EXPERIMENTALLY TESTING THE THREE-FACTOR STRUCTURE OF SOCIO-EMOTIONAL COMPARISONS

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Abstract

Evolutionary theories posit that comparisons to others are essential in determining one’s relative position in a social hierarchy. Social comparison information can help guide behaviour in several ways, but has been associated with different adverse psychological issues (e.g., depression; stress). However, a purely cognitive view of social comparisons ignores the emotional content that usually accompanies them. A novel construct named socioemotional comparisons (SEC) is theorized to bridge the cognition-emotion gap. SEC is defined as experiences of negative affect following a subjective evaluation of unfair or unjust disadvantage compared to another. These comparisons are represented by three factors: malicious envy, low self-esteem, and justice sensitivity. No study, however, has examined SEC’s proposed three-factor structure. In addition, the intercorrelation of SEC’s factors should not be better explained by confounding variables such as the experience of negative affect. This research attempted to validate the SEC construct through a series of experiments. I conducted three experiments, each manipulating a separate SEC factor. I then examined how experimental manipulations changed SEC scores, and whether these changes remained once negative affect was controlled for. Results showed that experimental manipulations of malicious envy did not significantly change SEC total or factor scores. Manipulations of self-esteem and justice sensitivity significantly changed SEC total and factor scores. However, once negative affect was controlled for, these effects disappeared. In light of these results, the nature and definition of the SEC construct, limitations of the present study, clinical and theoretical implications, and directions for future research are discussed.
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Dedication

Most importantly, I would like to dedicate this thesis to my late father, Najeh Refaie. Unfortunately, you could not see this achievement, but I hope you know that this thesis is as much a product of your hard work as it is mine. Your dedication, passion, and work ethic through even the toughest of times have taught me what I needed to know to get this done. I would not be standing where I am had it not been for you. You are sorely missed.
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CHAPTER 1: Introduction

Everyone compares themselves to others. These social comparisons are adaptive, as they allow individuals to evaluate where they stand in a social hierarchy. For those lower in a hierarchy, knowing one's relative position may help motivate behavioral strategies for upward social mobility. Although hierarchical information is valuable, social comparisons can also have nefarious effects, as unfavourable social comparisons have been associated with depression (e.g., Beshai, Mishra, Meadows, Parmar, & Huang, 2017; Daniels & Holtfreter, 2018; Mujcic & Oswald, 2018; Smith, Parrot, Diener, Hoyle, & Kim, 1999), anxiety (e.g., Mishra & Carleton, 2015), and stress (e.g., Beshai, Mishra, Mishra, & Carleton, 2017). The seemingly unemotional social comparison is, in reality, wrought with emotional content; when people compare themselves to others, they attach some emotional content to the comparison. Socio-emotional comparisons (SEC) are an attempt to combine both the cognitive and emotional aspects of social comparisons within a single explanatory framework. SEC is conceptualized as experiences of negative affect following a subjective evaluation of unfair or unjust disadvantage compared to another (Mishra, Beshai, Feeney, Iskric, & Novakowski, 2019). Three factors compose the SEC construct: feelings of anger, resentment and envy toward others, comparative self-esteem, and justice sensitivity. Understanding the nature of SEC is particularly important given its potential negative consequences. In this thesis, I will test the validity of the three-factor structure of the SEC construct through a series of experiments. I will first detail the theoretical background of SEC, focusing on Festinger’s (1954) social comparison theory; Mishra, Barclay, and Sparks’ (2017) relative state model; and evolutionary theory in general. I will identify the need to combine the cognitive and
emotional components of social comparison. Then, I will describe the SEC construct, placing emphasis on how it addresses the cognitive-emotional gap in social comparison theories and how its factors relate to evolutionary theories. Next, I will describe further evidence for SEC’s three-factor structure through empirical and theoretical evidence linking all three factors. Further, I will explore the potential of negative affect as being a more parsimonious explanation of the relationships among SEC factors than SEC itself, leading to the need to design an experiment to test this alternative hypothesis. This discussion will lead to the primary research questions: Is SEC’s three-factor structure valid? Does negative affect account for the relationship between the SEC factors and SEC itself?

1.1 Social Comparisons and Evolution

According to Festinger (1954), people have a strong tendency to compare themselves to others. These comparisons are useful in evaluating one’s abilities. Indeed, Festinger argued that people can only define themselves through comparisons with other people. In this sense, Festinger argued that one’s absolute state (as assessed by objective measures of abilities) is not important to the individual; rather what is important is one’s subjective standing compared to others in close proximity, or their relative state. For example, a student with straight A’s may be objectively intelligent (absolute state), but if they are in an environment where they are competing with other straight A students, they may perceive themselves as an average student (relative state).

The importance of relative state is supported by evolutionary theories. Competition is a central part of natural selection. From an evolutionary perspective, an individual’s ultimate goal is to reproduce and pass on their genes. To pass on one’s
genes, one must attract mates, reproduce with them, and ensure that their offspring survive long enough to continue this evolutionary process. At each of these stages, there is competition. For example, when trying to attract mates, people are competing with others who are also trying to attract these same mates. To attract mates, people are not required to be objectively attractive; rather, they are required to be more attractive than others competing for mates in their environment. Competition in natural selection is not concerned with one’s absolute state (objective markers of fitness), but rather with their relative state (markers of fitness compared to others; Mishra, Barclay, & Lalumière, 2014).

Considering the importance of relative state, people are inclined to compare themselves to others to know where they stand in a social hierarchy. Social comparisons theoretically allow those lower in a hierarchy to change their behaviour to rise to a higher standing (Wheeler, 1990). Without knowledge of their position in a hierarchy, however, people would not attempt to allocate resources with the goal of self-improvement. By improving oneself relative to local competitors, an individual can reduce the discrepancy between themselves and others perceived to be higher in rank.

The functional role of social comparisons is further expanded upon in the relative state model (RSM; Barclay, Mishra, & Sparks, 2018; Mishra et al., 2017). In the RSM, Mishra et al. (2017) described how individuals’ social comparisons drive decision-making processes. The authors argue that decision-making is at its core based on comparative processes; one’s relative state is what drives behaviour. For example, risk-taking is thought to arise from one of two pathways: an ability-based pathway and a need-based pathway. The ability-based pathway is used when individuals compare
themselves to others and deem themselves as superior to the target of comparison. As a result of their perceived superiority, they view risky decisions as less risky, because their personal capacities increase their chances of success. The need-based pathway is used when individuals compare themselves to others and deem themselves as inferior to the target of comparison. These individuals engage in risk-taking behaviours because they historically have not been able to accrue similar levels of resources as their comparisons. Therefore, they may turn to risk-taking as an alternative method of gaining sought-after resources. Both of these pathways invoke the relative state to explain behaviour.

Although Mishra et al.’s (2017) model focuses on explaining risk-taking behaviours, they suggest that the same processes can be applied to other behaviours like cooperation and mating strategies.

1.2 Social Comparisons and Emotion

Emotion is absent from most current conceptualizations of social comparisons (Mishra et al., 2019); most social comparison theories do not imply that social comparisons have some sort of emotional content. Yet, in most cases, comparisons involve an emotional reaction. Smith (2000) argues that any type of social comparison has some sort of affective response depending on a number of variables including the perceived advantage or disadvantage of the target of comparison and the comparer’s sense of control. He argues that when the target is seen as advantaged, comparers may feel inspiration, optimism, or admiration when they perceive a sense of control, and depression, shame, envy, or resentment when they do not perceive a sense of control. When the target is perceived as disadvantaged, comparers may feel contempt, scorn, schadenfreude, or pride when they have a sense of control, and fear, worry, pity or
sympathy when they do not have a sense of control. Accordingly, social comparisons are not without an emotional component, whether these emotions are positive or negative.

Other theories of social emotion rely solely on the emotional content in their conceptualizations, without addressing the cognitive comparative component necessary for this emotion to occur. Examples of these include envy and relative deprivation theories, both of which are reviewed in a later section.

1.3 Socio-Emotional Comparisons

Previous attempts at conceptualizing social comparisons have focused on either the cognitive component (e.g., social comparison orientation; Gibbons & Buunk, 1999) or the emotional content (e.g., dispositional envy; Smith, Diener, & Hoyle, 1999) of social comparisons in isolation. SEC, however, is an attempt to synthesize both the cognitive and emotional components of social comparisons into a single explanatory framework, as it involves both a cognitive appraisal of disadvantage, and an emotional reaction to this disadvantage. Considering the theoretical impact and clinical implications of social comparisons, it is important to confirm SEC’s proposed, three-factor structure. This thesis will attempt to test this structure through a series of experiments.

SEC can be defined as an experience of negative affect following a subjective evaluation of unfair or unjust disadvantage compared to another (Mishra et al., 2019). SEC is theorized to involve three separate, but correlated components: feelings of anger, resentment, and envy toward others (envy); negative thoughts and evaluations of self (comparative self-esteem); and justice sensitivity (Mishra et al., 2019). In the following sections, I will describe these factors theorized to comprise SEC, with a focus on how these factors relate to evolutionary theories of social comparison.
1.3.1 Feelings of anger, resentment, and envy toward others. The first SEC factor integrates emotional and cognitive components of relative deprivation (a feeling of anger or resentment following a subjective evaluation of disadvantage, Smith, Pettigrew, Pippin, & Bialosiewicz, 2012) and envy. Envy has been defined in several ways. Here, I will focus on the distinctions between dispositional, benign, and malicious envy.

Dispositional envy is a negative reaction to an advantaged other (Smith & Kim, 2007). Dispositional envy has been further divided into two constructs: malicious envy and benign envy. The former is associated with the motivation to bring the advantaged other down to the individual’s level (Smallets, Streamer, Kondrak, & Seery, 2016), while the latter is associated with self-improvement motivations, pushing the individual to mend the disadvantage they feel (Khan, Bell, & Quratulain, 2017). Both are elicited in a similar fashion; however, they differ in their emotional reaction. For example, autobiographical recall has been used to elicit envy generally (Cohen-Charash, 2000), but different prompts can elicit different types of envy. When asked to recall a time when they compared themselves to a superior other and felt negatively about it, participants reported more malicious envy (Crusius & Lange, 2017). If they were asked to recall a positive experience of disadvantaged social comparison (e.g., aspiring to be better when noticing someone is better than they are), they felt more benign envy. Considering that the SEC envy factor involves a negative rather than positive emotional reaction, it more closely resembles malicious, rather than benign, envy.

There are several factors that have been theorized to result in malicious envy. First, malicious envy entails a social comparison to a similar other. If an individual compares themselves to someone who is less similar to them, they are less likely to
experience malicious envy (Cohen-Charash, 2000; van de Ven, Zeelenberg, & Pieters, 2009). Second, the domain in which the individual is disadvantaged must be important to them. If the domain is not deemed to be important, people may not have an emotional reaction to this perceived disadvantage. Indeed, domain-importance of a disadvantage has been associated with experiences of malicious envy (Salovey & Rodin, 1991; van de Ven et al., 2009). Last, the individual must display some sort of hostile motivation toward the advantaged other. There is empirical support for the relationship between anger, resentment, hostility and malicious envy (Cohen-Charash, 2000; Daniels & Holtfreter, 2018; Johar, 2011). The accompanying experience of hostile emotions is one of the key differences distinguishing benign from malicious envy.

Relative deprivation and malicious envy both involve a negative emotional reaction to a social comparison in which the individual is disadvantaged in the form of hostility or anger. Theoretically, they are also quite similar. The first two preconditions of relative deprivation in Crosby’s (1976) model closely approximate the preconditions of malicious envy. Both constructs involve some form of wanting a certain outcome or object, not having it, and comparing oneself to another that does have it. Empirically, correlations between these measures are also quite high (see Table 1, adapted from Mishra et al., 2019). For ease of exposition, the SEC envy factor will be considered effectively equivalent to malicious envy for the purposes of this thesis.

In sum, the first SEC factor is best represented by malicious envy. Although it involves an inherently comparative process, its main contribution to the SEC concept is the emotional reaction formed from this process. It also shares some important similarities to relative deprivation, a concept similar to SEC.
Table 1. Correlations between Socio-Emotional Comparisons factors and Relative Deprivation

<table>
<thead>
<tr>
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<th>Feelings of anger, resentment, and envy toward others</th>
<th>Comparative self-esteem</th>
<th>Justice Sensitivity</th>
<th>Relative Deprivation</th>
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<td>Feelings of anger, resentment, and envy toward others</td>
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<td>Justice Sensitivity</td>
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<td>.42</td>
<td>-</td>
<td></td>
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<tr>
<td>Relative Deprivation</td>
<td>.55</td>
<td>.50</td>
<td>.40</td>
<td>-</td>
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*Note.* Adapted from Mishra, Beshai, Feeney, Iskric, & Novakowski (2019). All correlations are significant at $p < .001$. 
1.3.2 Comparative Self-Esteem. The second SEC factor is comparative self-esteem. Self-esteem is generally defined as attitudes one has toward oneself (Rosenberg, 1989). Exposing individuals to failure has been shown to induce low global self-esteem in previous studies (Dutton & Brown, 1997). Rosenberg and others distinguish between global self-esteem and domain-specific self-esteem (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). Whereas global self-esteem refers to a general attitude toward the self (Rosenberg, 1989), domain-specific self-esteem is an attitude toward the self in a specific context. For example, one may have high general self-esteem, having a general positive attitude toward themselves, but may have a negative attitude toward their academic selves, thus having a low domain-specific academic self-esteem. Considering that SEC’s second factor refers to general statements about the attitudes one has towards oneself and that global self-esteem is generally considered to be an amalgamation of domain-specific self-esteem (Rosenberg, 1989), we consider SEC’s second factor to be representative of low global self-esteem.

