EXPLAINING VARIANCE IN COUNTERFACTUAL-SEEKING BEHAVIOR

by Amanda R. Trask-Tolbert

Associative self-anchoring suggests that implicit self-esteem is positively related to satisfaction with a chosen object. Moreover, satisfaction has been found to inversely predict post-decisional search for information about foregone alternatives (counterfactual-seeking). Therefore, this study attempted to examine individual differences in implicit self-esteem to explain variance in counterfactual-seeking behavior. In this study, participants completed either a decision-making task or an endowment task, and then were asked if they would like to counterfactual-seek. The results suggest that implicit self-esteem does not predict counterfactual-seeking. However, those who made a decision were significantly more likely to seek counterfactual information than those who received an endowment. Further research should examine why decisions elicit more counterfactual-seeking than endowments.
EXPLAINING VARIANCE IN COUNTERFACTUAL-SEEKING BEHAVIOR

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Introduction

A new, growing area of research in decision-making has focused specifically on what motivates individuals to seek information about foregone options (termed “counterfactual-seeking”; Shani, Tykocinski & Zeelenberg, 2008; Shani & Zeelenberg, 2007; Summerville, 2008; van Dijk & Zeelenberg, 2007). Because this research is so new, very little is understood about what motivates individuals to seek this counterfactual information.

Unexplained Variance in Counterfactual-Seeking

Previous research has shown that satisfaction is inversely related to counterfactual-seeking (Shani et al., 2008; Summerville, 2008). The more dissatisfied individuals are, the more they will seek counterfactual information about the rejected alternatives. However, even among individuals who receive the same outcome and experience the same subjective satisfaction, there is still a great amount of variability in their decision to counterfactual-seek.

Individual differences may explain some of this variability. Ongoing research finds that counterfactual-seeking behavior positively relates to Openness to Experience, an individual difference linked to curiosity and creativity (Trask-Tolbert & Summerville, 2011). However, as this only accounts for approximately five percent of the variance in counterfactual-seeking, there is still much unexplained variability in individuals' decisions to counterfactual-seek. Therefore, this study attempts to resolve this unexplained variance through an associative self-anchoring framework, which suggests that individual differences in implicit self-esteem may predict counterfactual-seeking behavior.

Associative Self-Anchoring

Associative self-anchoring is the formation of an association between an object and the self, which results in the implicit transfer of an individual’s self-evaluations to the object (Cadinu & Rothbart, 1996; Gawronski, Bodenhausen, & Becker, 2007; Otten, 2003). Specifically, this association affects the individual’s implicit evaluation of the object. Individuals who have positive self-evaluations will have positive implicit evaluations of the object, whereas individuals who have negative self-evaluations will have negative implicit evaluations of the object. A vast amount of research has shown that people's implicit self-evaluations are generally positive (Bosson, Swann, & Pennebaker, 2000; Greenwald & Farnham, 2000; Koole, Dijksterhuis, & Van Knippenberg, 2001), though this may only be true of Western cultures (Heine, Lehman, Markus, & Kitayama, 1999).
Associative self-anchoring suggests that implicit self-esteem and satisfaction will be positively related. Therefore, in Western cultures, associative self-anchoring should generally lead to increased positive evaluations of the chosen object, manifest through increased satisfaction. However, this association is still dependent on the individual’s implicit self-evaluation. Individuals who have negative self evaluations will have negative evaluations of their chosen object, whereas individuals who have positive self evaluations will have positive evaluations of their object.

**Satisfaction and Counterfactual-Seeking**

**Implicit satisfaction.** Given the previously discussed effects of explicit satisfaction, it is likely that implicit satisfaction may also be implicated in counterfactual-seeking. Implicit attitudes can be defined as affective reactions resulting from associations that are automatically activated by a given stimulus (Gawronski et al., 2007; Sloman, 1996). Conversely, explicit attitudes are evaluative judgments about a given stimulus. According to Gawronski and colleagues (2007), whereas the activation of associations can occur irrespective of whether a person considers them to be true or false, evaluative judgments are concerned with subjective truth. However, implicit and explicit attitudes can be consonant as individuals typically use their affective reactions toward an object as a basis for their evaluative judgments, especially if the affective reactions were consistent with existing evaluative judgments (Gawronski et al., 2007; see also Strack & Deutsch, 2004). Similarly, if the attitude object is novel, an affective reaction to the object would serve as the basis for the explicit attitude, as there are no existing evaluative judgments. In either case, implicit and explicit attitudes should be positively related. In terms of associative self-anchoring, this would suggest that because the implicit attitude, or affective reaction is primarily due to implicit self-esteem, the explicit attitude would be positively related to implicit self-esteem.

