion of the questionnaire involved work-related questions about the person the participants chose to think about. When asked where they know the person from, a majority responded from a "Part-time Job" (67%), followed by "Volunteering" (19%), then "Seasonal Work" (4%) and "Other" (4%). The most frequent industries were "Accommodation and Food Services" at 35%, "Art, Entertainment, and Recreation" and "Retail" both at 15.4%, and "Educational Services" at 14%.

Relationship with Coworker

Twenty-five percent of the participants had known their coworker for two to four months, 17.3% for two years, 15% each for five to six months, seven to 12 months, and three or more years, and 6% each had worked with the person for one month and for one year. Most participants (48%) had interacted with the person two or three times a week, followed by 23% for once a week, 21% for every day, 6% for once month, and 2% for two or three times a month.

Manipulation Checks

Following the work-related questions, participants were asked to describe an event regarding the individual they chose. The irritated condition asked participants to write about an event in which the target made them irritated and the content condition asked them to write about an event in which the target made them feel content. Examples of what participants in the irritated condition wrote include "…many interactions where my coworker was very unpleasant and negative towards the field of work as well as rude to myself," "refused to … fulfill her prescribed leadership roles," "would constantly make up excuses so that I would help her do her work," and "I got blamed for her mistake." Examples from the content condition include "engaged in interesting conversation… we became friends," "told me I had done a great job," "respected me," and "everyday my boss would go over the things that have happened … worded [suggestions] in a way that didn't make me feel discouraged." Therefore, the reported experiences were consistent with the experimental condition participants were assigned to.

In total, the irritated condition included 27 participants while the content condition included 25 participants. Independent sample *t*-tests were conducted to test whether feelings of irritability and being content differed between conditions. As expected, results showed that

participants in the irritated condition (M = 4.04, SD = 0.81) felt more irritated than those in the content condition (M = 1.20, SD = 0.50), $t(50) = 15.08$, $p = .001$, $d = 4.22$. As hypothesized, results also showed that participants in the content condition felt more content (M = 4.16, SD = 0.75) than those in the irritated condition (M = 1.67, SD = .92), $t(50) = -10.68$, $p = .001$, d = 2.97. Therefore, the manipulation seemed effective in eliciting the emotion that was in line with the type of target they were asked to think about.

Rumination, Suppression of Feelings, and Perceived Difficulty Working with Target

T-tests were also conducted to test whether there were differences between the irritable and content conditions for rumination, suppression of feelings, and perceived difficulty working with the target. As expected, participants in the irritated condition (M = 4.33, SD = 1.36) ruminated about their target more than those in the content condition (M = 3.28, SD = 1.49), $t(50) = 2.67$, $p = .010$, $d = 0.74$. Participants in the irritated condition (M = 4.93, SD = 1.39) also felt they had to hide the expression of their feelings towards the target significantly more than those in the content condition (M = 1.40, SD = .87), $t(50) = 10.91$, $p = .001$, $d = 3.04$. Finally, participants in the irritated condition (M = 3.70, SD = 1.10) reported they would have a significantly harder time working with the target compared to those in the content condition (M = 1.76, SD = 0.83), $t(50) = 7.13$, $p = .001$, $d = 1.99$.

Positive and Negative Affect

Using a *t*-test to compare PANAS scores between the conditions, the results showed that participants in the irritated condition (M = 19.81, SD = 7.31) had significantly higher negative affect scores than those in the content condition (M = 13.44, SD = 3.73), $t(39) = 4.00$, $p = .001$, d = 1.10. Levene's test indicated unequal variances ($F = 14.84$, $p = .040$), as such degrees of

freedom were adjusted from 50 to 39. Interestingly, positive affect scores did not differ significantly between participants in the irritated condition (M = 29.22, SD = 9.20) and those in the content condition (M = 30.12, SD = 9.69), $t(50) = -3.43$, $p = .733$, $d = -0.10$.

PASAT Scores

For the PASAT scores, we looked at the percentage of correct responses out of 60, the number attempted by participants, and the percent correct out of the number that the participants attempted. In regards to the percent correct, the PASAT scores did not differ significantly between participants in the irritated condition (M = 60.5%, SD = 20.96) and the content condition (M = 58.48%, SD = 18.81), $t(50) = 0.37$, $p = .716$, $d = 0.10$. The amount attempted also did not differ significantly between the irritated condition (M = 42.26, SD = 11.11) and content condition (M = 41.28, SD = 9.66), $t(50) = .34$, $p = .737$, $d = 0.09$. Finally, the percent correct out of the number of attempted did not significantly differ between the irritated condition (M = 84.51, SD = 15.65) and content condition (M = 83.95, SD = 14.48), $t(50) = .13$, $p = .894$, $d = 0.04$. Therefore, contrary to our predictions, irritating targets did not affect cognitive processing negatively compared to content targets.