Lower global self-esteem may be useful as an indicator of disadvantage. Leary, Tambor, Terdal, and Downs (1995) developed the sociometer hypothesis of self-esteem, which states that self-esteem is useful to gauge whether one is attractive to others. High self-esteem then is the perception that one can create and maintain bonds with others. These bonds further aid the individual in transmitting their genes, either through enhanced cooperation or reproduction.

The sociometer hypothesis has received some empirical support. In a longitudinal study, Nezlek (2001) found that individuals’ quality of social interactions predicted later perceptions of social skills, suggesting that individuals with higher-quality social
interactions (or social bonds) will perceive themselves as having better social skills. Furthermore, multiple studies have demonstrated a negative relationship between group exclusion and self-esteem (e.g., Bourgeois & Leary, 2001; Leary, Haupt, Strausser, & Chokel, 1998; Nezlek, Kowalski, Leary, Blevins, & Holgate, 1997). These results highlight the importance of social bonds in self-esteem; individuals perceive themselves more positively or negatively as a result of gaining or losing respectively these bonds, a finding in line with the sociometer hypothesis.

Further evidence for the sociometer hypothesis is that self-esteem is generally considered to be comparative in nature. According to Rosenberg (1989), we establish our self-worth in certain domains by comparing our abilities to those of others in our immediate environments. Self-worth in specific contingent domains will constitute one’s general self-esteem. Attraction is generally thought to be an indicator of specific abilities that enhance fitness (e.g., physical strength; Fink, Neave, & Seydel, 2007). Therefore, low self-esteem is the perception that one does not measure up on certain qualities compared to others, and thus they perceive themselves as not able to create and maintain the bonds necessary for effective gene transmission. This evolutionary disadvantage to low self-esteem is similar to that of SEC; both concepts refer to a cognitive assessment of inadequacy compared to another.

In addition to a comparative element, the SEC self-esteem factor also encompasses an emotional component of social comparisons. Items measuring the SEC self-esteem factor were originally derived from the Positive and Negative Affect Scale, a widely-used measure of negative affect (Mishra et al., 2019; Watson, Clark, & Tellegen, 1988). There is also empirical evidence for a relationship between self-esteem and
negative affect, which will be reviewed in a later section.

In sum, the second factor of SEC (comparative self-esteem) approximates low self-esteem. Low self-esteem may be useful in identifying one’s competitive disadvantage, as a mechanism for identifying perceived inadequacy compared to others. The second factor encompasses both a cognitive, comparative component and an emotional component.

1.3.3 Justice Sensitivity. The third factor in SEC is justice sensitivity. Justice sensitivity can be defined as reactivity toward perceived unjust treatment (Schmitt, Baumert, Gollwitzer, & Maes, 2010). What constitutes unjust treatment is difficult to define, as in lay minds it is an abstract concept. In the literature, justice has been divided into four main types: distributive, procedural, interactional, and informational (Colquitt, 2001). Distributive justice is defined as a belief that the allocation of rewards related to a task should be consistent with equity. In other words, it is the belief that the outcomes one receives from a task are commensurate with the effort they put into that task. This type of justice originated from equity theory, which stipulated that individuals generally seek to redistribute rewards based on predetermined rules (Adams, 1963). In distributive justice, this rule is that one should receive rewards commensurate with the effort they put into a certain task. Procedural justice refers to the extent to which one feels that the procedures by which a decision was made are fair. Interactional justice is the perception that the interpersonal treatment they receive from the administrator of outcomes is fair, while informational justice relates to the openness and clarity of the procedures enacted in a decision. While some others provide distinct definitions of the four types of justice, some authors have argued that these types all represent the same concept. For example,
Greenberg (1993) argued that interactional and informational justices are subsets of distributive and procedural justice, respectively. Consistently high correlations are found between procedural justice and distributive justice (for a review, see Colquitt, 2001).

Cropanzano and Ambrose (2001) argued that procedural justice perceptions may actually be a product of distributive justice. Individuals may see procedures as unfair when they realize that the outcomes produced from these procedures are unfair. This would explain the high correlations between both types of justice. Accordingly, beliefs that efforts are commensurate with rewards appear to be more general, while procedural, informational, and interactional justice represent different ways that an individual can perceive a distributive injustice. This argument is further supported by Schmitt et al. (2010), who state “[p]eople want to get what they deserve and deserve what they get” (p. 212) when referring to justice. The core of this statement is strikingly similar to that of distributive justice, where efforts are commensurately rewarded. Given the difficulties of defining justice and the fact that all types of justice seem to connect back to distributive justice, I define a general sense of justice as a sense of distributive justice.

Beliefs that efforts are not commensurate with rewards may be helpful in identifying one’s standing in a social hierarchy. At the most basic level, justice may provide information on the distribution of resources in the environment and the individual’s ability to effect change in this landscape. For example, an individual who does not believe their efforts are appropriately rewarded might see that their competition holds most of the resources in the environment. They may not believe that they have an ability to effect change in this regard. As a result, they may identify their lower position on a hierarchy in terms of both their relative lack of resources, and their relative inability
to acquire these resources.

In addition, beliefs of injustice may result in the individual reacting with negative rather than positive emotions. Recall that while malicious envy represents the motivation to tear someone down from their position of advantage, benign envy is the motivation to push oneself to the advantaged person’s position (e.g., striving for more). The former may be more in line with a high sense of injustice; if one believes that the allocation of resources is not the result of one’s efforts, it follows that they would not believe an advantaged individual acquired their advantage through their heightened efforts. Thus, they may be more willing to react in a hostile way to this advantage, as opposed to simply striving to reach a similar position (i.e., benign envy). In addition, an individual who is more sensitive to injustices will be more likely to experience such reactions compared to those with less sensitivity. Empirical evidence supports this hypothesis, as benign envy is positively correlated with beliefs that efforts are commensurate with rewards (Gallagher, 2013), and theories of envy require the individual to have a sense of injustice (Heider, 1958).

In sum, the third SEC factor is that of justice sensitivity, or one’s reactivity to perceived situations of injustice. Justice sensitivity, like other SEC factors, involves a cognitive comparative process (in this case related to the distribution of rewards in environments) and a negative emotional reaction.

1.3.4 Interrelatedness of SEC factors. Although the previous section discussed SEC factors as separate constructs, they are highly interrelated. Mishra et al. (2019) found high correlations among all three factors (see Table 1), which provides evidence that these constructs are interdependent and all driven by the overarching SEC construct.
Furthermore, these factors all seem to have some cognitive and emotional component related to disadvantaged social comparisons (see previous sections for more details). Examining the interrelatedness among SEC factors is important as it provides evidence that these constructs are all approximations of SEC, confirming SEC’s three-factor structure. In the following sections, I will explore the empirical and theoretical evidence for the relationships among the three SEC factors.

1.3.4.1 Malicious envy and self-esteem. Tesser (1988) posited that one self-evaluates through two processes: reflection and comparison. Although both processes involve a social comparison to another person, the reactions elicited by each process are different. Through reflection, an individual may feel good about the successes of close others. Given that individuals identify with other people, they may reflect others’ successes onto themselves, vicariously experiencing the same positive feelings. In the comparison process, the individual may feel threatened by the success of others. The latter reaction, which closely resembles malicious envy, is present when the domain of advantage is important to the individual. Malicious envy is invoked in situations of disadvantage in self-important domains. These situations also threaten self-esteem. Therefore, according to Tesser (1988), it should follow that situations that elicit malicious envy should also elicit lower self-esteem. Tesser’s argument is supported by some empirical research, which finds moderate negative relationships between self-esteem and malicious envy (Duarte, 2011; Hughes, 2016; Salovey & Rodin, 1991; Vrabel, Zeigler-Hill, & Southard, 2018). This relationship still holds when controlling for domain-importance of the area surveyed, an important component of both malicious envy and self-esteem (Salovey & Rodin, 1991).
Despite evidence for a link between self-esteem and envy, some authors argue that this relationship may be a complex one. Smallets et al. (2016) define congruent high self-esteem as being a combination of high explicit self-esteem (measured by directly asking an individual how they feel about themselves) and high implicit self-esteem (measured by assessing self-esteem through measures of implicit attitudes toward the self), while discrepant high self-esteem is defined as high explicit self-esteem and low implicit self-esteem. They found that congruent high self-esteem is associated with more benign envy, while discrepant high self-esteem is associated with more malicious envy. The effect of explicit self-esteem on malicious envy, however, is consistently high. As seen in Appendix B, the type of self-esteem measured by the SEC scale is explicit self-esteem. Therefore, although Smallets et al.’s (2016) findings provide evidence of a complex relationship between self-esteem generally and envy, the type of self-esteem included in the SEC construct (explicit self-esteem) shares a consistent negative relationship with envy. Furthermore, the results pertaining to implicit self-esteem must be taken in light of the inability of such implicit measures to replicate (e.g., Forscher et al., 2016).

In sum, although the relationship between self-esteem and malicious envy is not necessarily robust, initial evidence suggests some covariation between the two constructs. The covariation between self-esteem and malicious envy provides some basis that they may be measuring the same latent construct (SEC), providing some evidence that the SEC construct is valid.

1.3.4.2 Malicious envy and justice sensitivity. In general, studies have found a negative relationship between malicious envy and measures of justice (Gallagher, 2013;
Grubb, 2011; Wilkin, 2011; Wobker, 2015), indicating that lower perceptions of justice are related to more feelings of anger toward others. Experimentally-induced injustice has been shown to elicit higher reports of malicious envy and anger (Grubb, 2011; Hoogland, 2016; Ven et al., 2012). Khan et al. (2017) found a positive relationship between envy and a sense of justice; however, this relationship was of a smaller magnitude than that of other studies and included both benign and malicious forms of envy.

Theoretical evidence also points to an association between malicious envy and justice. Indeed, it is plausible that if one believes their efforts do not help them in reaching their goals, they may look at more successful individuals as having achieved their status through external factors (e.g., chance) rather than effort. In these cases, they may respond to this disadvantage with maliciously envious feelings. As discussed earlier, benign envy is generally thought to be a driving force toward self-improvement. If one feels benign envy, they will be more likely to attempt to improve their own behaviours to reach their desired state. If one does not believe that their efforts will actually lead to this state, then they will not believe that the route to equalizing a discrepancy in rewards is through self-improvement. Therefore, they may feel malicious envy, and feel angry and resentful toward the advantaged other. Similarly, Major, Testa, and Bylsma (1991) argued that perceived control over a situation leads to more instrumental reactions to social comparisons like self-improvement. If one perceives that they do not have control over the situation, social comparisons will lead to more emotional responses. This distinction between instrumental and emotional reactions is similar to the distinction between benign and malicious envy. Benign envy expresses a more instrumental view where one attempts to mend the gap by self-improvement. On the other hand, malicious
envy is a social comparison response that is not instrumental, but rather purely emotional.

In sum, there is both theoretical and empirical evidence suggesting that a relationship between malicious envy and justice sensitivity exists. The existence of this relationship supports the SEC construct, specifically the presence of justice sensitivity and envy as its factors.

1.3.4.3 Self-esteem and justice sensitivity. There is little empirical evidence to substantiate the relationship between general self-esteem and justice. Although limited, this literature suggests that senses of justice are not reliably correlated with self-esteem (Burton, 2002; Lilly, 2001; Ratcliff, 1991; Sekiguchi & Hayashi, 2014). There is evidence, however, that domain-specific self-esteem may be related to a domain-specific sense of justice. Heck, Bedeian, and Day (2005) have found that higher organization-based self-esteem, or the degree to which a worker believes they are valuable to an organization, is associated with the degree to which one believes their efforts within an organization are rewarded appropriately. There is also evidence that negative feedback on an ambiguous task predicts a sense of injustice (Chory & Westerman, 2009). Considering that negative feedback reliably predicts lower self-esteem, this association may provide some evidence for a relationship between self-esteem and justice sensitivity. In short, a limited literature has found no association between justice and self-esteem. However, the association between domain-specific forms of self-esteem and justice provide some evidence to the contrary. The limited nature of this literature precludes any definitive conclusions. Furthermore, as discussed in previous sections, both factors involve a similar cognitive assessment that the individual is disadvantaged compared to others and a negative emotional reaction to this assessment.
1.4 Negative Affect

To confirm SEC’s three-factor structure, it is not enough to simply show that a manipulation of each factor will result in a change in overall reported SEC. Rather, it is important to rule out other possible explanations for the relationship between the individual SEC factors and the emergent SEC construct. Negative affect is one possible confound.

Negative affect can be defined as emotions that are generally aversive (Watson et al., 1988). These emotions include sadness, anger, hostility, grief, guilt, and resentment. Generally, these emotions can be separated into two categories: negative affect with arousal and negative affect without arousal (Barrett & Russell, 1998). Simply put, this dichotomization involves separating emotions based on whether they produce an increased physiological response or not. Emotions like sadness, guilt and shame are grouped as negative affect without arousal, while emotions like anger, hostility and resentment are grouped as negative affect with arousal. For the purposes of this thesis, negative affect without arousal will be represented by sadness, and negative affect with arousal will be represented by anger. In the following sections, I will detail how negative affect could be considered a potential confound in the relationship between SEC and its factors, by establishing how negative affect is related to each of SEC’s components.

1.4.1 Negative affect, envy, and relative deprivation. The relationship between malicious envy and negative affect with arousal is theoretically clear. Indeed, malicious envy (and by extension the first factor of SEC) as defined necessitates negative affect with arousal. The SEC scale has items directly asking participants about their feelings of irritability, hostility, and anger (see Appendix B). Further, Smith et al. (1999) argued that
malicious envy is by definition an expression of hostility toward another. This theoretical relationship is supported by empirical findings. Specifically, envious feelings have been linked to feelings of hostility (Ambardar, 2003; Kim, 2008) and anger (Ambardar, 2003; Johar, 2011; Malone, 2006; Salerno, 2014; Wilkin, 2011).