**Discrepancies between implicit and explicit satisfaction.** Despite the fact that implicit and explicit satisfaction may be related, there are often discrepancies between implicit and explicit attitudes (Karpinski & Hilton, 2001; Nosek, 2007; Olson, Fazio, & Hermann, 2007; Rydell & McConnell, 2006). These discrepancies can occur for many reasons, such as attempting to maintain one's self presentation (Olson et al., 2007) or being exposed to primes and behavioral information that are inconsistent (Rydell, McConnell, Mackie, & Strain, 2006). Research suggests that these discrepancies lead to increased information processing (Petty,
Tormala, Briñol, & Jarvis, 2006), likely as a result of dissonance (Rydell, McConnell, & Mackie, 2008).

Similarly, a series of studies conducted by Summerville (2008) found that counterfactual-seeking serves as a functional response to dissonance, as it improves selective information processing. In these studies, negative outcomes (in violation of positive expectancies) as well as dissatisfaction increased counterfactual-seeking, which ultimately was found to reduce dissonance. Therefore, in situations where implicit and explicit satisfaction diverge, counterfactual-seeking may improve selective information processing and reduce dissonance. 

**Associative Self Anchoring and Counterfactual-Seeking**

As previously discussed, associative self-anchoring suggests that choosing an object creates an association between the object and the self such that implicit self-esteem and implicit satisfaction with the chosen object are positively related. Thus, an individual's affective reaction toward the object is governed by his implicit self-esteem. Further, when the chosen object is novel, this affective reaction is likely to be the basis for the explicit evaluation of the object. As mentioned, explicit satisfaction inversely predicts counterfactual-seeking. Therefore, implicit satisfaction should also be inversely related to counterfactual-seeking. And, because this object-self association creates a direct relationship between implicit self-esteem and implicit satisfaction, implicit self-esteem should also be inversely related to counterfactual-seeking. Therefore, associative self-anchoring would suggest that the lower an individual's implicit self-esteem is, the more likely it is that he will counterfactual-seek, due to the effects of implicit self-esteem on implicit and explicit satisfaction.

**Effect of association strength.** Because associative self-anchoring is based on an association between an object and the self, it is important to examine both situations in which there is a strong association and situations in which there is a weak association. Gawronski et al. (2007) found that the self-object association was stronger for objects that were chosen than for objects that were rejected. Similarly, varying the degree of personal involvement with the object should affect the strength of the object-self association. One way to vary the strength of the object-self association is to manipulate the circumstances in which an individual receives the object, through either a decision or an endowment. A decision requires some degree of personal responsibility, which requires a greater amount of personal involvement. An endowment, on the other hand, is a gift, and is not contingent on any aspect of the self. Therefore, it follows that
there would exist a stronger, more reliable association between an object and an individual in situations where the individual chose the object, as opposed to if the individual was merely endowed with the object, as a decision requires more input from the self. Thus, any relationship between implicit self-esteem and satisfaction should be strengthened by choice, relative to endowment.

**Direct Effect of Choice Versus Endowment**

In addition to moderating the relationship between implicit self-esteem and satisfaction, the distinction between choice and endowment may also have a direct effect on counterfactual-seeking behavior. Previous findings suggest that increased freedom of choice leads to increased selective exposure and selective information search, whereas decreased freedom of choice leads to decreased selective information search (Cotton & Hieser, 1980; Frey & Wicklund, 1978). This finding has been attributed to an increase in dissonance in the high choice group, as they sought more information that was primarily consonant with their decision than did the low choice group.

As previously mentioned, this selective information search can be exhibited through counterfactual-seeking, a search for information about the foregone alternatives. Therefore, the distinction between a decision and an endowment should predict different rates of counterfactual-seeking, independent of implicit self-esteem or associative self-anchoring processes. Specifically, a decision should elicit more counterfactual-seeking behavior because the increased freedom of choice leads to increased selective exposure, whereas an endowment leads to decreased selective exposure.