For exploratory purposes, we also examined whether there were gender differences on the measures above. The findings indicated that there were no differences between genders for the percent of correct responses: male (M = 60.15, SD = 19.55), female (M = 58.99, SD = 20.33), $t(50) = .21$, $p = .803$, $d = 0.06$; the number of questions they attempted: male (M = 40.63, SD = 9.69), female (M = 81.76, SD = 10.96), $t(50) = -0.75$, $p = .491$, $d = -3.98$; or the percentage they got correct out of the number they attempted: male (M = 87.14, SD = 15.11), female (M = 81.76, SD = 14.63), $t(50) = 1.30$, $p = .199$, $d = 0.36$. Therefore, there were no effects of gender on the level of cognitive processing.

Discussion

The purpose of the present study was to examine whether coworkers who elicit different emotions can have different effects on work outcomes. In the present study, participants were asked to think about either a coworker who makes them feel irritated or content. Participants in the irritated condition reported feeling more irritated and less content about their coworker, ruminated more about their coworker, and felt they had to hide the expression of their feelings towards their coworker relative to those in the content condition. Participants in the irritated condition also reported that they would have more difficulty working with their coworker. Therefore, the manipulation seemed to be effective in eliciting the kinds of responses expected when individuals were thinking about an irritating and pleasant coworker.

The results also showed that participants in the irritated condition reported greater negative affect scores after thinking about working with their coworker on a hypothetical project compared to those in the content condition. Interestingly, there were no differences in positive affect scores between the two conditions after thinking about the hypothetical project. Most importantly, the findings showed that there was no difference in cognitive performance between individuals thinking about a coworker who makes them feel irritated versus content.

Possible explanations for this finding may be that the affect elicited from past experience and the hypothetical scenario did not last long enough to impact the cognitive task, and it is unclear whether asking participants to think about both positive and negative affect regarding their coworker would impact the experimental manipulation. Affect models place words resembling being content and irritated on opposite ends of the spectrum, however none have explored the amount of time different affects last nor how the valence of one affect may affect another (Watson & Tellegen, 1985). It is also plausible that the experimental manipulation,

asking participants to recall and imagine a hypothetical scenario involving a coworker, particularly thinking about an irritating coworker, was not enough to cause ego-depletion or induce stress to affect cognitive performance. And finally, the PASAT and the way it was administered may have been problematic.

Limitations and Future Directions

One limitation of the current study is the PASAT which was used to assess cognitive processing. A handful of participants made audible exclamations or complaints about the difficult or confusing nature of the PASAT during the practice or test sessions. The time that was taken to read the PASAT instructions and to do the practice rounds could have weakened the effect of the manipulation by eliciting feelings of irritation among participants. Although irritated participants may feel even more irritated from the PASAT, which would be in line with our predictions, content participants would also be likely to feel irritated. Therefore, the PASAT may have eliminated or weakened the effects of the manipulation.

Future research can still utilize the PASAT, but participants should be taught how the task works at the beginning of the study. The instructions and practice session should be done before the survey portion of the study, which would allow participants to focus more on and remember the target person they were asked to think about. As a result, effects of the manipulation will be less likely to be weakened prior to the PASAT. Consequently, the PASAT scores may be a better reflection of the manipulation without interference from the practice session.

Additionally, it may make a difference if each participant did the PASAT individually instead of in a group of three. According to Markus (1978), performance in simple tasks may be

boosted when done in groups. However, the PASAT may not be as simple a task even though it is a task involving one digit addition. The elements of quick thinking and memory retention may make it difficult for some, no matter the condition that they were assigned to. Both conditions could have performed worse to a level that made their scores not significantly different from each other. As such, it may be more beneficial to have participants complete the PASAT individually rather than in a group.

Finally, the original PASAT is a verbal task such that participants say their answer instead of writing it down while listening to a tape. The researcher then marks if the response is correct or not. To examine the overall performance of the current sample on the PASAT and whether the methodology may have had potentially negative implications on the scores, I compared them to the standard established for the two second PASAT for participants with over 12 years of education ("Instructions for the Paced Auditory Serial Addition Test"). The total mean of both conditions combined was significantly lower than the established standard[1]. This may be due to the length of time writing an answer being longer than the length of time it takes to say an answer. The additional time may take away from the participants' ability to focus on the next equation.