As for the relationship between negative affect without arousal and malicious envy, Kim (2008) found a high positive correlation between episodic envy (which includes both benign and malicious envy) and experiences of negative affect without arousal (e.g., sadness, unhappiness). Smith et al. (1999) found correlations between dispositional envy and depressive symptoms across multiple samples. Correlations ranged from 0.36 to 0.51. Furthermore, Daniels and Holtfreter (2018) found similar correlations between the constructs in their sample of undergraduate students. Using epidemiological data, Mujcic and Oswald (2018) found that feelings of dispositional envy, a construct that is close to malicious envy, are predictive of various mental health outcomes including depression later in life. Furthermore, relative deprivation, another construct closely tied to the SEC envy factor, shared high correlations with depressive symptoms (Beshai et al., 2017). Although evidence is limited, there is some support for the relationship between negative affect without arousal and malicious envy.

1.4.2 Negative affect and self-esteem. General negative affect has been associated with lower levels of self-esteem. Correlations between the two variables are generally moderate to high (Ben-Zur, 2002, Cheng & Furnham, 2003; Lightsey, Burke, Ervin, Henderson, & Yee, 2006). Longitudinal studies have also shown that low self-esteem predicts future negative affect (Burke et al., 2006; Orth, Robins, & Widaman, 2012). Orth et al. (2012) found that negative affect did not significantly predict future
self-esteem, suggesting that self-esteem may influence negative affect but that the opposite is not necessarily true.

In general, there is evidence for a relationship between self-esteem and negative affect with arousal. Specifically, studies have found negative moderate correlations between self-esteem and anger (Bak, 2016; Dreman, Spielberger, & Darzi, 1998; Pekala, Kumae, Maurer, Elliott-Carter, & Moon, 2009), and self-esteem and feelings of hostility (Pekala et al., 2009). A meta-analysis of studies investigating the relationship between self-esteem and anger found similar results (Teng, Liu, & Guo, 2015). Furthermore, in mental imagery tasks, those with lower self-esteem imagined responding to situations with more anger compared to those with higher self-esteem (Hayamizu, Kino, Takagi, & Tan, 2004; Kuppens & Tuerlinckx, 2007). In addition, Richter and Ridout (2011) found that, when exposed to faces of anger and disgust, low self-esteem participants experienced more negative affect compared to high self-esteem participants. This finding may suggest that those with lower self-esteem attend to or are more affected by negative stimuli in their environments. Last, Turner and White (2015) found that anger rumination was negatively associated with global self-esteem, and positively correlated with fragile forms of self-esteem, suggesting that those with lower self-esteem and those with inconsistently high self-esteem ruminate more on their feelings of anger. This rumination may lead to further feelings of anger. In sum, extant evidence suggests a robust relationship between negative affect with arousal and self-esteem, whereby those with lower self-esteem tend to be generally angrier.

Surprisingly little research has examined the relationship between self-esteem and negative affect without arousal. Shim, Wang, and Cassady (2013) found a null correlation
between self-esteem and sadness. On the other hand, the cognitive reactivity hypothesis suggests that sadness may trigger negative self-referential thinking (Teasdale, 1988). This negative self-referential thinking may consequently reduce self-esteem, because an individual holds the belief that their abilities do not stack up compared to others. Experimental inductions of sad moods induced negative self-appraisals only in subjects with low self-esteem (Brown & Mankowski, 1993). Although this study does not provide direct evidence for a correlation between self-esteem and negative affect without arousal, it does suggest that negative affect may influence how individuals low in self-esteem, but not high, view themselves.

There are several studies relating depression and self-esteem. Studies have shown that self-esteem is negatively related to depressive symptoms across diverse samples, including the general population (Smokowski, Evans, Cotter, & Guo, 2014; Takagishi, Sakata, & Kitamura, 2011), university students (Bajaj, Robins, & Pande, 2016; Cha & Sok, 2014; Eisenbarth, 2012; Lin, 2015; Michalak, Teismann, Heidenreich, Ströhle, & Vocks, 2011; Nima, Rosenberg, Archer, & Garcia, 2013; Shi, Liu, Yang, & Wang, 2015; Wouters et al., 2013), adolescents (Bos, Huijding, Muris, Vogel, & Biesheuvel, 2010; de Jong, Sportel, de Hullu, & Nauta, 2012; Ju & Lee, 2018; Steiger, Fend, & Allemand, 2015), sexual abuse victims (Asgeirsdottir, Gudjonsson, Sigurdsson, & Sigfusdottir, 2010), patients diagnosed with depression (Valiente, Cantero, Vazquez, Sanchez, Provencio, & Espinosa, 2011; Wegener et al., 2015), and among remitted patients with a history of depression (Fuhr, Reitenbach, Kraemer, Hautzinger, & Meyer, 2017; Smeijers et al., 2017). There is also experimental evidence of this association, where individuals were presented with a series of adjectives and later asked to recall them (Romero,
Sanchez, Vazquez, & Valiente, 2016). Participants low in self-esteem recalled more depressive adjectives than those high in self-esteem, indicating that low self-esteem is associated with attention to and memory for negative information.

A meta-analysis of longitudinal studies on the association between self-esteem and depression found that low self-esteem predicted depressive symptoms later in life, while depressive symptoms did not predict low self-esteem later in life (Sowislo & Orth, 2013). Johnson, Galambos, Finn, Neyer, and Home (2017) compared a model where depression predicted self-esteem and another where self-esteem predicted depression. They found that the latter model fit the data they collected better than the former. These studies provide more evidence for a negative association between self-esteem and depression.

Evidence for the relationship between self-esteem and negative affect is limited. This limited literature, however, suggests a potential negative relationship between self-esteem and negative affect in general, and with and without arousal, where individuals low in self-esteem score higher on these dimensions. These findings emphasize the potential confounding role of negative affect in the relationship between SEC and its components.

1.4.3 Negative affect and justice sensitivity. Correlations between measures of justice and negative affect in general are negative and moderate (Aquino, Lewis, & Bradfield, 1999; Brimecombe, 2012; Hill, 2000; Meyer, 2006). Further, experimental evidence shows that when manipulating one of these variables, there is a change in the other variable. Schoefer and Ennew (2005) found that more intense negative emotions are elicited when participants believe outcomes are unjust. Mao (2010) found that
experimentally induced negative affect was associated with feelings of injustice compared to when positive affect was induced. These results suggest a strong relationship between justice sensitivity and general negative affect.

As for the relationship between negative affect with arousal and justice, the results are similar to other SEC factors. Correlations between anger and justice are generally negative and moderate in strength (Bembenek, 2006; Hegtvedt & Killian, 1999; Kwak, 2006). In addition, studies have found that the most common emotional response to a justice violation in students is anger (Horan, Chory, & Goodboy, 2010; Rodriguez, 2012). Experimental evidence further supports the negative relationship between justice and negative affect with arousal. Experimental inductions of justice sensitivity are generally associated with higher self-reported feelings of anger and resentment (Grubb, 2011; Muller, 2014; Stecher & Rosse, 2005). For example, Feather, McKee, and Bekker (2011) presented participants with scenarios where either the participant or someone else engaged in a positive (e.g., worker was diligent) or negative (e.g., worker was not diligent) action. When the scenario involved the participant taking negative action, they felt that negative outcomes were less deserved and experienced more intense anger and resentment. This finding lends some support to the relationship between a general sense of justice and negative affect with arousal. Another experiment showed that, in upward social comparisons (social comparisons in which the target of comparison is advantaged relative to the one making the comparison), anger was only elicited when participants felt the disadvantage was unjust.

Research on the relationship between justice and negative affect without arousal has produced different results than other SEC factors. Bembenek (2006) found that scores
on a composite negative affect without arousal scale was not affected by distributive justice manipulations. Further, the perception that one’s pay is fair was not correlated with depression with one’s pay (Hegtvedt & Killian, 1999). Withdrawal behaviours, which can be seen as a proxy for negative affect without arousal considering it involves low activation and generally negative valence, were also not found to be a common reaction to injustice in high school students (Rodriguez, 2012). Only one study to my knowledge (Khan, Quratulain, & Crawshaw, 2012) found an association between negative affect without arousal and justice, where greater injustice was associated with greater feelings of sadness. In sum, although there is some evidence that negative affect without arousal is associated with justice sensitivity, most of the research reviewed here suggests the association between negative affect and justice is centered around anger rather than sadness.

1.4.4 Confounding potential of negative affect. In the previous sections, I explored the relationships between SEC components and negative affect. These associations pose a problem for SEC’s three-factor structure: negative affect may be a more parsimonious explanation for the interrelations among SEC’s three factors than SEC itself. Each of the three factors identified in SEC’s factor structure—envy/relative deprivation, self-esteem, and justice sensitivity have been empirically shown to be associated with negative affect. As a consequence, it is necessary to verify that SEC is not simply a domain-specific instantiation of negative affect. However, if the three identified components of SEC are demonstrably more influential on measures of SEC than negative affect, it can be concluded that the three-factor structure is a more valid conceptualization of SEC than simply negative affect. As a result, it is important to
statistically control for negative affect when experimentally manipulating each SEC component, to see whether the components affect SEC over and above any effect of negative affect.

1.5 Importance of SEC

As outlined above, SEC may help to account for previously understudied, but strong links between cognitive and emotional appraisals in social comparison processes. Furthermore, emergent evidence suggests that SEC has an important influence on mental health. Mishra et al. (2019) found consistently moderate to high correlations between the SEC construct and a variety of mental health outcomes, including anxiety, depression, problematic gambling, and general stress. Considering the magnitude of these correlations, SEC may be heavily implicated in the onset or maintenance of psychopathology. Given the theoretical and clinical importance of the SEC construct, it is important to understand what is and what is not a central factor of SEC.

1.6 Present Study

In the previous sections, I have established that SEC may be a solution to the conceptual gap present in current social comparison constructs. Then, I described each SEC component (envy/relative deprivation, self-esteem, and justice sensitivity) in detail, emphasizing their cognitive and affective roles in the construct. I explained how the three factors were interrelated both theoretically and empirically. The importance of the overarching SEC construct was emphasized, and a discussion of negative affect as a potentially more parsimonious explanation of the relationship between SEC and its components was explored.

The literature reviewed invites the primary research questions of this thesis: Is
SEC’s three-factor structure valid? Or, does negative affect more effectively account for the relationship between SEC’s components and SEC itself? This thesis will attempt to answer these questions by experimentally manipulating each SEC factor individually and examining how these manipulations affect SEC as a whole. It will also examine whether these effects are present when controlling for negative affect. To do so, I conducted three experiments, each with a specific manipulation of each SEC factor. Considering that each factor and negative affect are highly correlated, experiments were designed to limit the influence of other factors and negative affect. Results from these experiments provide evidence that help disentangle mechanisms involved in SEC.

1.6.1 Research Questions/Hypotheses

**Research Question 1:** Will participants exposed to an experimental manipulation of each SEC factor have greater changes in SEC scores compared to participants exposed to a control condition?

**H1:** The malicious envy condition will elicit more SEC than a benign envy condition or control condition.

**H2:** The low self-esteem condition will elicit more SEC than a high self-esteem condition or control condition.

**H3:** The high justice sensitivity condition will elicit more SEC than a low justice sensitivity condition.

**Research Question 2:** Does negative affect account for the relationship between SEC factors and SEC? Will the hypothesized effects still hold when statistically controlling for negative affect with and without arousal?

**H4:** In each experiment, hypothesized effects will be present after controlling for
negative affect with and without arousal.

CHAPTER 2: Study 1 – Malicious Envy

2.1 Method

2.1.1 Power Analysis. G*Power analyses (Faul, Erdfelder, Lang, & Buchner, 2007) indicate that to reliably detect a difference among three independent groups (three experimental conditions) yielding a medium effect size in a design with a single covariate, a sample of 206 participants is needed to achieve a power of 0.90. A medium effect size was considered adequate, as correlations between the SEC scale and SEC subscales are generally moderate to high (see Table 1, adapted from Mishra et al., 2019). The malicious envy experiment had a 3-condition design, meaning there are 3 independent groups. I planned to collect data from 249 participants, to account for participant exclusion and drop-out (see next section). Since all three experiments discussed in this thesis have the same 3-condition design, this power analysis also applies to the second and third studies discussed below.

2.1.2 Sample. I recruited 250 participants from Amazon’s Mechanical Turk (AMT). Participants were asked to participate in a 20-minute experiment on individual differences in the experience of affect. After conferring with various AMT stakeholders including AMT workers and researchers, Salehi (2016) determined that a compensation rate of $6/hour was an adequate and ethical compensation for behavioural research. Therefore, participants were compensated $2 for their time.

Participants were excluded if they did not consent to participating in the study \( n = 1 \), if they chose to withdraw their data after the study was completed \( n = 9 \), if they failed an attention check item at the end of the study \( n = 4 \), or if they did not adequately
participate in the experimental manipulation (e.g., did not answer the experimental question; \( n = 8 \); see Figure 1). The final sample consisted of 228 participants (\( M_{age} = 37.39; SD_{age} = 11.62; 121 \) identified as male, 106 as female, and 1 as trans\(*\)). Other descriptive statistics of this sample are presented in Table 2.