**Hypotheses**

Previous research concludes that even among participants who receive the same outcome and experience the same subjective dissatisfaction, there is still much variability in the decision to counterfactual-seek. Associative self-anchoring suggests that individual differences in implicit self-esteem might explain some of this variability. Therefore, this study aims to examine whether associative self-anchoring provides a reasonable framework to explain counterfactual-seeking behavior. Additionally, this study also aims to test the limits of associative self-anchoring by comparing the influence of implicit self-esteem in a circumstance
that should involve more of the self (i.e., a decision) with a circumstance that involves less of the self (i.e., an endowment).

As suggested by Gawronski et al. (2007), implicit self-esteem should directly relate to implicit satisfaction with the chosen object, as implicit satisfaction derives from the individual's implicit self-esteem. This leads to my first hypothesis, as shown in Figure 1:

**H1: Implicit self-esteem directly predicts satisfaction.**

Further, because there is greater association with the self for chosen objects rather than endowed objects, Hypothesis 2 predicts the following:

**H2: Task condition will moderate the relationship between implicit self-esteem and satisfaction, as a decision will strengthen the relationship and an endowment will weaken it.**

Additionally, previous research finds that counterfactual-seeking is related to explicit satisfaction (Shani et al., 2008; Summerville, 2008). Further research also finds that implicit and explicit measures may be related (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005), and that discrepancies between the two can lead to increased information processing (Rydell et al., 2008). Thus, my third hypothesis states:

**H3: Both implicit and explicit satisfaction predict counterfactual-seeking.**

This hypothesis can be separated into three specific sub-hypotheses, each aimed to examine different relationships between implicit and explicit satisfaction, as they predict counterfactual-seeking.

Previous research suggests that dissatisfaction is directly related to counterfactual-seeking (Shani et al., 2008; Summerville, 2008). Thus, explicit satisfaction should be negatively related to counterfactual-seeking, as shown in Figure 1.

**H3a: Explicit satisfaction inversely predicts counterfactual-seeking.**

Previous research suggests that individuals may use their affective reactions toward an object as a basis for their evaluative judgments, especially if their experience with the object is extremely limited (Gawronski et al., 2007). This finding has only been examined using neutral objects. However, it may also extend to novel photographs, which are not neutrally valenced. If this finding can be extended to include negatively valenced novel photographs, implicit satisfaction may predict counterfactual-seeking indirectly, as suggested by Hypothesis 3b:
**H3b:** Explicit satisfaction partially mediates the effect of implicit satisfaction on counterfactual seeking.

Previous research suggests that discrepancies between implicit and explicit attitudes can result in dissonance-related discomfort (Rydell et al., 2008). This discomfort can lead individuals to seek counterfactual-information in order to gain more information and make their implicit and explicit attitudes more alike. Thus, greater discrepancies between implicit and explicit satisfaction will be related to increased counterfactual-seeking, as predicted by Hypothesis 3c:

**H3c:** Discrepancies between implicit and explicit satisfaction lead to dissonant affect and increased counterfactual-seeking.

Finally, previous findings also suggest that increased freedom of choice leads to increased selective exposure and selective information search, whereas decreased freedom of choice leads to decreased selective information search (Cotton & Hieser, 1980; Frey & Wicklund, 1978). This information search can be exhibited through counterfactual-seeking, a selective search for information about the foregone alternatives. Therefore, a decision should elicit more counterfactual-seeking behavior than an endowment, independent of implicit self-esteem or associative self-anchoring processes. This leads to my final hypothesis, as displayed in Figure 1:

**H4:** Decisions lead to increased rates of counterfactual-seeking compared to endowments, independent of implicit self-esteem.

In this study, participants either made a choice between two blurred photographs or were assigned to receive one of the photographs. They then received the unblurred image as feedback on the outcome of their decision before either viewing or bypassing information about the foregone picture.

This study examines whether individual differences in implicit self-esteem can account for some unexplained variance in counterfactual-seeking behavior. Additionally, this study also examines the boundaries of associative self-anchoring by comparing the influence of implicit self-esteem for a decision and for an endowment. In addition to answering the proposed research questions aimed at better understanding when and why counterfactual-seeking occurs, this research moves from simulated decision-making to more realistic and meaningful decision-
making in hopes that it will allow for better assessment and understanding of the phenomenon in general.

