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"IF ONLY . . .": THE ROLE OF VISUAL IMAGERY IN COUNTERFACTUAL THINKING

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ABSTRACT

Counterfactual thinking (imagined alternatives to actual events) influences how people respond to events. This research examined the impact visual imagery has on counterfactual thinking. The present study relied on past findings that indicate that more extreme affective responses to outcomes are a sign that counterfactual thinking has occurred. Participants completed the Vividness of Visual Imagery Questionnaire (VVIQ) and then read a scenario about a person who either made or lost money as a result of taking an action. The counterfactual alternative was made either salient or non-salient. High VVIQ participants had extreme affective responses (an indication that they generated counterfactuals) across salience conditions; however, low VVIQ participants only had extreme affective responses (suggesting that they only generated counterfactuals) when the counterfactual was made salient. Visual imagery may play an important role in the generation of counterfactuals. Implications for imagery research are discussed.

A counterfactual thought is defined as an imagined alternative to an actual event [1]. Individuals who engage in counterfactual thinking will often think "what might have been" to a situation or event that, typically, has a negative outcome [2]. The general effect of such counterfactual thinking is to amplify the individual's emotional response to the event [1, 3, 4]. For example, when something bad happens to a person, and they can easily imagine the outcome being different (perhaps as a result of a different action they could have taken that would have

prevented the negative outcome), the person will feel worse about the outcome. This counterfactual thinking can influence affect and subjective well-being in many ways [5]. Of particular concern is the fact that the regret that is experienced as a result of this counterfactual thinking in response to negative outcomes can lead to self-pity and depression, and harm a person's overall well-being [6].

The extent to which individuals engage in counterfactual thinking, the factors within a given situation that affect whether counterfactuals are generated, and the implications for counterfactual thinking for well-being have been extensively research within the social-cognitive literature (see Roese and Olson [7] for an extensive review). Research has shown that many people do imagine alternatives to actual events. Davis, Lehman, Wortman, Silver, and Thompson [8] found that 48% of their respondents reported engaging in counterfactual thinking in response to the death of a close family member, and that this thinking led to greater distress about the event. Similarly, Landman and Manis [9] found that over half of their participants spontaneously generated counterfactuals and stated that they would do something differently if they had their life to do over again. Taken together, these studies suggest that counterfactuals are produced fairly regularly. However, these findings also indicate that there are possible individual differences in the ability to generate counterfactual thoughts. One such individual difference, that has not been studies in the counterfactual literature, is vividness of visual imagery, or the ability to visualize people, places, and objects in the mind [10]. The current study examined the impact visual imagery has on counterfactual thinking. However, prior to discussing the current experiment in detail, other factors that influence counterfactual thinking will be discussed.

FACTORS INFLUENCING COUNTERFACTUAL THINKING

Kahneman and Tversky [11] suggested that cognitive heuristics, or mental simulations, cause the construction and use of counterfactual thinking. Basically, people will mentally simulate and create alternative scenarios to actual events. Past research has shown that counterfactuals influence both affective [12, 13] and behavioral responses [3, 11, 14].

Research has shown that the multiple factors can influence the degree to which counterfactuals are produced. The first factor is closeness of the counterfactual outcome to the actual outcome, and research has shown that when the two are very close (e.g., a runner loses a race by a tenth of a second), then a counterfactual thought is more likely to be produced [7]. The second factor is involvement in the outcome. Research has shown that a counterfactual thought is more likely to be generated when the individual feels personally involved in the outcome [7]. The third is action (when the individual decides to act) versus inaction (when the individual does not act), and research has shown that a counterfactual is more likely to be generated when the outcome is the result of an action that was taken, as

opposed to an action that was not taken, inaction [1]. Two additional factors that are particularly relevant to the current study are positive versus negative outcomes and salience versus non-salience of the counterfactual/alternative outcome, both of which will be discussed in detail below. For comprehensive reviews of other factors refer to Gleicher et al. [1] and Roese and Olson [7].