2.1.3 Measures. Descriptive statistics, reliabilities, and missing data rates for measures are available in Table 3.

2.1.3.1 Socio-Emotional Comparisons Scale (SECS). To measure socio-emotional comparisons, participants completed the SECS (Mishra et al., 2019; see Appendix B). The SECS is a 12-item scale, in which participants indicate the degree to which they agree with statements on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items are distributed across three factors: feelings of anger, resentment, and envy toward others (4 items; e.g., “I feel ill will toward people I envy”), comparative self-esteem (4 items; e.g., “All in all, I am inclined to feel that I am a failure”), and justice sensitivity (4 items; e.g., “Compared to others, I get less than what I deserve given how hard I work”). The scale demonstrated excellent reliability (\( \alpha = .93-.96 \)), and has been correlated with dispositional envy, relative deprivation, comparison propensity, negative and positive affect, and justice sensitivity in previous studies, demonstrating good construct validity (Mishra et al., 2019).

Factor subscores were computed by taking the average of items related to that factor. A total score was computed by averaging the self-esteem and justice sensitivity factor scores.

2.1.3.2 Visual Analogue Mood Scale (VAMS). Negative affect, being a potential confound for the relationship between SEC factors and SEC, was assessed using the
Figure 1. Sample exclusions

Study 1

Initial Sample:  
n = 250

Excluding participants who did not consent  
(1): n = 249

Excluding participants who withdrew their data  
(9): n = 240

Excluding participants who failed an attention check  
(4): n = 236

Excluding participants who did not complete manipulation  
(8): n = 228

Study 2

Initial Sample:  
n = 249

Excluding participants who did not consent  
(0): n = 249

Excluding participants who withdrew their data  
(19): n = 230

Excluding participants who failed an attention check  
(3): n = 227

Excluding participants who did not complete manipulation  
(12): n = 215

Study 3

Initial Sample:  
n = 248

Excluding participants who did not consent  
(0): n = 248

Excluding participants who withdrew their data  
(11): n = 237

Excluding participants who failed an attention check  
(3): n = 234

Excluding participants who did not complete manipulation  
(33): n = 201
Table 2. Sample descriptive statistics for Study 1

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>84.2</td>
</tr>
<tr>
<td>Asian</td>
<td>7.5</td>
</tr>
<tr>
<td>Black/African American</td>
<td>7.5</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>6.6</td>
</tr>
<tr>
<td>Other</td>
<td>1.8</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Relationship Status</strong></td>
<td></td>
</tr>
<tr>
<td>Single, never married</td>
<td>29.3</td>
</tr>
<tr>
<td>Dating, not cohabiting</td>
<td>9.8</td>
</tr>
<tr>
<td>Married or cohabiting</td>
<td>51.1</td>
</tr>
<tr>
<td>Divorced or separated</td>
<td>8.9</td>
</tr>
<tr>
<td>Widowed</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Did not complete high school</td>
<td>0.9</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>28.5</td>
</tr>
<tr>
<td>College/Bachelor’s degree or equivalent</td>
<td>60.09</td>
</tr>
<tr>
<td>Graduate or professional degree</td>
<td>10.5</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
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<tr>
<td>Employed (part-time or full-time)</td>
<td>83.3</td>
</tr>
<tr>
<td>Unemployed, looking for work</td>
<td>4.8</td>
</tr>
<tr>
<td>Unemployed, not looking for work</td>
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</tr>
<tr>
<td>Never employed</td>
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</tr>
<tr>
<td>Retired</td>
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</tr>
<tr>
<td>Unknown</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Personal Income Last Year</strong></td>
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<tr>
<td>Less than 10,000</td>
<td>6.6</td>
</tr>
<tr>
<td>10,000 – 30,000</td>
<td>39.5</td>
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<td>30,001 – 50,000</td>
<td>26.3</td>
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<tr>
<td>50,001 – 75,000</td>
<td>16.2</td>
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<tr>
<td>75,001 – 100,000</td>
<td>6.1</td>
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<tr>
<td>More than 100,000</td>
<td>4.8</td>
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<tr>
<td>Unknown</td>
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<tr>
<td><strong>Household Income Last Year</strong></td>
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<tr>
<td>10,000 – 30,000</td>
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<tr>
<td>30,001 – 50,000</td>
<td>25.4</td>
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<tr>
<td>50,001 – 75,000</td>
<td>25.9</td>
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<tr>
<td>75,001 – 100,000</td>
<td>11.4</td>
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<tr>
<td>More than 100,000</td>
<td>13.2</td>
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<tr>
<td>Unknown</td>
<td>1.8</td>
</tr>
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</table>
Table 3. *Scale descriptive statistics, reliabilities, and missing data rates – Study 1*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>Reliability (α)</th>
<th>Missing Data Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 - SECS Total</td>
<td>2.94</td>
<td>1.44</td>
<td>.92</td>
<td>0.0</td>
</tr>
<tr>
<td>T1 - SECS Envy</td>
<td>2.35</td>
<td>1.40</td>
<td>.93</td>
<td>0.4</td>
</tr>
<tr>
<td>T1 - SECS Self-Esteem</td>
<td>2.75</td>
<td>1.61</td>
<td>.91</td>
<td>0.4</td>
</tr>
<tr>
<td>T1 - SECS Justice</td>
<td>3.14</td>
<td>1.64</td>
<td>.95</td>
<td>0.4</td>
</tr>
<tr>
<td>T1 - VAMS Anger</td>
<td>11.56</td>
<td>19.63</td>
<td>-</td>
<td>0.9</td>
</tr>
<tr>
<td>T1 - VAMS Sadness</td>
<td>17.50</td>
<td>2.64</td>
<td>-</td>
<td>0.4</td>
</tr>
<tr>
<td>T2 – SECS Total</td>
<td>3.01</td>
<td>1.51</td>
<td>.92</td>
<td>0.4</td>
</tr>
<tr>
<td>T2 – SECS Envy</td>
<td>2.36</td>
<td>1.46</td>
<td>.93</td>
<td>0.9</td>
</tr>
<tr>
<td>T2 – SECS Self-Esteem</td>
<td>2.74</td>
<td>1.64</td>
<td>.90</td>
<td>1.3</td>
</tr>
<tr>
<td>T2 – SECS Justice</td>
<td>3.26</td>
<td>1.80</td>
<td>.97</td>
<td>0.9</td>
</tr>
<tr>
<td>T2 – VAMS Anger</td>
<td>16.27</td>
<td>22.88</td>
<td>-</td>
<td>1.3</td>
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<tr>
<td>T2 – VAMS Sadness</td>
<td>20.27</td>
<td>23.94</td>
<td>-</td>
<td>1.3</td>
</tr>
</tbody>
</table>

*Note. T1 = Time 1, T2 = Time 2, SECS = Socio-Emotional Comparisons Scale, VAMS = Visual Analogue Mood Scale.*
VAMS (see Appendix C). Participants were presented with a line with an emotional response at each end to assess sadness (not sad at all – very sad) and anger (not angry at all – very angry). They were asked to indicate how they felt based on these anchors by clicking on the line where their emotions currently lie. Such scales have been shown to reliably discriminate between different emotions, including anger, sadness, and happiness (Killgore, 1999; Luria, 1975).

2.1.4 Procedure. Participants were asked demographic information regarding their age, gender, ethnic background, country of residence, education, employment status, marital status, and personal and household income (see Appendix A). They then completed the pre-manipulation measures, which include the SECS and the VAMS. The order of presentation of these measures was randomized. Following these questionnaires, participants were randomly assigned to one of three experimental conditions, and received the appropriate manipulation (for more details, see below). They then completed the SECS and VAMS a second time. Again, the order of presentation of these measures was randomized.

2.1.5 Experimental manipulation. Participants were asked to recall a specific experience in their past, and describe it in as much detail as possible with an emphasis on how this experience made them feel. They were told that they have 5-10 minutes to complete this task. Participants were randomly assigned to one of three conditions: malicious envy, benign envy, and control. Although the number of participants in each group was equal when data was collected, imbalances in sample size across conditions is due to the exclusion criteria described earlier.

In the malicious envy condition (n = 74), participants were asked to recall an
experience where they felt anger or resentment toward another person whom they realized they were inferior to. In the benign envy condition ($n = 72$), participants were asked to recall an experience where they felt motivated to improve themselves following the realization they were inferior to another. Both conditions asked individuals to recall a time when they were inferior to another, but the conditions differed in the type of emotion the recall task involved (anger vs. self-improvement). In the control condition ($n = 82$), participants were asked to recall a chore that they had completed (e.g., washing dishes, mowing lawn). As mentioned previously, these types of autobiographical recall manipulations have been effective in eliciting malicious and benign envy. See Appendix D for more details.

2.1.6 Data Preparation.

2.1.6.1 Scale Computation. Before computing scores on scales and subscales, I first examined the frequency of missing data in items that comprised the scale or subscale. If more than 20% of items in a scale or subscale had missing values, then scores for that scale or subscale were not computed (Bono, Ried, Kimberlon, & Vogel, 2007). As a result of this strategy, scales had some missing scores (see Table 3 for more details). Scores were then computed by taking the average of the non-missing items.

2.1.6.2 Missing Data. Missing data is an important consideration in data analysis, as a high proportion of missing data reduces statistical power and may bias results (e.g., Padgett, Skilbeck, & Summers, 2014). Although there are many recommendations as to how to deal with missing data, it is the general consensus that a negligible proportion of missing data will not bias or skew results. Some authors suggest that if overall missing data is less than 1% of all data collected, then there is no reason to suspect this missing
data is altering the nature of results (Young, Weckman, & Holland, 2011). In this sample, the overall missing data rate was 0.38%. For Studies 2 and 3, missing data rates were 0.24% and 0.23%, respectively. In all studies, missing data rates were well below the 1% cut-off. Therefore, I did not correct for missing data in these samples.

**2.1.7 Data analysis.** To examine whether the malicious envy manipulation was able to induce malicious envy, I conducted a mixed two-way 2 (time: before and after manipulation) x 3 (experimental condition: malicious, benign, control) ANOVA, with SECS envy factor scores as the dependent variable. To test Hypothesis 1, I conducted several mixed two-way 2 (time) x 3 (experimental condition) ANOVAs, with SECS total, self-esteem and justice sensitivity scores as dependent variables. Next, to test Hypothesis 4, I first computed Pearson correlations to examine the relationships between anger and sadness and SECS total, envy and self-esteem scores. If these correlations reached statistical significance, I conducted a series of mixed two-way 2 (time) x 3 (experimental condition) two-way ANCOVAs with SECS total, self-esteem and justice sensitivity scores as dependent variables, and changes in the emotions that were significantly correlated with SECS scores as covariates. When results were significant in either the ANOVA or ANCOVA analyses, I conducted Scheffe post hoc analyses to examine where the differences in dependent variables between the three conditions lie.

**2.2 Results**

Sample descriptive statistics are presented in Table 2. Means and standard deviations for each scale used are presented in Table 3.

**2.2.1 Manipulation Check.** The experimental manipulation was successful in changing malicious envy scores (Table 4). However, the size of this effect was small ($\eta^2$
Table 4. Two-way analysis of variance of SECS envy scores by a malicious envy manipulation – Study 1

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>2.32</td>
<td>1.16</td>
<td>.301</td>
<td>.741</td>
</tr>
<tr>
<td>Residual</td>
<td>222</td>
<td>856.24</td>
<td>3.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>.04</td>
<td>.04</td>
<td>.232</td>
<td>.630</td>
</tr>
<tr>
<td>Experimental Manipulation*Time</td>
<td>2</td>
<td>1.26</td>
<td>.63</td>
<td>3.31</td>
<td>.038</td>
</tr>
<tr>
<td>Residual</td>
<td>222</td>
<td>42.39</td>
<td>.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>223</td>
<td>43.69</td>
<td>.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. SECS = Socio-Emotional Comparisons Scale.
Further, Scheffe post-hoc analyses indicate that there were only significant differences between the control and malicious envy conditions (Figure 2). Malicious envy change scores (score after the manipulation subtracted by score before the manipulation) were higher in the malicious envy condition ($M = 0.17; SD = .10$), compared to the control condition ($M = -.08; SD = .04$; see Table 5).

2.2.2 Socio-emotional Comparisons Total and Factor scores. The malicious envy manipulation did not significantly change SECS scores ($\eta^2 = .02, [.00, .05]$). The manipulation also had no effect on either self-esteem ($\eta^2 = .01, [.00, .04]$) or justice sensitivity factor subscores ($\eta^2 = .02, [.00, .05]$; see Table 5).

CHAPTR 3: Study 2 – Self-Esteem

3.1 Method

3.1.1 Sample. I recruited 249 participants from AMT using the same procedure as the one described in Study 1. Participants were excluded if they chose to withdraw their data after the study was completed ($n = 19$), if they failed an attention check item at the end of the study ($n = 3$), or if they did not adequately participate in the experimental manipulation (e.g., spent less than 5 seconds reading information regarding relative performance; $n = 12$; see Figure 1). The final sample included 215 participants ($M_{age} = 39.22; SD = 12.09$; 112 identified as male, 100 as female, and 3 as trans*). If participants participated in Study 1, they were restricted from participating in Study 2. Other descriptive statistics of this sample are presented in Table 6.

The procedure, measures, and data analysis strategies were similar to those employed in Study 1. The only differences were the type of experimental manipulation used (see below for details), that SECS total scores were computed by averaging envy
Figure 2. Post hoc analyses of the relationship between malicious envy manipulation and changes in SECS envy scores.