**Method**

**Participants**

One hundred twenty-three undergraduate college students from introductory-level psychology courses at Miami University were recruited to participate in this study in partial fulfillment of a class requirement.

**Manipulation**

In this study, task was manipulated using two conditions: a decision condition, where participants were asked to make a decision between two objects, and an endowment condition, where participants were told that they had been randomly assigned to receive an object.

**Decision-making task.** The decision-making task was a computer-based task. Participants were told that they were participating in a study to examine the effect of visual perception on decision-making. Participants chose between two blurred pictures, which simulated a decision made under uncertainty (Scherer, Windschitl, Smith, & Rose, 2010), an essential component for gaining an accurate understanding of whether the individual wishes to seek out information about the rejected alternative. After making their decision, participants received a 5x7 inch copy of their un-blurred picture to keep.

**Endowment task.** The endowment task was also a computer-based task. Instead of making a decision between two photographs, participants were shown the same two blurred images but told that they had been randomly assigned to receive one of two photographs. Participants in this condition also received a 5x7 inch copy of their picture to keep.

**Stimuli**

The pictures used in the study were unattractive digital pictures taken by the researcher on the Miami University campus (shown in Figures 2a and b). The use of unattractive rather than attractive pictures aimed at preventing a floor effect for counterfactual-seeking, as greater dissatisfaction leads to more counterfactual-seeking. All pictures were pilot tested for likeability (attractiveness) using a 7-point scale. The two pictures that were used in this study were rated the lowest of all the piloted pictures ($M = 2.16, 2.64$). The ratings for these pictures did not significantly differ ($t (25) = 1.26, p = .11$). The pictures were blurred using photo editing software (see Figures 3a and b).
Measures

Measure of implicit self-esteem. In order to measure implicit self-esteem, participants completed an initials preference task (Greenwald & Banaji, 1995; Gawronski et al., 2007; Kitayama & Karsawa, 1997; Koole et al., 2001). In this task, participants were asked to rate the likeability of each letter of the alphabet. The degree to which they had a preference for their initials over the other letters was interpreted as an index of implicit self-esteem.

An index of implicit self-esteem was created using the ipsatized double correction algorithm (Baccus, Baldwin, & Packer, 2004). Specifically, for each participant, the mean rating of all non-initial letters is subtracted from each letter rating. Then, the ipsatized letter ratings for both the initials and non-initials are averaged to create a normative letter baseline. An index for implicit self-esteem is the computed from the difference score between the ipsatized initial ratings and the ipsatized baseline, controlling for both baseline levels of attractiveness and individual differences in responding. This particular scoring algorithm was used because previous research has suggested that it demonstrates the best combination of favorable characteristics (LeBel & Gawronski, 2009).

Measure of explicit self-esteem. The Rosenberg (1989) Self Esteem scale was used to measure participants' explicit self-esteem. This 10-item measure was rated on a 7-point Likert scale ranging from Strongly Disagree to Strongly Agree. Items 3, 5, 8, 9, and 10 were reverse-scored and then all of the items were averaged to produce a single value of explicit self-esteem. The scale was reliable ($\alpha = .88$).

Measure of implicit satisfaction. To measure participants' implicit satisfaction, a modified version of the affect misattribution procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005) was used. As in the original procedure, for each trial of the priming task, a prime image appears in the center of the screen for 75 milliseconds, followed by a blank screen for 125 milliseconds, and then a Chinese pictograph for 100 milliseconds. Following the pictograph, a pattern mask consisting of black and white noise appeared on the screen until the participant responded, at which point a new trial would begin. Participants were asked to indicate whether the pictographs were pleasant or unpleasant by pressing either the ‘P’ or the ‘Q’ button on the keyboard. There were a total of 50 trials. For half of the trials, participants were primed with their chosen picture (target prime). For the other half of the trials, participants were primed with
a gray rectangle (control prime). The proportion of 'pleasant' to total responses following the target prime was interpreted as an index for their implicit satisfaction with their selected picture.