Positive versus Negative Valence Outcomes

Positive outcomes are when the consequences of an event that are rewarding, while negative outcomes are the result of unpleasant events. For example, in a common type of scenario used in counterfactual studies is one in which a person is speculating in the stock market [1]. In this scenario, a negative outcome would be the protagonist losing money, while a positive outcome would be the protagonist making money. Past research on counterfactual thinking has primarily used scenarios with negative outcomes [15]. However, studies have shown that it is important to look at both positive and negative outcomes as a factor because both types of outcomes can lead to counterfactual thinking. Landman [14] found that counterfactual thinking led to more extreme affective responses to both positive and negative outcomes. People compare the actual outcome with the imagined counterfactual/alternative outcome, and this comparison tends to lead to more extreme affective responses. To be more specific, when participants engaged in counterfactual thinking, they felt happier in response to positive outcomes (when thinking about the imagined negative outcome that was avoided) and felt greater regret in response to negative outcomes (when thinking about the imagined more positive outcome that did not occur), than when they did not generate counterfactuals. More extreme affective responses to outcomes are a sign that counterfactual thinking has occurred [1, 3].

Salience versus Nonsalience

One factor that influences the likelihood that a counterfactual will be generated is its salience [1]. In some situations, such as when an extremely negative outcome occurs, counterfactual thinking tends to occur spontaneously (e.g., "If only I hadn't switched stock in the companies, I wouldn't have lost all that money"). In these situations, even if the counterfactual is not explicitly made salient, such as when attention is focused on the actual outcome rather than the counterfactual/alternative outcome, the individual will still generate and respond affectively to the counterfactual/alternative outcome (in this case, experiencing more regret). On the other hand, in other situations counterfactual thinking may only occur if the counterfactual/alternative outcome is made salient for the individual. For example, someone explicitly refers to the counterfactual/alternative outcome or something else brings it to mind (e.g., "If you had switched stock in the companies as you considered doing, you would have lost a lot of money"). Once the counterfactual is generated, people respond similarly to it, regardless of whether the

person spontaneously generated the counterfactual or if it was made salient for the individual [1].

WHO ENGAGES IN COUNTERFACTUAL THINKING?

The fact that counterfactuals sometimes must be made salient for individuals indicates that not everyone engages spontaneously in counterfactual thinking when the necessary conditions are present. As mentioned previously, Davis et al. [8] found that only 48% of people reported engaging in counterfactual thinking of a negative event. This suggests that certain individuals may engage in counterfactual thinking more than others. Individual differences may exist regarding who will spontaneously simulate alternatives to reality and who will not (unless those alternatives are made salient to them).

The following are some possible individual difference or personality variables that may influence the tendency to engage in counterfactual thinking: self-esteem, need for cognition, optimism, rumination, ability to cope, negative affect, belief in a just world, and locus of control [16]. Most of these variables have a complex relationship to counterfactual thinking such that in some situations they increase the likelihood that a person will generate counterfactuals (for example, when a negative event occurs), whereas other times they decrease the likelihood that counterfactuals are produced.

As mentioned previously, one important individual difference variable that has not been examined in relation to counterfactual thinking is visual imagery, or the ability to visualize or form mental pictures in the mind [10]. Research has shown that people who have been in a negative circumstance may engage in visual imagery practices in order to gain an understanding of the event and to regain a sense of environmental mastery of their world [17, 18]. It seems appropriate to hypothesize that people who have high levels of visual imagery would be more likely to engage in counterfactual thinking in response to events [16]. This makes sense because if Person A is better able to visualize people, places, or things than Person B, then Person A should be better able to visualize a counterfactual alternative outcome. Therefore, the ability to visualize certain events that have or have not occurred (using visual imagery) may influence performance on various tasks, including counterfactual thinking.

OVERVIEW OF THE CURRENT RESEARCH

The purpose of the current study was to examine the relationship between counterfactual thinking and vividness of visual imagery. The methodological framework was provided from the well-known Gleicher et al. [1] study, in which they investigated how counterfactual thinking influences affective responses. Using a 2 (positive or negative outcome) × 2 (salient or non-salient counterfactual) × 2 (action taken or inaction) between participants factorial design, they found that when participants read scenarios that had negative outcomes (the

character lost money in the stock market), participants assumed more negative affect by a character who acted (had recently switched stocks) rather than one who did not act (did not switch stocks when there was an opportunity). Conversely, greater positive affect was assumed in response to a positive outcome (making money in the stock market) when the character acted than when he did not act (but only when the counterfactual was made salient). As noted previously, more extreme affective responses to outcomes are a sign that counterfactual thinking has occurred [1, 3], and variables that facilitate the construction of counterfactuals have the effect of amplifying emotional responses [1, 3, 4]. The current study utilized the procedure of Gleicher et al. [1], but rather than examining the effects of action versus inaction on counterfactual thinking, vividness of visual imagery was explored. The current study only examined action events because research has demonstrated that action events have a significantly higher probability of eliciting counterfactual thinking than inactions [14]. Additionally, the current research employed a measure of visual imagery in order to investigate the effects of imagery levels on counterfactual thinking. Based upon the prior literature, the current hypotheses are:

H_1: Independent of their level of visual imagery, participants will display more extreme affective responses (an indication that they are engaging in counterfactual thinking) when the counterfactual to the event is made especially salient.