Note. SECS = Socioemotional Comparisons Scale.
Table 5. Two-way analysis of variance of SECS total, self-Esteem and justice sensitivity scores by a malicious envy manipulation – Study 1

<table>
<thead>
<tr>
<th>Source</th>
<th>SECS Total</th>
<th></th>
<th>SECS Self-Esteem</th>
<th></th>
<th>SECS Justice Sensitivity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
</tr>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>5.20</td>
<td>2.60</td>
<td>.62</td>
<td>.541</td>
<td>2</td>
</tr>
<tr>
<td>Residual</td>
<td>224</td>
<td>945.90</td>
<td>4.22</td>
<td></td>
<td></td>
<td>221</td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>.51</td>
<td>.51</td>
<td>3.06</td>
<td>.082</td>
<td>1</td>
</tr>
<tr>
<td>Experimental Manipulation*</td>
<td>2</td>
<td>.71</td>
<td>.35</td>
<td>2.12</td>
<td>.123</td>
<td>2</td>
</tr>
<tr>
<td>Time</td>
<td>224</td>
<td>37.45</td>
<td>.17</td>
<td></td>
<td></td>
<td>221</td>
</tr>
<tr>
<td>Total</td>
<td>227</td>
<td>38.67</td>
<td>.17</td>
<td></td>
<td></td>
<td>224</td>
</tr>
</tbody>
</table>

*Note. SECS = Socio-Emotional Comparisons Scale.*
Table 6. Sample descriptive statistics for Study 2

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>74.9</td>
</tr>
<tr>
<td>Black/ African American</td>
<td>11.6</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>7.9</td>
</tr>
<tr>
<td>Asian</td>
<td>6.5</td>
</tr>
<tr>
<td>Other</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Relationship Status</strong></td>
<td></td>
</tr>
<tr>
<td>Single, never married</td>
<td>10.7</td>
</tr>
<tr>
<td>Dating, not cohabiting</td>
<td>31.6</td>
</tr>
<tr>
<td>Married or cohabiting</td>
<td>47.9</td>
</tr>
<tr>
<td>Divorced or separated</td>
<td>8.4</td>
</tr>
<tr>
<td>Widowed</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Did not complete high school</td>
<td>0.5</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>33.0</td>
</tr>
<tr>
<td>College/Bachelor’s degree or equivalent</td>
<td>52.6</td>
</tr>
<tr>
<td>Graduate or professional degree</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
</tr>
<tr>
<td>Employed (part-time or full-time)</td>
<td>82.8</td>
</tr>
<tr>
<td>Unemployed, looking for work</td>
<td>7.0</td>
</tr>
<tr>
<td>Unemployed, not looking for work</td>
<td>7.0</td>
</tr>
<tr>
<td>Retired</td>
<td>2.8</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Personal Income Last Year</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 10,000</td>
<td>6.0</td>
</tr>
<tr>
<td>10,000 – 30,000</td>
<td>36.7</td>
</tr>
<tr>
<td>30,001 – 50,000</td>
<td>26.5</td>
</tr>
<tr>
<td>50,001 – 75,000</td>
<td>20.0</td>
</tr>
<tr>
<td>75,001- 100,000</td>
<td>6.0</td>
</tr>
<tr>
<td>More than 100,000</td>
<td>4.2</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Household Income Last Year</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 10,000</td>
<td>2.8</td>
</tr>
<tr>
<td>10,000 – 30,000</td>
<td>22.2</td>
</tr>
<tr>
<td>30,001 – 50,000</td>
<td>21.9</td>
</tr>
<tr>
<td>50,001 – 75,000</td>
<td>24.7</td>
</tr>
<tr>
<td>75,001 – 100,000</td>
<td>16.2</td>
</tr>
<tr>
<td>More than 100,000</td>
<td>12.1</td>
</tr>
</tbody>
</table>
and justice sensitivity SECS scores, and self-esteem SECS scores were used as a manipulation check for the experimental manipulation. Descriptive statistics, reliabilities, and missing data rates for measures used with this sample are presented in Table 7.

3.1.2 Experimental Manipulation. To experimentally manipulate self-esteem, participants were asked to complete the Remote Association Task (Mednick, 1962; see Appendix E). They were told that this task has been used in the past as a reliable assessment of intelligence. During this task, participants were presented with 20 sets of three words. For each set, they were asked to find a fourth word that relates to the other three. They were told that scores depended on accuracy and speed, and so were encouraged to complete the task as quickly and accurately as possible. After completing the task, they were presented with fictitious information on how their scores compared to others, depending on the condition to which they were assigned (see Appendix F).

Participants were randomly assigned to one of three conditions. Much like Study 1, although the groups were equal at the time of data collection, differences in sample size across conditions was due to exclusion of certain participants. In the low self-esteem condition \( (n = 75) \), participants were told that they scored worse than 80% of people who have taken this test. They were shown a graph displaying their rank relative to others. Failure manipulations such as these have been shown to induce low self-esteem in previous studies (Dutton & Brown, 1997). In the high self-esteem condition \( (n = 67) \), participants were told they scored better than 80% of people who have taken this test. Similarly, they were shown a graph displaying their rank relative to others. In the no-information condition \( (n = 73) \), participants were not given any information about how well they did on the task. Participants across conditions did not differ in the number of
Table 7. *Scale descriptive statistics, reliabilities, and missing data rates – Study 2*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>Reliability (α)</th>
<th>Missing Data Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 - SECS Total</td>
<td>2.65</td>
<td>1.38</td>
<td>.93</td>
<td>0.5</td>
</tr>
<tr>
<td>T1 - SECS Envy</td>
<td>2.21</td>
<td>1.47</td>
<td>.94</td>
<td>0.5</td>
</tr>
<tr>
<td>T1 - SECS Self-Esteem</td>
<td>2.57</td>
<td>1.51</td>
<td>.89</td>
<td>0.5</td>
</tr>
<tr>
<td>T1 - SECS Justice</td>
<td>3.08</td>
<td>1.66</td>
<td>.95</td>
<td>0.5</td>
</tr>
<tr>
<td>T2 – SECS Total</td>
<td>2.49</td>
<td>1.49</td>
<td>.94</td>
<td>0.0</td>
</tr>
<tr>
<td>T2 – SECS Envy</td>
<td>2.09</td>
<td>1.49</td>
<td>.96</td>
<td>1.9</td>
</tr>
<tr>
<td>T2 – SECS Self-Esteem</td>
<td>2.67</td>
<td>1.55</td>
<td>.86</td>
<td>0.5</td>
</tr>
<tr>
<td>T2 – SECS Justice</td>
<td>2.87</td>
<td>1.73</td>
<td>.96</td>
<td>1.4</td>
</tr>
<tr>
<td>T2 – VAMS Anger</td>
<td>12.65</td>
<td>20.93</td>
<td>-</td>
<td>0.9</td>
</tr>
<tr>
<td>T2 – VAMS Sadness</td>
<td>17.10</td>
<td>24.04</td>
<td>-</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*Note.* T1 = Time 1, T2 = Time 2, SECS = Socio-Emotional Comparisons Scale, VAMS = Visual Analogue Mood Scale.
correct responses they gave, \( F = 1.44, p = .238 \), nor did they differ in the amount of time it took them to complete the task, \( F = 1.57, p = .210 \).

4.2 Results

Sample descriptive statistics are presented in Table 6. Means, standard deviations and missing data rates for each scale used are presented in Table 7.

4.2.1 Manipulation Check. The self-esteem manipulation was successful in changing self-esteem scores (Table 8). The size of this effect was medium (\( \eta^2 = .05, [.01, .10] \)). Scheffe post hoc analyses indicated that there were only differences between the high self-esteem and low self-esteem conditions (Figure 3). Specifically, self-esteem change scores were higher in the low self-esteem condition (\( M = 0.29, SE = 0.09 \)) compared to the high self-esteem condition (\( M = -.09, SE = .08 \)).

4.2.2 Socio-emotional comparisons total and factor scores. The low self-esteem manipulation increased SECS scores (Table 9). The size of this effect was small (\( \eta^2 = .04, [.01, .09] \)). Scheffe post hoc analyses suggest that there were only differences between the high self-esteem condition and the low self-esteem condition (Figure 3). SECS total change scores were greater in the high self-esteem condition (\( M = -.27, SE = .74 \)), compared to the low self-esteem condition (\( M = .03, SE = .42 \)).

The low self-esteem manipulation was also able to change envy factor scores (Table 9). The size of this effect was small (\( \eta^2 = .03, [.02, .08] \)). Scheffe post hoc analyses suggest that the main differences were found between the high and low self-esteem conditions (Figure 3). There were greater changes in SECS malicious envy scores in the high self-esteem condition (\( M = -.27, SE = .10 \)), compared to the low self-esteem condition (\( M = .03, SE = .05 \)).
Table 8. Two-way analysis of variance of SECS self-esteem scores by a self-esteem manipulation – Study 2

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>16.06</td>
<td>8.03</td>
<td>1.83</td>
<td>.164</td>
</tr>
<tr>
<td>Residual</td>
<td>210</td>
<td>923.63</td>
<td>4.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>.70</td>
<td>.70</td>
<td>2.74</td>
<td>.099</td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>2.68</td>
<td>1.34</td>
<td>5.24</td>
<td>.006</td>
</tr>
<tr>
<td>Manipulation*Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>210</td>
<td>53.72</td>
<td>.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>213</td>
<td>57.10</td>
<td>.27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. SECS = Socio-Emotional Comparisons Scale.*
**Figure 3.** Post hoc analyses of the relationship between a self-esteem manipulation and changes in SECS scores.

*Note.* SECS = Socioemotional Comparisons Scale.
Table 9. Two-way analysis of variance of SECS total, envy and justice sensitivity scores by a self-esteem manipulation – Study 2

<table>
<thead>
<tr>
<th>Source</th>
<th>SECS Total</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>SECS Envy</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>SECS Justice Sensitivity</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
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<td>SS</td>
<td>MS</td>
<td>F</td>
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<tr>
<td><strong>Between-Subjects</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>.14</td>
<td>.07</td>
<td>.02</td>
<td>.982</td>
<td>2</td>
<td>1.78</td>
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<td>.811</td>
<td>2</td>
<td>.40</td>
<td>.20</td>
<td>.04</td>
</tr>
<tr>
<td>Residual</td>
<td>815.03</td>
<td>211</td>
<td>3.86</td>
<td></td>
<td></td>
<td>207</td>
<td>876.69</td>
<td>4.24</td>
<td></td>
<td></td>
<td>208</td>
<td>1111.67</td>
<td>5.35</td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>2.95</td>
<td>2.95</td>
<td>14.07</td>
<td>.000</td>
<td>1</td>
<td>1.95</td>
<td>1.95</td>
<td>8.66</td>
<td>.004</td>
<td>1</td>
<td>4.45</td>
<td>4.45</td>
<td>11.61</td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>1.94</td>
<td>.97</td>
<td>4.63</td>
<td>.011</td>
<td>2</td>
<td>1.58</td>
<td>.79</td>
<td>3.49</td>
<td>.032</td>
<td>2</td>
<td>2.68</td>
<td>1.34</td>
<td>3.51</td>
</tr>
<tr>
<td>*Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>207</td>
<td>46.69</td>
<td>.23</td>
<td></td>
<td></td>
<td>208</td>
<td>79.61</td>
<td>.38</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>214</td>
<td>49.15</td>
<td>.23</td>
<td></td>
<td></td>
<td>210</td>
<td>50.22</td>
<td>.24</td>
<td></td>
<td></td>
<td>211</td>
<td>86.74</td>
<td>.41</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SECS = Socio-Emotional Comparisons Scale.
The low self-esteem manipulation was able to change justice sensitivity scores (Table 9). The size of this effect was small ($\eta^2 = .03, [.02, .08]$). Scheffe post hoc analyses suggest that the main differences were found between the high self-esteem and low self-esteem conditions, although this difference did not achieve statistical significance (Figure 3). There were greater changes in SECS justice sensitivity scores in the high self-esteem condition ($M = -.43$,$ SE = .13$), compared to the low self-esteem condition ($M = -.05$, $SE = .08$).

It is important to note that, in each of these analyses, the low self-esteem condition’s effect on SECS change scores was near zero, indicating that this condition did not change scores much. Therefore, these results reflect the ability of the high self-esteem condition to decrease SECS total, envy, and justice sensitivity scores, rather than the low self-esteem condition’s ability to increase these scores.

4.2.3 Negative Affect as a Covariate. Table 10 presents the correlations between SECS total and factor scores and negative affect with and without arousal. Both types of negative affect were significantly correlated with SECS total and factor scores.

As can be seen in Table 11, the experimental manipulation had an effect on self-reported anger. The size of the effect was medium ($\eta^2 = .06, [.01, .11]$). Scheffe post hoc analyses suggest that there were differences in changes in anger between the high and low self-esteem conditions, and between the high self-esteem and control conditions (Figure 4). Changes in anger were lower in the high self-esteem condition ($M = -1.82, SE = .98$), compared to the low self-esteem condition ($M = 4.34, SD = 1.10$) and the no-information condition ($M = 4.28, SE = 1.83$).

The experimental manipulation did not have an effect on changes in sadness
Table 10. Correlations between changes in SECS scores and changes in self-reported anger and sadness – Study 2

<table>
<thead>
<tr>
<th></th>
<th>Anger</th>
<th>Sadness</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECS Total Scores</td>
<td>.18**</td>
<td>.18**</td>
</tr>
<tr>
<td>SECS Envy</td>
<td>.19**</td>
<td>.19**</td>
</tr>
<tr>
<td>SECS Justice Sensitivity</td>
<td>.13*</td>
<td>.13*</td>
</tr>
</tbody>
</table>

Notes. * = p < .05, ** = p < .01. SECS = Socio-Emotional Comparisons Scale.
Table 11. Two-way analysis of variance of changes in self-reported anger and sadness by a self-esteem manipulation – Study 2

<table>
<thead>
<tr>
<th>Source</th>
<th>Anger</th>
<th>Sadness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Df</em></td>
<td><em>SS</em></td>
</tr>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>5116.33</td>
</tr>
<tr>
<td>Residual</td>
<td>209</td>
<td>155906.98</td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>543.48</td>
</tr>
<tr>
<td>Experimental Manipulation *Time</td>
<td>2</td>
<td>861.40</td>
</tr>
<tr>
<td>Residual</td>
<td>209</td>
<td>13666.39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>212</td>
<td>15071.27</td>
</tr>
</tbody>
</table>

*Note.* SECS = Socio-Emotional Comparisons Scale.
Figure 4. Post hoc analyses of the relationship between a self-esteem manipulation and changes in self-reported anger and sadness
Therefore, I did not examine the confounding effect of sadness on the relationship between the experimental manipulation and SECS scores.