Following the procedures of Payne et al. (2005), frequencies of pleasant and unpleasant responses for each type of prime (picture or neutral) were aggregated. Then, the percentage of pleasant responses for each type of prime was calculated by dividing the number of pleasant responses by the total number of responses possible. A difference score was computed by subtracting the neutral percentage from the picture percentage. This was done for both Time 1 and Time 2, and became the index for implicit satisfaction.

**Measure of explicit satisfaction.** Participants rated how satisfied they were with their choice using a 2-item self-report measure (sample item: “I am satisfied with the picture I chose.”). This was rated on a 7-point scale and was administered both before and after participants were given the option to seek counterfactual information. A single score of explicit satisfaction was created by averaging the two responses from each participant at both Time 1 and Time 2. The scale was reliable (Time 1 α = .89, Time 2 α = .94).

**Measure of dissonant affect.** Participants also completed a brief measure of dissonant affect. They rated their current level of discomfort using this five-item self-report measure (sample item: "Right now, I feel uncomfortable."). Participants rated their responses on a 7-point scale before and after they were given the opportunity to counterfactual-seek. To create a single index of dissonant affect for each Time 1 and Time 2, the fourth item of the scale was reverse-scored. Initial scale reliability analyses revealed that the scale was moderately reliable (Time 1 α = .62, Time 2 α = .64). However, with the last item removed ("Right now, I feel alert.") the scale reliability improved (Time 1 α = .80, Time 2 α = .80). Thus, only the first four items (‘uneasy’, ‘uncomfortable’, ‘bothered’, ‘relaxed’(reverse scored)) were averaged to create the single index of dissonant affect.

**Procedure**

After providing informed consent, each participant completed the implicit and explicit self-esteem measures. Participants were then randomly assigned to a task (decision or endowment) condition, which they completed on a computer. After completing the task, participants received a 5x7 inch printed version of their un-blurred picture, which they were told they could keep as reward for completing the study.
Once they received their picture, participants completed the measures of implicit and explicit satisfaction as well as the measure of dissonant affect. They were then asked if they would like to view the picture that they did not select (the dichotomous measure of counterfactual-seeking) before again completing the measures of satisfaction and dissonant affect. Finally, participants provided demographic information before being thanked and debriefed.

**Results**

Overall descriptive statistics for each of the measured variables are provided in Table 1. Additionally, correlations between each of the measures are provided in Table 2.

**Effects of Implicit Self-Esteem**

There was a failure of random assignment as there was a significant difference in implicit self-esteem between conditions \((t(102) = -2.89, p = .005)\). Implicit self-esteem was significantly higher in the endowed condition \((M = 2.04, SD = .90)\) than in the choice condition \((M = 1.42, SD = 1.41)\).

A linear regression was used to test Hypothesis 1, which predicted that implicit self-esteem would be directly related to implicit satisfaction. As shown in Figure 4, the regression was non-significant, suggesting that implicit self-esteem does not predict initial implicit satisfaction \((\beta = .02, t(122) = 1.10, p = .27)\). Moderation analyses revealed that this relationship was not moderated by task condition \((\beta = .00, t(122) = .03, p = .97)\).

A regression predicting explicit satisfaction from implicit self-esteem was not significant \((\beta = .11, t(122) = 1.04, p = .30)\). Because this relationship is non-significant, it cannot be mediated by explicit self-esteem. Furthermore, this relationship was not moderated by task condition \((\beta = -.23, t(122) = -.96, p = .34)\). Additionally, there was no significant relationship between implicit self-esteem and explicit self-esteem \((\beta = .00, t(122) = .03, p = .97)\). Thus, Hypotheses 1 and 2 were not supported, providing evidence contrary to previous findings in support of associative self-anchoring.

Despite the fact that implicit self-esteem did not predict satisfaction, it was possible that it could directly predict counterfactual-seeking. To test this, a logistic regression was used to predict the logit of counterfactual-seeking from implicit self-esteem. However, implicit self-esteem was not a significant predictor of counterfactual-seeking \((\beta = -.16, \text{Wald} = .93, p = .33)\). Further, moderation analyses revealed that task condition did not moderate this relationship \((\beta = \)
.06, Wald = .03, p = .86). Therefore, these findings suggest that implicit self-esteem is unrelated to counterfactual-seeking.