H_2: Participants who are high in visual imagery will display more extreme affective responses than participants low in visual imagery when the counterfactual to the event is not made salient, suggesting that participants who are high in visual imagery more readily generate counterfactuals.

METHOD

Materials

Using the stimuli used by Gleicher et al. [1] and others [15], the current study utilized variations of the following scenario:

> "Mr. Paul owns shares in Company A. During the past year he considered switching to stock in Company B, but decided against it. He now finds out that he would have been better off by $1,200 if he had switched to the stock of Company B." How much regret does Mr. Paul feel?
>
> On the other hand,
>
> "Mr. George owns shares in Company B. During the past year he switches to stock in Company A. He now finds that he would have been better off by $1,200 if he had kept his stock in Company B." How much regret does Mr. George feel?

As in Gleicher's [1] study, the scenario were altered in order to manipulate the outcome valence (positive versus negative) and the salience of the counterfactual. Positive and negative outcomes were manipulated by altering the endings of the scenarios. The positive outcome condition had the character investing in the other company and being better off by $1,200, while the negative outcome condition had the characters losing the $1,200 after investing in the other company. Counterfactual salience was manipulated by varying where the emphasis was placed in the scenario, such that in the salient counterfactual condition the character's alternative outcome was explicitly stated. Thus the salient counterfactual stated that the man "would have been" worse off "if he had not" switched companies. The non-salient counterfactual was stated such that the man "is better off because he switched companies. Hence, for the non-salient counterfactual, the focus is not on the alternative outcome, but on the actual one. For the salient counterfactual condition, the focus was on the counterfactual/alternative outcome [1].

Participants were asked to indicate how much regret the character experienced on a 1 (no regret/feels good) to 10 (complete regret) Likert scale. This constituted the extent to which the participant was responding to counterfactual thinking, the primary dependent variable.

To measure clarity of visual imagery, the Vividness of Visual Imagery Questionnaire (VVIQ) [10] was used, which asked participants to use a scale ranging from 1 (perfectly clear) to 5 (no image at all) to rate how able they were to visualize certain people, places, and things. For example, one question instructed participants to think of some relative or friend whom they frequently see and to create a mental picture of them. There were a total of 16 questions on this scale. The VVIQ was selected because it is a widely used and important measure of visual imagery that is generally considered to be reasonably reliable and valid [19], coefficient alpha = .86 in the present study.

Participants

There were 242 participants (132 females) in this study, all of whom attended a large Midwestern university and received partial course credit for their General Psychology course.

Procedure

Upon entering the room, participants were randomly assigned to read one of the four different scenarios and to answer the questions associated with the story. Participants then completed the VVIQ which assessed the subject's ability to generate vivid images in their mind. Participants were then fully debriefed and thanked for their participation.

RESULTS

Given that participants completed the VVIQ after the experimental manipulations, it was possible that participants' VVIQ scores would be influenced by those manipulations. However, an ANOVA with salience and valence as the independent variables and participants' VVIQ score as the dependent variable resulted in Fs $\leq .50$, indicating that VVIQ scores were not affected by the experimental manipulations.

Participants were categorized as being high or low on Vividness of Visual Imagery (VVI) based upon a median split of the scores on the VVIQ. A 2 (Counterfactual Salience: High Low) × 2 (Outcome Valence: Positive/Negative) × 2 (Vividness of Visual Imagery, VVI: High/Low) between-participants analysis of variance was performed on the affect ratings. There was a significant main effect for outcome valence, with participants in the negative counterfactual condition expressing significantly more regret ($M = 8.85$, $SD = 1.49$) than participants on the positive counterfactual condition ($M = 3.40$, $SD = 2.77$; with lower numbers indicating no regret/feels good); $F(1, 234) = 345.94$, $p < .0001$, partial eta-squared = .60.

This main effect was qualified, however, by a significant Counterfactual Salience × Outcome Valence × Vividness of Visual Imagery interaction; $F(1, 234) = 7.87$, $p < .006$, partial eta-squared = .03. There were no other significant main effects or interactions. Recall that it was predicted that participants' Vividness of Visual Imagery (VVI) was not expected to influence affective responses when the counterfactual to the event was made salient (suggesting that everybody would engage in counterfactual thinking when the counterfactual was made salient), but the participants who were high in VVI were expected to display more extreme affective responses than participants low in VVI when the counterfactual to the event was not made salient (suggesting that the person's natural tendency to form, or not form, counterfactuals would drive their affective response). The significant three-way interaction was decomposed, and a series of planned comparisons were performed to test these predictions.