Last, I examined the potentially confounding effect of anger on the relationship between the experimental manipulation and SECS scores using an ANCOVA. In this model, changes in anger did have an effect on SECS total scores (Table 12, $\eta^2 = .02, [.0006, .06]$). However, the experimental manipulation did not have an effect on SECS scores once changes in anger were controlled for ($\eta^2 = .03, [.00, .07]$; Table 12). This pattern was also observed in malicious envy scores (Table 12). The effects of changes in anger ($\eta^2 = .03, [.002, .07]$) and the experimental manipulation ($\eta^2 = .02, [.00, .06]$) were small. However, neither the experimental manipulation ($\eta^2 = .02, [.00, .06]$) nor changes in anger scores ($\eta^2 = .006, [.00, .04]$) had a significant effect on justice sensitivity scores (Table 12).

CHAPTER 4: Study 3 – Justice Sensitivity

4.1 Method

4.1.2 Sample. I recruited 248 participants from AMT using the same procedure as the one described in Study 1. Participants were excluded if they chose to withdraw their data after the study was completed ($n = 11$), if they failed an attention check item at the end of the study ($n = 3$), or if they did not adequately participate in the experimental manipulation (e.g., spent less than 5 seconds reading information regarding relative income, did not complete all fields, did not enter correct discrepant income; $n = 33$; see Figure 1). The final sample included 201 participants ($M_{age} = 37.09, SD_{age} = 10.38$; 122 identified as male, 78 as female, and 1 as trans*). Other descriptive statistics of this sample are presented in Table 13.
Table 12. Two-way analysis of covariance of SECS total, envy and justice sensitivity scores by a self-esteem manipulation, with changes in self-reported anger as a covariate – Study 2

<table>
<thead>
<tr>
<th>Source</th>
<th>SECS Total</th>
<th></th>
<th></th>
<th>SECS Envy</th>
<th></th>
<th></th>
<th>SECS Justice Sensitivity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
</tr>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Anger MANIP</td>
<td>2</td>
<td>1.41</td>
<td>.70</td>
<td>.19</td>
<td>.831</td>
<td>2</td>
<td>2.53</td>
<td>1.27</td>
</tr>
<tr>
<td>Residual</td>
<td>207</td>
<td>784.03</td>
<td>3.79</td>
<td>.08</td>
<td>.002</td>
<td>203</td>
<td>842.74</td>
<td>4.15</td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>3.50</td>
<td>3.50</td>
<td>16.74</td>
<td>.000</td>
<td>1</td>
<td>2.52</td>
<td>2.52</td>
</tr>
<tr>
<td>Experimental Anger MANIP</td>
<td>2</td>
<td>1.25</td>
<td>.63</td>
<td>2.99</td>
<td>.052</td>
<td>2</td>
<td>1.07</td>
<td>.53</td>
</tr>
<tr>
<td>*Time</td>
<td>1</td>
<td>.90</td>
<td>.90</td>
<td>4.33</td>
<td>.039</td>
<td>1</td>
<td>1.19</td>
<td>1.19</td>
</tr>
<tr>
<td>Residual</td>
<td>207</td>
<td>43.25</td>
<td>.21</td>
<td></td>
<td></td>
<td>203</td>
<td>45.46</td>
<td>.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>211</td>
<td>48.90</td>
<td>.23</td>
<td></td>
<td></td>
<td>207</td>
<td>50.24</td>
<td>.24</td>
</tr>
</tbody>
</table>

*Note.* SECS = Socio-Emotional Comparisons Scale.
Table 13. *Sample descriptive statistics for Study 3*

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>85.6</td>
</tr>
<tr>
<td>Asian</td>
<td>8.5</td>
</tr>
<tr>
<td>Black/African American</td>
<td>6.0</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>4.0</td>
</tr>
<tr>
<td>Other</td>
<td>1.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Relationship Status</strong></td>
<td></td>
</tr>
<tr>
<td>Single, never married</td>
<td>29.4</td>
</tr>
<tr>
<td>Dating, not cohabiting</td>
<td>6.5</td>
</tr>
<tr>
<td>Married or cohabiting</td>
<td>58.2</td>
</tr>
<tr>
<td>Divorced or separated</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Did not complete high school</td>
<td>0.5</td>
</tr>
<tr>
<td>High school or equivalent</td>
<td>33.8</td>
</tr>
<tr>
<td>College/Bachelor’s degree or equivalent</td>
<td>57.2</td>
</tr>
<tr>
<td>Graduate or professional degree</td>
<td>8.5</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
</tr>
<tr>
<td>Employed (part-time or full-time)</td>
<td>89.6</td>
</tr>
<tr>
<td>Unemployed, looking for work</td>
<td>4.5</td>
</tr>
<tr>
<td>Unemployed, not looking for work</td>
<td>4.5</td>
</tr>
<tr>
<td>Retired</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Personal Income Last Year</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 10,000</td>
<td>4.5</td>
</tr>
<tr>
<td>10,000 – 30,000</td>
<td>36.3</td>
</tr>
<tr>
<td>30,001 – 50,000</td>
<td>24.4</td>
</tr>
<tr>
<td>50,001 – 75,000</td>
<td>22.4</td>
</tr>
<tr>
<td>75,001 – 100,000</td>
<td>5.5</td>
</tr>
<tr>
<td>More than 100,000</td>
<td>4.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Household Income Last Year</strong></td>
<td></td>
</tr>
<tr>
<td>Less than 10,000</td>
<td>2.0</td>
</tr>
<tr>
<td>10,000 – 30,000</td>
<td>18.4</td>
</tr>
<tr>
<td>30,001 – 50,000</td>
<td>23.9</td>
</tr>
<tr>
<td>50,001 – 75,000</td>
<td>24.4</td>
</tr>
<tr>
<td>75,001 – 100,000</td>
<td>15.9</td>
</tr>
<tr>
<td>More than 100,000</td>
<td>15.4</td>
</tr>
</tbody>
</table>
The procedure, measures, and data analysis strategies were similar to those employed in Study 1. Similar to Study 2, the only differences were the type of experimental manipulation used (see below for more details), that SECS total scores were computed by averaging envy and self-esteem scores, and that SECS justice sensitivity scores were used as a manipulation check. Descriptive statistics, reliabilities, and missing data rates for measures used are presented in Table 14.

4.1.2 Experimental Manipulation. A modified version of Kulczycki’s (2008) social comparison manipulation was used to manipulate justice sensitivity. Participants were asked information on their annual salaries, the industry in which they work, their level of education, and a short description of their jobs, as well as questions related to the effort they put into their work. These questions included the number of hours worked per week, the amount of time spent socializing per day, and the amount of time spent on social media per day. Following this, they were presented with a paragraph reiterating the information they gave us, including their annual income. Then, participants were told what the average income of other participants in their effort/occupation group were. As recommended by Kulczycki (2008), participants’ incomes differed by proportions rather than actual numbers, as specific numbers may be more subject to different reactions based on the initial income. For example, if all participants were informed that they receive $5,000 less than they should, participants with higher incomes (e.g., $120,000) will undoubtedly see this discrepancy as less important than participants with lower incomes (e.g., $12,000). Using proportions allows discrepancies in income to be more likely relevant to all participants, regardless of their initial income. Participants’ relative position was manipulated through assignment to one of three conditions: disadvantageous
Table 14. Scale descriptive statistics, reliabilities, and missing data rates – Study 3

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>SD</th>
<th>Reliability (α)</th>
<th>Missing Data Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 - SECS Total</td>
<td>2.28</td>
<td>1.20</td>
<td>.92</td>
<td>0.0</td>
</tr>
<tr>
<td>T1 - SECS Envy</td>
<td>2.05</td>
<td>1.22</td>
<td>.94</td>
<td>1.0</td>
</tr>
<tr>
<td>T1 - SECS Self-Esteem</td>
<td>2.52</td>
<td>1.42</td>
<td>.86</td>
<td>0.5</td>
</tr>
<tr>
<td>T1 - SECS Justice Sensitivity</td>
<td>2.61</td>
<td>1.48</td>
<td>.95</td>
<td>0.0</td>
</tr>
<tr>
<td>T1 - VAMS Anger</td>
<td>7.66</td>
<td>16.01</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>T1 - VAMS Sadness</td>
<td>12.33</td>
<td>18.46</td>
<td>-</td>
<td>0.0</td>
</tr>
<tr>
<td>T2 – SECS Total</td>
<td>2.19</td>
<td>1.26</td>
<td>.93</td>
<td>0.0</td>
</tr>
<tr>
<td>T2 – SECS Envy</td>
<td>1.96</td>
<td>1.34</td>
<td>.96</td>
<td>1.5</td>
</tr>
<tr>
<td>T2 – SECS Self-Esteem</td>
<td>2.42</td>
<td>1.41</td>
<td>.87</td>
<td>0.0</td>
</tr>
<tr>
<td>T2 – SECS Justice Sensitivity</td>
<td>2.59</td>
<td>1.61</td>
<td>.98</td>
<td>0.5</td>
</tr>
<tr>
<td>T2 – VAMS Anger</td>
<td>8.90</td>
<td>16.91</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>T2 – VAMS Sadness</td>
<td>13.61</td>
<td>20.43</td>
<td>-</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*Note.* T1 = Time 1, T2 = Time 2, SECS = Socio-Emotional Comparisons Scale, VAMS = Visual Analogue Mood Scale.
information, advantageous information, and low justice sensitivity. Although I initially randomly assigned participants to one of these three groups and groups were relatively equal when data was collected, differences in sample sizes across groups was due to exclusion criteria described above.

In the disadvantageous information condition \((n = 58)\), individuals were told that based on their efforts at work, industry, position, and education, their annual income was 10% lower than the average income of their group. A 10% decrease was used to maintain believability, but still produce a significant discrepancy between the participant and average incomes. I then presented participants with a visual graph, where the participant’s income is placed on the lower end of a distribution of incomes. In the advantageous information condition \((n = 72)\), participants were told that their incomes are 10% higher than the average income. This information was again presented in a short paragraph and a visual graph. Both of these conditions were unjust, but differed in whether the participant is advantaged or not by the discrepancy between effort and rewards. In the low justice sensitivity condition \((n = 71)\), half of participants were told that their incomes were 1% higher than the average person sharing their characteristics, while the other half were told their incomes were 1% lower. This condition can be considered just, as individuals believe that their rewards (incomes) reflect their efforts. The 1% margin was used to ensure some level of believability, as it is unlikely that an individual has the exact same income as the average income of any population (some variability will most likely be present). I then presented a visual graph showing that their income is placed near the middle of a distribution of incomes (see Appendix G).
4.2 Results

Sample descriptive statistics are presented in Table 13. Means and standard deviations for each scale used are presented in Table 14.

4.2.1 Manipulation Check. The experimental manipulation was successful in changing justice sensitivity scores (Table 15). The effect was medium ($\eta^2 = .08, [.03, .14]$). Scheffe post hoc analyses revealed that there were only differences between the low justice sensitivity and the disadvantageous information conditions, and between the advantageous and disadvantageous information conditions (Figure 5). Changes in justice sensitivity scores were greater in the disadvantageous information condition ($M = .36, SE = .14$), compared to the advantageous information ($M = -.10, SE = .09$) and low justice sensitivity conditions ($M = -.25, SE = .08$).

4.2.2 Socio-emotional Comparisons Total and Factor Scores. The justice sensitivity manipulation changed SECS total scores (Table 16). Again, the size of this effect was medium ($\eta^2 = .06, [.01, .11]$). Scheffe post hoc analyses suggest that there were only differences between the disadvantageous information and low justice sensitivity conditions, and between the disadvantageous and advantageous information conditions (Figure 5). SECS total scores increased in the disadvantageous information condition ($M = .09, SE = .08$), while they decreased in the low justice sensitivity ($M = -.21, SE = .06$) and the advantageous information conditions ($M = -.13, SE = .05$).