**Effects of Satisfaction**

As expected, there were no differences in initial implicit satisfaction for the decision (M = .03, SD = .28) and endowment conditions (M = .03, SD = .28; t(121) = -.06, p = .95). Similarly, there were no differences between the decision (M = 3.21, SD = 1.43) and endowment conditions (M = 3.12, SD = 1.34) for initial explicit satisfaction (t(121) = -.37, p = .71).

Therefore, satisfaction was not dependent on whether a participant made a decision or was given an endowment.

**Explicit satisfaction predicting counterfactual-seeking.** In order to test Hypothesis 3a, a logistic regression predicting the logit of the dichotomous outcome of counterfactual-seeking was used. As shown in Figure 4, explicit satisfaction was not a significant predictor (β = -.07, Wald = .27, p = .60), in contrast to previous findings that explicit satisfaction is inversely related to counterfactual-seeking.

**Partial mediation of implicit satisfaction and counterfactual-seeking.** A logistic regression was used to determine the relationship between implicit satisfaction and counterfactual-seeking. Implicit satisfaction did not significantly predict counterfactual-seeking (β = -.96, Wald = 1.83, p = .18; see Figure 4). Further, a linear regression predicting explicit satisfaction from implicit satisfaction was not significant (β = .50, r(122) = 1.11, p = .27). As these relationships were not significant, there can be no mediation of implicit satisfaction and counterfactual-seeking. This evidence therefore fails to support Hypothesis 3b.

**Discrepant implicit and explicit satisfaction.** Hypothesis 3c states that individuals experiencing greater differences between their implicit and explicit satisfaction will experience greater dissonant affect, increasing their desire to seek counterfactual information. To test this hypothesis, standardized values were computed for both implicit and explicit satisfaction. The absolute value of the difference between these values was calculated and interpreted as a measure of explicit-implicit satisfaction discrepancy (Briñol, Petty, & Wheeler, 2006).

Implicit and explicit satisfaction was not significantly correlated (r = .10, p = .27). A logistic regression predicting counterfactual-seeking from this discrepancy indicated that discrepant implicit and explicit satisfaction did not significantly predict counterfactual-seeking (β = .10, Wald = .17, p = .68; see Figure 4). Moderation analyses revealed that this relationship
was not moderated by condition ($\beta = .82$, Wald = 2.50, $p = .11$). Further, dissonant affect was found to be unrelated to this discrepancy ($r = -.01$, $p = .95$), suggesting that any discrepancy between implicit and explicit satisfaction did not produce dissonant affect.

**Effect of Task Condition**

A logistic regression was used to examine any differences in counterfactual-seeking due to task condition. The regression revealed that task significantly predicted counterfactual-seeking ($\beta = -1.26$, Wald = 8.92, $p = .003$; see Figure 4), as counterfactual information was sought more often in the decision condition (82%) than in the endowment condition (56.5%; see Figure 5). This finding provides support for Hypothesis 4, which suggests that decisions will elicit more counterfactual-seeking behavior than endowments, even when controlling for implicit self-esteem.

**Discussion**

**Effect of Associative Self-Anchorong**

**Role of implicit self-esteem.** I was unable to replicate the original associative self-anchoring finding, as implicit self-esteem did not significantly predict initial satisfaction. This suggests that associative self-anchoring did not occur in this study. Additionally, task condition did not moderate this relationship. Previous research in support of associative self-anchoring was limited to only decisions involving neutral objects, whereas this study examined decisions involving only negatively valenced objects. Therefore, it is possible that associative self-anchoring only occurs when the decision involves neutral objects, and that it does not occur when the decision involves negative or dissatisfying objects.

However, the possibility of replicating the previous associative self-anchoring finding is unlikely. In a recent study, LeBel and Paunonen (2011) used a Monte Carlo simulation to demonstrate that unreliable implicit measures such as the initials preference task are likely to be replicated only about twenty percent of the time because this low reliability decreases the ability to detect a statistically significant effect. Therefore, the Gawronski et al. (2007) finding is unlikely to be replicated, as it was based on a measure that has very low reliability.