A 2 (Outcome Valence: Positive/Negative) × 2 (Vividness of Visual Imagery, VVI: High Low) between-participants' analysis of variance was performed on the regret ratings for the salient counterfactual condition (see Figure 1). There was a significant main effect for outcome valence, with participants in the negative counterfactual condition expressing significantly more regret ($M = 8.98$, $SD = 1.11$) than participants on the positive counterfactual condition ($M = 3.41$, $SD = 3.21$; with lower numbers indicating no regret/feels good); $F(1, 82) = 135.45$, $p < .0001$, partial eta-squared = .62. The were no other significant main effects or interactions (Fs ≤ 1). As predicted, when the counterfactual was made salient, there were no differences in the extremity of the affective responses of high versus low VVI participants for either the positive [$M = 3.77$, $SD = 3.47$, $N = 13$ versus $M = 3.13$, $SD = 3.07$, $N = 16$, respectively; $F(1, 234) = 0.67$, $p = .41$, partial eta-squared = .00] or the negative [$M = 8.82$, $SD = 1.22$, $N = 28$ versus $M = 9.14$,

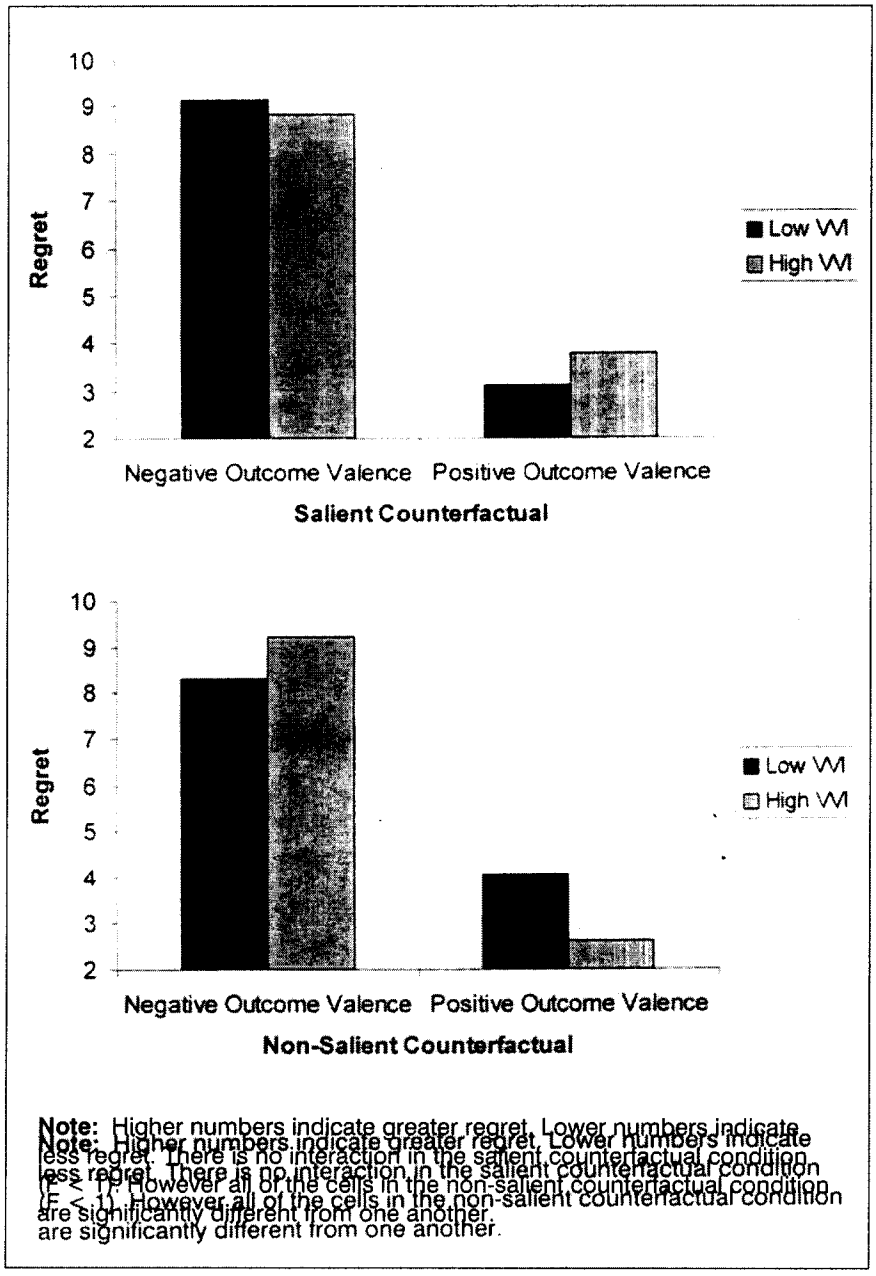

Figure 1. Regret as a function of counterfactual salience, outcome valance, and vividness of visual imagery.

$SD = 0.99, N = 29$, respectively; $F(1, 234) = 0.32, p = .57$, partial eta-squared = .00] counterfactual conditions.

Similarly, a 2 (Outcome Valence: Positive/Negative) × 2 (Vividness of Visual Imagery, VVI: High/Low) between-participants' analysis of variance was performed on the regret ratings for the non-salient counterfactual condition. There was a significant main effect for outcome valence, with participants in the negative counterfactual condition expressing significantly more regret (M = 8.76, SD = 1.72) than participants on the positive counterfactual condition (M = 3.39, SD = 2.60; with lower numbers indicating no regret/feels good); $F(1, 152)$ = 253.43, $p < .0001$, partial eta-squared = .63. This main effect was qualified, however, by a significant Outcome Valence × Vividness of Visual Imagery interaction; $F(1, 152) = 11.85$, $p < .001$, partial eta-squared = .07. As predicted, when the counterfactual was not made salient, there were significant differences in the extremity of the affective responses of high versus low VVI participants for both the positive [$M = 2.63$, $SD = 2.07$, $N = 35$ versus $M = 4.05$, $SD = 2.85$, $N = 41$ respectively, with lower numbers indicating no regret/feels good; $F(1, 234)$ = 8.58, $p < .01$, partial eta-squared = .04] and the negative [M = 9.23, SD = 1.17, N = 40 versus M = 8.30, SD = 2.04, N = 40, respectively, with higher numbers indicating complete regret; $F(1, 234) = 3.85$, $p = .05$, partial eta-squared = .02] counterfactual conditions. In other words, when the counterfactual was not made salient, participants high in Vividness of Visual Imagery felt better in response to the positive counterfactual condition and worse in response to the negative counterfactual condition, than low Vividness of Visual Imagery participants.