The justice sensitivity manipulation was able to change malicious envy scores (Table 16). The size of this effect was small ($\eta^2 = .04, [.003, .09]$). Scheffe post hoc analyses suggest that the main differences are found between the low justice sensitivity and the disadvantageous information conditions (Figure 5). Malicious envy scores
Table 15. Two-way analysis of variance of changes in SECS justice sensitivity scores by a justice sensitivity manipulation – Study 3

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>8.78</td>
<td>4.39</td>
<td>1.00</td>
<td>.371</td>
</tr>
<tr>
<td>Residual</td>
<td>197</td>
<td>867.45</td>
<td>4.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>.004</td>
<td>.004</td>
<td>.01</td>
<td>.918</td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>6.24</td>
<td>3.12</td>
<td>8.96</td>
<td>.000</td>
</tr>
<tr>
<td>Manipulation*Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>197</td>
<td>68.64</td>
<td>.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>200</td>
<td>74.88</td>
<td>.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* SECS = Socio-Emotional Comparisons Scale.
Figure 5. Post hoc analyses of the relationship between a justice sensitivity manipulation and changes in SECS scores

Note. SECS = Socioemotional Comparisons Scale.
Table 16. Two-way analysis of variance of changes in SECS total, envy, and self-esteem scores by a justice sensitivity manipulation – Study 3

<table>
<thead>
<tr>
<th>Source</th>
<th>SECS Total</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>SECS Envy</th>
<th></th>
<th></th>
<th></th>
<th>SECS Self-Esteem</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
</tr>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>1.64</td>
<td>.82</td>
<td>.28</td>
<td>.754</td>
<td>2</td>
<td>.29</td>
<td>.14</td>
<td>.05</td>
<td>.956</td>
<td>2</td>
<td>4.95</td>
<td>2.47</td>
<td>.65</td>
</tr>
<tr>
<td>Residual</td>
<td>198</td>
<td>575.93</td>
<td>2.91</td>
<td></td>
<td></td>
<td>193</td>
<td>613.87</td>
<td>3.18</td>
<td></td>
<td></td>
<td>197</td>
<td>747.60</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>.71</td>
<td>.71</td>
<td>5.82</td>
<td>.017</td>
<td>1</td>
<td>.77</td>
<td>.77</td>
<td>5.22</td>
<td>.023</td>
<td>1</td>
<td>.82</td>
<td>.82</td>
<td>3.65</td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>1.50</td>
<td>.75</td>
<td>6.09</td>
<td>.003</td>
<td>2</td>
<td>1.12</td>
<td>.56</td>
<td>3.80</td>
<td>.024</td>
<td>2</td>
<td>1.59</td>
<td>.79</td>
<td>3.55</td>
</tr>
<tr>
<td>*Time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>198</td>
<td>24.31</td>
<td>.12</td>
<td></td>
<td></td>
<td>193</td>
<td>28.54</td>
<td>.15</td>
<td></td>
<td></td>
<td>197</td>
<td>43.99</td>
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<tr>
<td><strong>Total</strong></td>
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<td>26.52</td>
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<td>196</td>
<td>30.43</td>
<td>.16</td>
<td></td>
<td></td>
<td>199</td>
<td>46.40</td>
<td>.23</td>
<td></td>
</tr>
</tbody>
</table>

*Note. SECS = Socio-Emotional Comparisons Scale.*
increased in the disadvantageous information condition \((M = .06, SE = .10)\), while they were decreased in the low justice sensitivity condition \((M = -.21, SE = .06)\).

Last, the justice sensitivity manipulation had an effect on self-esteem scores (Table 16). The size of this effect was small \((\eta^2 = .03, [.002, .08])\). Scheffe post-hoc analyses suggest that there were only differences between the disadvantageous information and low justice sensitivity conditions (Figure 5). Self-esteem scores increased in the disadvantageous information condition \((M = .09, SE = .09)\), while they decreased in the low justice sensitivity condition \((M = -.21, SD = .08)\).

**4.2.3 Negative Affect as a Covariate.** Following the procedure outlined above, I explored the confounding effect of negative affect with and without arousal on the relationship between the self-esteem manipulation and SECS scores. Correlations between SECS total, envy and self-esteem scores, and changes in anger and sadness were significant (Table 17).

A two-way ANOVA showed that the justice sensitivity manipulation had an effect on anger scores (Table 18). This effect was of a medium size \((\eta^2 = .10, [.04, .16])\). Scheffe post-hoc analyses suggest that differences were found between the disadvantageous information and low justice sensitivity conditions, and between the disadvantageous information and advantageous information conditions (Figure 6). Changes in anger were greater in the disadvantageous information condition \((M = 6.88, SE = 2.05)\), compared to the low justice sensitivity \((M = -1.58, SE = 1.12)\) and advantageous information conditions \((M = -.60, SE = .96)\).

A two-way ANOVA showed that the justice sensitivity manipulation had an effect on sadness scores as well (Table 18). The size of this effect was medium \((\eta^2 = .09, \ldots)\).
Table 17. Correlations between changes in SECS scores and changes in self-reported anger and sadness – Study 3

<table>
<thead>
<tr>
<th></th>
<th>Anger</th>
<th>Sadness</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECS Total Scores</td>
<td>.40***</td>
<td>.43***</td>
</tr>
<tr>
<td>SECS Envy</td>
<td>.40***</td>
<td>.43***</td>
</tr>
<tr>
<td>SECS Self-Esteem</td>
<td>.25***</td>
<td>.30***</td>
</tr>
</tbody>
</table>

Note. *** = p < .001. SECS = Socio-Emotional Comparisons Scale.
Table 18. Two-way analysis of variance of changes in self-reported anger and sadness scores by a justice sensitivity manipulation – Study 3

<table>
<thead>
<tr>
<th>Source</th>
<th>Anger</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Sadness</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
<td>P</td>
</tr>
<tr>
<td><strong>Between-Subjects</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Manipulation</td>
<td>2</td>
<td>714.78</td>
<td>357.39</td>
<td>.75</td>
<td>.474</td>
<td>2</td>
<td>22.39</td>
<td>11.19</td>
<td>.016</td>
<td>.984</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>196</td>
<td>134398.61</td>
<td>685.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Time</td>
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<td>240.53</td>
<td>3.89</td>
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<td>283.99</td>
<td>283.99</td>
<td>3.85</td>
<td>.051</td>
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<tr>
<td>Experimental Manipulation*</td>
<td>2</td>
<td>1305.83</td>
<td>652.91</td>
<td>10.57</td>
<td>&lt;.001</td>
<td>2</td>
<td>1429.31</td>
<td>714.66</td>
<td>9.69</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Time</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>195</td>
<td>12048.13</td>
<td>61.79</td>
<td></td>
<td></td>
<td>196</td>
<td>14457.23</td>
<td>73.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>198</td>
<td>13594.49</td>
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<td></td>
<td></td>
<td>199</td>
<td>16170.53</td>
<td>81.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. SECS = Socio-Emotional Comparisons Scale.*
Figure 6. Post hoc analyses of the relationship between justice sensitivity manipulation and changes in self-reported anger and sadness

Note. SECS = Socioemotional Comparisons Scale.
Scheffe post-hoc analyses suggest that there were only differences between the disadvantageous information and low justice sensitivity conditions, and between the disadvantageous and advantageous information conditions (Figure 6). Changes in sadness were greater in the disadvantageous information condition ($M = 7.24, SE = 2.16$), compared to the low justice sensitivity ($M = -1.39, SD = 1.12$) and advantageous information conditions ($M = -.76, SE = 1.22$).

To further examine negative affect’s confounding effect, I conducted a series of ANCOVAs. For total SECS scores, changes in sadness ($\eta^2 = .07, [.02, .13]$) and anger ($\eta^2 = .04, [.008, .10]$) had an effect on SECS total scores; however, once these factors were controlled for, the justice sensitivity manipulation did not have a significant effect on SECS total scores ($\eta^2 = .01, [.00, .04]$; Table 19). Changes in sadness ($\eta^2 = .07, [.02, .13]$) and anger ($\eta^2 = .05, [.01, .10]$) had an effect on malicious envy scores; however, once these factors were controlled for, the justice sensitivity manipulation did not have an effect on changes in malicious envy scores ($\eta^2 = .008, [.00, .03]$; Table 19). Changes in sadness had an effect on self-esteem scores ($\eta^2 = .03, [.005, .09]$; Table 19). Once changes in sadness were controlled for, the justice sensitivity manipulation ($\eta^2 = .01, [.00, .04]$) and changes in anger ($\eta^2 = .009, [.00, .04]$) did not have an effect on self-esteem scores (Table 19).

**CHAPTER 5: Discussion**

The aims of this study were to experimentally validate the three-factor structure of SEC, and to examine whether negative affect confounded the relationships between SEC factors and SEC itself. To this end, I conducted three experiments, each manipulating a separate SEC factor. SEC and negative affect scores were measured before and after the
Table 19. Two-way analysis of covariance of SECS total, envy, and self-esteem scores by a justice sensitivity manipulation, with changes in self-reported anger and sadness as covariates – Study 3

<table>
<thead>
<tr>
<th>Source</th>
<th>SECS Total</th>
<th></th>
<th></th>
<th></th>
<th>SECS Envy</th>
<th></th>
<th></th>
<th></th>
<th>SECS Self-Esteem</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Df</td>
<td>SS</td>
<td>MS</td>
<td>F</td>
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<td>MS</td>
<td>F</td>
<td>P</td>
<td>Df</td>
<td>SS</td>
</tr>
<tr>
<td><strong>Between-Subjects</strong></td>
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<tr>
<td>Experimental</td>
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<td>11.70</td>
<td>5.85</td>
<td>2.10</td>
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<td>2</td>
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<tr>
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<td>17.62</td>
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<td>.013</td>
<td>1</td>
<td>19.36</td>
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<td>2.60</td>
<td>.93</td>
<td>.336</td>
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<td>.107</td>
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<td></td>
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<td>187</td>
<td>555.68</td>
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<td></td>
<td></td>
<td>191</td>
<td>715.16</td>
</tr>
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<td><strong>Within-Subjects</strong></td>
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<td></td>
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<tr>
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<td>13.50</td>
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<td>.12</td>
<td>.17</td>
<td>.496</td>
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<td>.17</td>
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<td>.71</td>
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<td>.40</td>
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<tr>
<td>Anger*Time</td>
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<td>.88</td>
<td>8.69</td>
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<td>.37</td>
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<td>1.41</td>
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<td>1.60</td>
<td>13.20</td>
<td>&lt;.001</td>
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<td>1.39</td>
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<td>.10</td>
<td></td>
<td></td>
<td>187</td>
<td>22.68</td>
<td>.12</td>
<td></td>
<td></td>
<td>191</td>
<td>39.23</td>
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<tr>
<td>Total</td>
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<td>23.23</td>
<td>.12</td>
<td></td>
<td></td>
<td>192</td>
<td>28.82</td>
<td>.14</td>
<td></td>
<td></td>
<td>196</td>
<td>42.91</td>
</tr>
</tbody>
</table>

*Note.* SECS = Socio-Emotional Comparisons Scale.
administration of this manipulation. I then examined whether these experimental manipulations changed SECS scores above any changes in negative affect.

In Study 1 (malicious envy manipulation), the analyses revealed no significant effect of the manipulation on SECS total, self-esteem, or justice sensitivity scores. In Study 2 (self-esteem manipulation), significant changes in SECS total, malicious envy, and justice sensitivity scores were observed. However, once negative affect with arousal was controlled for, these effects disappeared. In Study 3 (justice sensitivity manipulation), significant changes in SECS total, malicious envy, and self-esteem scores were observed. Similarly, these effects vanished once negative affect with and without arousal were controlled for. In all of these analyses, effect sizes were generally small to medium.

These results are important in defining the components of SEC. First, the results of Study 1 suggest that the SEC envy factor may not be as important to the SEC construct as Mishra et al. (2019) initially conceptualized. Indeed, as a manipulation of the SEC envy factor was not able to significantly change SEC self-esteem or justice sensitivity scores, the likely conclusion is that the SEC envy factor is not related to other SEC factors. This conclusion, however, goes against many of the results found in previous studies. As discussed earlier, in many studies, malicious envy has correlated negatively with self-esteem (Duarte, 2011; Hughes, 2016; Salovey & Rodin, 1991; Vrabel et al., 2018) and with perceptions of justice (Gallagher, 2013; Grubb, 2011; Wilkin, 2011; Wobker, 2015). These results also counter Mishra et al.’s (2019) results. Using best-practice statistical methods in a series of pre-registered studies with
well-powered samples, Mishra et al. (2019) found that all three SEC factors (and especially the envy factor) are important to the construct. Mishra et al.’s results and this thesis’ results can be reconciled if we consider SEC to be an enduring schema rather than a social emotion, a possibility discussed later in this section.

Although the malicious envy manipulation was successful in increasing SEC envy factor scores, the size of this effect was smaller than that of other experiments and there were no differences in changes in SECS envy scores between the benign envy and malicious envy conditions. Given that benign envy and malicious envy are two different constructs and therefore should be elicited by different experimental manipulations, the lack of different results among conditions may indicate that SEC’s envy factor was not appropriately manipulated by Study 1. Furthermore, SEC’s envy factor is more complex than simply malicious envy; rather it is an amalgamation of dispositional envy, relative deprivation, anger and resentment. As a result, a stronger experimental manipulation that incorporates more elements integrated into SEC’s envy factor may be more successful than the one used in this thesis.

Another possible explanation for these results may reflect the directionality of the associations between malicious envy, self-esteem, and justice sensitivity. To my knowledge, no other study has examined whether an experimental manipulation of malicious envy has an effect on self-esteem or perceptions of justice. However, experimental manipulations of justice perceptions have been found to effect malicious envious feelings (Hoogland, 2016, Ven et al., 2012). It may be that, within the SEC construct, envious feelings are elicited through justice sensitivity and low self-esteem. However, envious feelings may not elicit lower self-esteem or perceptions of injustice.
Second, self-esteem and justice sensitivity manipulations changed SECS total and associated factor scores. These results are in line with many studies that have found a correlation between self-esteem, justice sensitivity, and malicious envy (Duarte, 2011; Gallagher, 2013; Grubb, 2011; Hughes, 2016; Salovey & Rodin, 1991; Vrabel et al., 2018; Wilkin, 2011; Wobker, 2015). In addition, the significant effect of a justice sensitivity manipulation on malicious envy is supported by similar results in past experiments (Hoogland, 2016; Ven et al., 2012). What is interesting, however, is that we found evidence that self-esteem and justice sensitivity manipulations affected justice sensitivity and self-esteem scores, respectively, despite the numerous studies suggesting that there is no correlation between self-esteem and perceptions of justice (Burton, 2002; Lilly, 2001; Ratcliff, 1991; Sekiguchi & Hayashi, 2014). It may be that the discrepancy between the results of this thesis and past literature is caused by flawed methodologies. In all four studies, the authors used measures of justice perceptions that were short (2-5 items), created specifically for their studies, and not validated in other studies. Our measure of justice sensitivity, however, is based on another scale that has been validated in multiple samples, and has itself been validated in multiple, well-powered samples (see Mishra et al., 2019). Furthermore, Heck et al. (2005) found a positive relationship between domain-specific self-esteem and domain-specific perceptions of justice. Further, negative feedback on ambiguous tasks (an experimental manipulation similar to the one I used in Study 2) has been found to increase perceptions of injustice (Chory & Westerman, 2009).