Two other methodological issues could have potentially masked this effect in this study. The first potential issue is that this individuals in this sample reported significantly higher implicit self-esteem than those in previously reported samples ($M = .91$, $SD = .73$; $t(122) = 7.49$, $p < .001$).
This abnormally high implicit self-esteem may have led to a ceiling effect, which would make the results difficult to interpret. The second potential issue concerns the measure of implicit satisfaction. Because I used an altered version of the AMP, I may have altered its ability to accurately measure implicit satisfaction. Instead of using positive and negative stimuli, I primed participants with their chosen picture and a gray rectangle. These are not opposite stimuli, though I treated them as such. Additionally, in the normal procedure, primes are not repeated. However, because I wanted to prime for implicit satisfaction with a specific target, we had to reuse the stimuli. Because their picture was repeatedly presented to them, participants may have found their picture to be more fluent, or easier to process (mere exposure effect; Bornstein & D'Agostino, 1992; Bornstein & D'Agostino, 1994). Previous research has found that increased fluency increases likeability and satisfaction (Reber, Schwarz, & Winkielman, 2004; Reber, Winkielman, & Schwarz, 1998). Thus, repeatedly priming participants with their picture may have led them to like the picture more than they would have otherwise, resulting in a distorted measure of implicit satisfaction. Moreover, because this measure appeared before the explicit satisfaction ratings, this increased fluency may have artificially increased explicit satisfaction as well.

**Role of satisfaction.** My hypotheses regarding satisfaction were also not supported. Explicit satisfaction was unrelated to counterfactual-seeking, contrary to previous findings. One explanation for this may be that there was not enough variability in explicit satisfaction because participants only received negatively rated pictures. In the previous studies that found such a relationship, participants received either positive or negative feedback about their decision. If both negative and positive pictures were used, there would likely have been more variation in responses, allowing for a significant finding. Thus, while the data did not support my hypothesis, it is possible that this relationship does exist and might be detected if some participants received positive feedback while others received negative feedback.

Additionally, implicit and explicit satisfaction were not related, indicating that explicit satisfaction did not mediate the relationship between implicit satisfaction and counterfactual-seeking. These results failed to support Hypothesis 3b, which suggested that implicit satisfaction would be indirectly related to counterfactual-seeking. The results also failed to support Hypothesis 3c, which predicted that discrepancies between implicit and explicit satisfaction would lead to dissonant affect and increased counterfactual-seeking. This discrepancy was
unrelated to dissonant affect or counterfactual-seeking, which suggests that in this study, the discrepancy between implicit and explicit attitudes did not result in dissonance-related discomfort. This may have occurred because the attitude object in this study was novel. New objects do not have the same, rich associational structure as familiar objects, as implicit attitudes are thought of as a slow-learning system that develops through many associations over long periods of time (Sloman, 1996). Therefore, the novel object used in this study would have limited implicit associations, which would primarily be based on the individual's affective reaction (Gawronski & Bodenhausen, 2006). Because of the limited associative structure, any discrepancy between the implicit and explicit attitude would likely be resolved by updating the implicit, associational structure to be more consonant with the explicit, evaluative judgment rather than resulting in dissonance.

**Effect of Task Condition**

The only significant predictor of counterfactual-seeking was task condition. Participants who made a decision were significantly more likely to seek counterfactual information than those who received an endowment. However, this finding is not the result of individual differences in implicit self-esteem, as self-esteem was unrelated to counterfactual-seeking. This finding supports Hypothesis 4, suggesting that differences between making a choice and receiving an endowment account for some of the variance in counterfactual-seeking behavior, but that this difference is not due to individual differences in self-esteem.

**Alternative Explanations.** Assuming that the results from this study reflect the true nature of these relationships, I can conclude that individual differences in self-esteem do not predict counterfactual-seeking behavior. However, it is evident from these results that decisions elicit more counterfactual-seeking behavior than endowments. While this finding may not be due to individual differences in self-esteem, there are several other possible explanations for this pattern of results.