DISCUSSION

The results of the present study suggest that persons high in Vividness of Visual Imagery are more likely to spontaneously generate counterfactuals (as indicated by their more extreme affective responses) than persons low in Vividness of Visual Imagery. It appears that the ability to generate vivid mental images may be related to the ability to imagine counterfactual events.

This finding has some interesting implications. Although the generation of counterfactuals tends to result in more extreme affective responses in general, research suggests that people do not display as much intensification of affect in response to counterfactuals dealing with positive as with negative outcomes [1, 14]; see also [20] and [21]. In other words, although generating counterfactuals leads to both more extreme positive and negative responses to outcomes, the effect is stronger for negative outcomes. People who are prone to generate counterfactuals are more likely to ruminate over past mistakes and experience more regret. When this regret concerns serious negative events, such as the death of a loved one, it may continue for years after the event [8] and can lead to self-pity and depression, and harm a person's overall well-being [6]. Given that persons who are high in vivid mental imagery appear to be more likely to generate

counterfactuals, they may also be more likely to respond emotionally to outcomes in general. The propensity to engage in counterfactual thinking may be one of many reasons why people who are prone to vivid mental imagery tend to be more emotional in general [24]. In particular, they may be more prone to experience regret for past decisions. Of course, this is an area for future research.

LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Indirect Measure of Counterfactual Thinking

It should be noted that the present study did not directly measure counterfactual thinking. Instead, it relied on past literature that indicates that more extreme affective responses to outcomes are a sign that counterfactual thinking has occurred [1, 3], and variables that facilitate the construction of counterfactuals have the effect of amplifying emotional responses [1, 3, 4]. Future research examining the relationship between the ability to generate vivid mental images and counterfactuals should also include more direct measures of counterfactual thinking.