The PASAT guideline states that no significant differences in performance were found among those between the ages of 25 and 60. It was assumed that a mean age of near 20 (for the current sample) was close enough to 25 and that the sample could be tested in accordance to the guidelines. It is unclear whether the age of the current sample or the way the PASAT was administered in the present study accounts for the poor performance on the PASAT. Future

[1] The total mean of both conditions (M = 59.53, SD = 19.79) was significantly lower than the norm of 65%, based on a one sample t-test, $t(51) = -2.23$, $p = .030$, $d = .31$.

research can replicate the present study and administer the PASAT verbally to identify whether it is the age of the sample or the method of presenting the PASAT that explains the poor performance. The findings from the replication study can help determine whether a different sample is needed (i.e., an older sample) or that the verbal method of the PASAT is necessary.

Future research can also consider using a different task than the PASAT to assess cognitive performance. The PASAT was chosen because it resembles a work environment in some ways. The PASAT involves thinking quickly, using memory, and multitasking. The task is similar to situations when individuals might be in the middle of something, such as writing an e-mail, and there is a distraction, such as a coworker asking a question or a supervisor giving instructions. Other tasks can be used to measure similar or different effects of interpersonal relationships. For example, the length of time spent trying to solve an unsolvable puzzle can be used to measure persistence. Work-related tasks could include clerical tasks, such as searching for grammatical errors on a sheet of text, or some other measure of how people might perform specific to their work environment.

Another limitation involves the use of a hypothetical scenario when participants were asked to imagine working with the target coworker. To recap, the participants first described an event that matched their condition, then imagined and described what it would be like working with the target, and then answered the PANAS. The hypothetical scenario may have elicited an affect that was not as intense as the affect resulting from the recall scenario, and subsequently, weakened participants' affect.

This may be more likely the case for the irritated condition. For example, a participant may have remembered a horrible thing that the target had done but then may think, regardless, that they would be an asset to a project. For example, one participant wrote in their description

about how they had to fix errors that their target was responsible for and take the blame for them. However, in the hypothetical scenario they said the target is a hard worker and would probably come prepared to meetings. Another issue may be that the hypothetical scenarios may not result in as strong of a negative affect as in the recall question. The participant may react emotionally thinking about the target doing them wrong, however when they answer the hypothetical scenario, they may approach it more rationally than emotionally and simply describe what the project would go like. The current study should be recreated without the hypothetical scenario or with a rating system for the recall and hypothetical scenario questions as a manipulation check. Future research should try using different methods and tasks.

Conclusion

The current study has begun to address a gap in the literature involving interpersonal relations and cognitive performance. Many of us work in places that require us to interact with coworkers, supervisors, and clients. It is natural for us to be affected by these interactions. With the addition of employers striving for higher profits, potentially causing more tense interactions, people can become very stressed and upset due to work. The reviewed research had shown that stress may potentially be detrimental to productivity specifically because it appears to have a negative impact on working memory. Our working memory is essential to memory recall, multitasking, and applying information.

However, the present study showed that thinking of irritating individuals, rather than individuals that makes one feel content, does not decrease individuals' performance on the PASAT. Although, future studies could involve other tests of performance or the use of confederates to make participants feel irritated or content, it may be the case that interpersonal relations in the workplace do not affect cognitive performance. Perhaps people become

accustomed to their coworkers and therefore their cognitive capacity is not affected anymore by the coworkers' personalities or actions. It may also be the case that thinking of irritating coworkers does not affect one's working memory. This would prevent significant differences being found through the PASAT.

Regardless, by building an understanding of daily aspects of our lives, such as social interactions and relationships, we can begin to find ways of improving them or bringing about greater positive effects. If future research does indeed find that working with irritating people decreases cognitive performance or performance on some tasks, then other research and business organizations may have to take into consideration social aspects of potential employees and their interpersonal skills. For example, organizations that utilize teamwork may want to test employees on their extraversion and agreeableness to try to ensure smooth operation in group work. They may also look into groupmate compatibility. Although tedious, this may result in less stress, negative feelings, rumination, and mental fatigue, and more workplace satisfaction for employees and greater productivity and profit for the organizations.

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