One such explanation may be that regret plays a more central role in this relationship than previously described. Instead of implicit self-esteem being the main predictor of dissatisfaction and counterfactual-seeking behavior, dissatisfaction may predict regret, which also predicts counterfactual-seeking (Summerville, 2008). Whereas dissatisfaction does not require any self-blame component, regret, by definition, requires that an individual must feel some degree of self-blame or personal responsibility (Connolly & Zeelenberg, 2002; Roese & Summerville, 2005).
And, while a decision requires personal input and responsibility, an endowment does not. Therefore, regret should only be present following a decision, whereas dissatisfaction may follow from either a decision or an endowment. In this study, I did not measure regret, because it is difficult to adapt to the endowment condition, as participants cannot regret receiving an endowment. However, satisfaction was not related to either counterfactual-seeking or task condition. Therefore, it can be assumed that both those making a choice and those receiving an endowment were equally dissatisfied with their outcome. However, there was a much higher rate of counterfactual-seeking in the decision condition, where individuals were likely to experience regret, than in the endowment condition, where participants could not experience regret. Therefore, it is possible that regret could mediate the relationship between task condition and counterfactual-seeking.

The effect of task on counterfactual-seeking could also be the result of attention to the alternative. In the decision condition, individuals made a choice between two clear alternatives. Therefore, the presence of a second option should have been very salient, and participants were more likely to pay attention to it. In contrast, the alternative option may not have been salient in the endowment condition, as participants never saw the second option. If the alternative is less salient, an individual is less likely to be interested in learning about the alternative (van Dijk & Zeelenberg, 2007). Therefore, participants in the endowment condition would be less likely to seek counterfactual information about the alternative than those in the decision condition, where the alternative is more obvious.

Alternatively, a functional account may explain the difference in counterfactual-seeking between decisions and endowments. Previous research suggests that counterfactual thinking serves a functional purpose, which includes improving performance and learning (Epstude & Roese, 2008). This functional account would suggest that, while it may be beneficial to counterfactual-seek after making a decision, it is not beneficial to do so following an endowment. Again, this is because decisions require personal input, whereas endowments do not. Therefore, an individual who makes a decision may counterfactual-seek in order to learn or improve future performance. However, an individual who received an endowment would not benefit from counterfactual-seeking, as there was no performance to improve. For endowments, an individual’s actions have no bearing on the outcome, therefore they have nothing to learn or
gain from counterfactual-seeking. Therefore, in a functional account of the results, those who sought counterfactual information in the decision condition may have done so because it was potentially beneficial to their future performance, whereas it was not for those in the endowment condition.

**Implications and Future Directions**

The overall findings from this research have the potential to allow us to understand more about counterfactual-seeking. While the findings suggest that counterfactual-seeking does not appear to be the result of individual differences in implicit self-esteem, they do suggest that decisions and endowments lead to different rates of counterfactual-seeking. Future research should focus on the alternative explanations previously outline and continue to examine why this occurs.

Ultimately, this study sheds some light on what makes people more or less likely to seek counterfactual information. This area of research has the potential to provide a better understanding of how we make decisions as well as how we correct for negative outcomes. More broadly, however, this study considered possible effects of implicit cognition in judgment and decision-making. While the findings of this particular study suggest that implicit cognition does not predict counterfactual-seeking, the inclusion of implicit cognition in judgment and decision-making research has the potential to extend it into the broader area of social cognition.
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<th>Mean</th>
<th>SD</th>
<th>Observed Range</th>
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<td>I-E Satisfaction Discrepancy (T1)</td>
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<td>1.00 - 7.00</td>
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*Note.* I-E Satisfaction Discrepancy represents the absolute value of the difference between standardized implicit and explicit satisfaction scores.
### Table 2.
Correlations Between Time 1 Measured Variables

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</table>

1. Counterfactual-Seeking
2. Implicit Self Esteem
3. Implicit Satisfaction (T1)
4. Explicit Satisfaction (T1)
5. I-E Satisfaction Discr. (T1)
6. Dissonant Affect (T1)

*p < .05, **p < .01
Figure 1.

The proposed path model predicting counterfactual-seeking from self-esteem, task condition, and satisfaction. The corresponding hypotheses are shown next to each pathway.
Figure 2.
The two photographs participants could have received.

A.

B.
Figure 3.

The blurred version of Figures 2a and b. Participants in the decision condition viewed these photographs on the computer prior to making their decision.

A.

B.
Figure 4.

The obtained path model predicting counterfactual-seeking from self-esteem, task condition, and satisfaction. Significant paths are shown in bold.
Figure 5.

Rates of counterfactual-seeking grouped by task condition. Participants in the decision condition sought counterfactual information significantly more than those in the endowment condition ($t(115) = 3.16, p = .002$).
References