Use of Hypothetical Scenarios

One potential shortcoming of the current study (as with most counterfactual studies [7]) is that it relied upon judgments about hypothetical scenarios. As noted by Roese and Olson [7] research conducted on counterfactual thinking has heavily relied upon scenarios that often involve ambiguous characters and events, in which the participants have to estimate how much regret another person (the ambiguous character) is feeling in response to a given event [1, 7]. Roese and Olson [7] suggest, however, that such a simulation is approximately the same as a true experiment, in which the imagined event has actually happened to the person. Research that has used actual events yielded a similar probability of having participants engage in counterfactual thinking as simulated events. For example, Roese [17] had participants recall an exam that they did poorly on and found that when the memories of the exam were more disappointing, there was a higher probability of engaging in counterfactual thinking (see also Markman & Miller [23]). Similar results were found when participants recalled other negative life events [2, 9, 11, 24]. Therefore, when either actual events or hypothetical story stems are used, the results are similar.[1] Even so, however, the present research was intended to provide an initial demonstration of the relationship between the ability to generate vivid visual images and the propensity to generate counterfactuals.

[1] These studies did not directly compare the probability of generating counterfactual thoughts between a hypothetical story stem (i.e., one that involves researcher-created people, places, and events) and a real-life manipulation (i.e., having participants recall an actual life-event). However, as the aforementioned studies show, the probability of producing counterfactual thoughts is similar using either method.

Now that this relationship has been established, future research examining this relationship should use more realistic and involving social situations.

Judgments of Own versus Others' Regret

Another important conceptual distinction between studies examining actual events versus hypothetical story stems concerns the nature of the dependent variables that are measured. In scenario studies, counterfactual thinking is frequently measured by how much regret *another person* would feel in the situation [1]. On the other hand, in studies examining actual events, counterfactual thinking is measured by how much regret the *participants themselves* feel while remembering a negative life event [2, 23]. Although, as mentioned in the previous paragraph, the results of studies using both the scenario and the actual event approaches tend to be similar, technically speaking, the present study deals with perceived regret of others rather than anticipated regret of the self. Therefore, the findings of the current study suggest that those who tend to create vivid visual images are also more likely to assume more extreme affective responses in others, compared to those who are not as able to create such vivid images. Given that counterfactuals are more likely to be generated when the person feels involved in the outcome [7], and because more information about the self is available than about others, one might expect even more pronounced effects when judgments about the self are the dependent variable [1]. Although this is an important issue for future research to address, it should be noted that the present research used the more common, standard, methodology in the counterfactual literature.

TAKING ADVANTAGE OF THE RELATIONSHIP BETWEEN COUNTERFACTUALS AND VIVIDNESS OF VISUAL IMAGERY

The ability of people to use counterfactuals properly is important to everyday life. Research in this area has examined the many different cognitive and social psychological variables that influence the production of counterfactuals and the consequences of such counterfactuals once they are produced. The research has shown that counterfactual thinking has an impact on both positive and negative outcomes. Counterfactual thinking can result in the improvement/increase in the following positive outcomes: memory accuracy [25], intelligence development in children [26, 27], positive emotions [28], mood improvement [29], coping ability [30], group decision making [31], visual problem solving [32], and self-efficacy [33]. However, engaging in counterfactual thinking can also result in the following negative outcomes: increased blame attributions [34], diffusion of responsibility attributions [35], negative affect [17], negative judgments of victimization [4], increased suspicion [36], and heightened negative expectancies [37].

Clearly, this extensive list of variables is not limited to counterfactual thinking. Some of the aforementioned cognitive and social psychological constructs are also related to visual imagery. In fact, there is some research that suggests, as does the current research, that visual imagery and counterfactual thinking may produce similar consequences. For instance, concerning just a few of the variables that were listed earlier as being associated with counterfactual thinking, past research has shown that visual imagery is used extensively in clinical practice to aid in coping with specific diseases [38] visual imagery tactics are helpful for making better decisions [39]; and specific guided imagery techniques can be used to influence an individual's current mood state [40].

The research mentioned in the previous paragraphs suggests that some cognitive and social psychological variables have been investigated by both counterfactual researchers and by visual imagery researchers and have been found to have similar effects on positive and negative outcomes. However, several of the variables listed above that have been linked to counterfactual thinking have *not* been examined extensively in the visual imagery literature. Given the results of the present study, that there is a relationship between the ability to generate vivid mental images and the likely tendency to engage in counterfactual thinking, it may be beneficial for future researchers to examine the relationship of these and other variables to visual imagery. An examination of the extensive literature on counterfactual thinking may suggest numerous new variables and new associations for imagery researchers to explore.

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