All in all, the main results of Studies 2 and 3 provide further evidence that SEC’s self-esteem and justice sensitivity factors are important to the SEC construct. However,
the results also showed that once negative affect was controlled for, the effect of manipulations disappeared, which sheds doubt on the validity of the SEC construct; it may simply be that negative affect alone influences SEC scores, and that individual SEC factors are not all that important.

Third, assuming that high justice sensitivity is an important factor in the SEC construct, it may be useful to refine this factor to only include situations where the individual is disadvantaged. When comparing the disadvantageous information and advantageous information conditions of the justice sensitivity experiment, I found that only the former increased SECS scores, while the latter was indistinguishable from a low justice sensitivity condition, indicating that individuals may not have a SEC reaction to perceived injustices when this injustice advantages them.

Effect sizes for ANOVA and ANCOVA analyses were generally small. As a result, whether any of these results replicate in future studies is an open question. These small effect sizes raise another possibility: SEC may be a disposition that cannot be altered with short experimental manipulations. Recent data has demonstrated that SEC shares a large proportion of variance with various negative childhood schemas (78%; Wuth, Mishra, Beshai, & Feeney, 2019), or stable maladaptive cognitive themes like entitlement, failure to achieve, and abandonment (Young & Lindemann, 1992). Therefore, it may be that SEC is a schema that developed early in childhood, and thus is difficult to manipulate in adults. As discussed earlier, considering SEC as a schema rather than a social emotion may explain the differences in the results of Study 1 (that is, the inability of a malicious envy manipulation in changing SECS scores) and the results of previous studies (Duarte, 2011; Gallagher, 2013; Grubb, 2011; Hughes, 2016; Mishra et
Although not related to the primary research questions of this study, some of the most interesting findings I found involve the effect of a self-esteem manipulation on SECS scores. If this manipulation were successful in changing SECS scores, we would expect that those exposed to a low self-esteem manipulation would show increased SEC reactions, while those exposed to a high self-esteem manipulation would show decreased SEC reactions, and those exposed to a no-information manipulation would not show an increase or decrease in SEC reactions. The low self-esteem condition did negatively influence participants levels of self-esteem (as measured by the SECS self-esteem factor); however, it did not change SECS total, envy, or justice sensitivity scores. On the other hand, the high self-esteem condition did decrease SECS self-esteem scores as expected, but also decreased SECS total, envy, and justice sensitivity scores. Essentially, the effects of the low self-esteem and high self-esteem conditions were opposite.

In contrast, in the justice sensitivity experiment, the disadvantageous information condition increased SECS scores, while the advantageous information and low justice sensitivity conditions either had no effect or decreased SECS scores. What makes the self-esteem manipulation produce different results than the justice sensitivity manipulation if both are similarly considered SEC factors? There are a few possibilities. First, the self-esteem manipulation involves an evaluation of one’s abilities or inherent qualities compared to others, while the justice sensitivity manipulation involves an evaluation of one’s outcomes or extrinsic rewards. There may be a difference in how individuals respond to perceived inequalities in these domains: when one finds that their abilities are put to the test, some evidence suggests they may disregard this information
altogether (Seery, Blascovich, Weisbuch, & Vick, 2004). As a result, they may have disregarded the information given to them about relative performance altogether, which would explain why their SECS scores did not increase. Second, these differences may indicate that self-esteem is a dispositional SEC component that is difficult to manipulate in a short experiment, while justice sensitivity is a response to situational cues (and thus is much easier to manipulate). In this way, SEC may arise when individuals with low self-esteem respond to perceived injustices, but it will not arise when these same individuals are presented with “just” situations.

5.1 Strengths

The results of this series of studies are bolstered by the strength of the methodologies employed. First, all three studies were well-powered. As previously discussed, I determined that the sample size needed to reliably detect a medium effect size with a power of .90 was 206. Even after exclusions, all three studies’ sample sizes were well above this benchmark. Second, the sample was collected from AMT, which more closely approximates the “general” population than other sources of participants including undergraduates. Third, the experimental manipulations used in these studies have been validated previously, and were generally able to manipulate the targeted states (particularly in Studies 2 and 3). Last, all measures used were well-validated and consistently reliable across our studies.

5.2 Limitations

Despite the importance of the present study’s findings, such findings should be interpreted in light of certain limitations. First, experimental manipulations were not strong enough to properly manipulate the targeted states, given the small effect sizes
found when analyzing their effects on manipulation checks. Second, in this study, I only measured aspects of negative affect, namely anger and sadness, which do not fully represent the full range of emotions under the negative affect umbrella. Future research would benefit from including other emotions that are related to social comparisons such as shame and embarrassment. Third, the use of ANCOVA to test whether negative affect was a confounding variable in the relationship between SEC factors and SEC may be problematic. Negative affect is a core component of SEC, as SEC is defined as a *negative emotional* reaction to social comparisons. Therefore, it is not surprising that controlling for negative affect reduces or eliminates the effects of SEC factors on SEC, especially given the proximate nature of negative affect and the distal nature of some SEC factors (e.g., self-esteem). Future research should investigate whether SEC may be a form of negative social emotion, and hence its close relationship with negative affect generally.

### 5.3 Implications

The results of this study, if valid, have important implications. First, these results indicate that malicious envy may not be important in the genesis of SEC. However, both self-esteem and justice sensitivity are involved in SEC reactions. Second, SEC may be a combination of both dispositional, unchanging factors and situational, context-relevant factors. Third, the finding that the relationships between SEC factors and SEC disappear once negative affect is controlled for indicate that SEC reactions may simply arise as a result of negative affect; it may therefore not be useful to invoke social comparisons in this construct at all. Last, these results have potentially important implications for the treatment of psychopathologies. As indicated previously, SEC has been associated with depression, anxiety, and stress. These results may provide further indication of where
treatments of SEC-related issues should focus, specifically self-esteem and justice sensitivity.

5.4 Future Directions

Despite the importance of the results discovered in this study, more research is needed. First, as mentioned previously, the fact that the relationships between SEC factors and SEC disappeared when controlling for negative affect does not confirm that negative affect confounds this relationship given that negative affect is a core component of SEC. Instead, a more appropriate test of this confounding effect may be to examine whether “pure” experimental manipulations of negative affect change SEC scores. In doing so, we can examine whether negative affect without any social comparison information is enough to induce SEC reactions, or if negative affect leads to SEC reactions only in the presence of negative social comparison information. Future research should use this method to further clarify the role of negative affect in the genesis of SEC.

Second, if we consider that SEC is more than negative affect and at least involves low self-esteem and high justice sensitivity, it is still unclear whether these factors act alone to produce SEC (additive effect), or if they become more powerful in their interactions (multiplicative effect). Further, although in this study I found that malicious envy manipulations did not change SEC scores indicating it is not important in the genesis of SEC, it is possible that malicious envy can further increase SEC reactions when either low self-esteem, high justice sensitivity, or both are present. If SEC factors do have a multiplicative effect on the genesis of SEC, the question of ordering remains unanswered: are SEC reactions different based on whether people feel low self-esteem, malicious envy, or high justice sensitivity first? All of these questions should be
examined in future research.

Third, an interesting question arising from the findings of this study is whether SEC is dispositional, situational, or a mix of both. As discussed, the effectiveness of experimental manipulations was generally small. One possibility of this result is that SEC cannot be adequately manipulated in the lab as it is an enduring trait. On the other hand, SEC was first conceptualized as a social emotion, one that is changeable depending on the situation. Further, as discussed, some SEC factors may be dispositional (e.g., self-esteem) while others may be situational (e.g., justice sensitivity). In short, the question of SEC’s enduring nature remains, and should be examined in future research.

Last, as discussed, the results of this thesis suggest that treatment of SEC-related psychopathologies should focus on patients’ low self-esteem and high justice sensitivities. However, treatment studies should still be conducted in order to confirm these claims.

5.5 Conclusion

This thesis examined the validity of the SEC construct through a series of constructs. Results indicate that although comparative self-esteem and justice sensitivity may be important components of SEC, negative affect may confound the relationship between these factors and SEC. These results, however, should be considered in light of the potentially invariant nature of SEC reactions, thus making experimental manipulations of the construct difficult if not impossible. Important theoretical and clinical implications of these results include refining the SEC construct, the question of whether SEC is an enduring trait or a malleable state, and the possibility of clinical interventions to treat SEC-related psychopathologies. However, future research should
attempt to replicate these results and answer the questions raised by the results of this thesis.
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10.1007/s11031-011- 9202-4


depression. *Journal of Abnormal Psychology, 120*(6), 691–699. DOI: 10.1037/a0022856


Appendix A. Demographic Questions

Please answer the following demographic questions truthfully and to the best of your ability.

What is your age?

________________________________________________________________

What is your gender?

○ Male

○ Female

○ Trans*

○ Other

If other, please specify what gender you identify as

________________________________________________________________

What country are you currently living in?

▼ Afghanistan (1) ... Zimbabwe (208)

Which category best describes you? Select all answers that apply. You may select more than one response.

□ White

□ South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
☐ Chinese
☐ Black or African American
☐ Filipino
☐ Hispanic, Latino or Spanish
☐ Middle Eastern or North African
☐ Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.)
☐ West Asian (e.g., Iranian, Afghan, etc.)
☐ Korean
☐ Japanese
☐ Aboriginal (e.g., Navajo, Mayan, Métis, Cree, etc.)
☐ Other

If other, please specify what other category you identify with.
________________________________________________________________
What is your primary language at home?

☐ English
☐ Other

If other, please specify what your primary language is.
________________________________________________________________
What is the highest level of education you have completed?

- Did not complete high school
- High school (or equivalent)
- College/university
- Post graduate (e.g., graduate, professional, doctoral, etc.)

What is your current marital status?

- Currently dating, not cohabiting
- Single, never married
- Divorced or separated
- Married or cohabiting
- Widowed

Empl_Status What is your current employment status?

- Employed full time
- Employed part time
- Unemployed looking for work
- Unemployed not looking for work
- Never employed
- Retired
How many children do you have?

________________________________________________________________

What is your personal income before tax (USD)?

○ No income
○ $10,000 - $30,000
○ $30,001 - $50,000
○ $50,001 - $75,000
○ $75,001 - $100,000
○ Greater than $100,000

What is your household income before tax (USD)?

○ No income
○ $10,000 - $30,000
○ $30,001 - $50,000
○ $50,001 - $75,000
○ $75,001 - $100,000
○ Greater than $100,000
Appendix B. Socio-Emotional Comparison Scale

To what extent do you agree or disagree with the following statements?

Likert Scale: 1 (Strongly disagree) – 7 (Strongly agree)

1- Feelings of envy constantly torment me.
2- No matter what I do, envy always plagues me.
3- I feel ill will toward people I envy.
4- Seeing other people’s achievements makes me resent them.
5- When I compared myself to other people, I think that I am no good.
6- When I compare myself to others, I feel like a loser.
7- I feel that I am a person of worth, at least on an equal plane with others.
8- All in all, I am inclined to feel that I am a failure.
9- Compared to others, I don’t get rewarded for how hard I work.
10- Compared to others, I get less than what I deserve given how hard I work.
11- Compared to others, it upsets me that I don’t get rewarded for how hard I work.
12- Compared to others, I don’t get what I deserve given how much effort I put in.
Appendix C. Visual Analogue Mood Scales

Use the following sliders to represent to what extent you currently feel the following emotions.

<table>
<thead>
<tr>
<th></th>
<th>Not sad at all</th>
<th>Very sad</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sadness</strong></td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Not angry at all</th>
<th>Very angry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anger</strong></td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Not happy at all</th>
<th>Very happy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Happiness</strong></td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>
Appendix D. Study 1 Experimental Questions

Control Condition:

People sometimes complete everyday tasks (e.g., washing dishes, mowing lawn). Please describe a time when you completed an everyday task, and describe in as much detail as possible how you felt at that time. You will have approximately 5-10 minutes to complete this task.

Benign Envy Condition:

People sometimes feel motivated when comparing themselves to another person who has something they do not. Please describe a time when you might have felt motivated when realizing someone was superior to you in some way (for example, income, physical appearance, relationship status), and describe in as much detail as possible how you felt at that time. You will have approximately 5-10 minutes to complete this task.

Malicious Envy Condition:

People sometimes feel anger when comparing themselves to another person who has something they do not. Please describe a time when you might have felt angry when realizing someone was superior to you in some way (for example, income, physical appearance, relationship status), and describe in as much detail as possible how you felt at that time. You will have approximately 5-10 minutes to complete this task.
Appendix E. Remote Association Task

The next task you will complete is the Remote Association Task (RAT). The RAT is one of the best validated measures of intelligence (IQ). You will be presented with three words. You will be tasked with entering a fourth word that relates the three other words.

Example: River/Note/Account: (answer is bank)

1- Dew/Comb/Bee
2- Fork/Dark/Man
3- Political/Surprise/Line
4- Mail/Board/Lung
5- Nuclear/Feud/Album
6- Hungry/Order/Belt
7- Worm/Shelf/End
8- Home/Sea/Bed
9- Sleeping/Bean/Trash
10- Trip/House/Goal
11- Rocking/Wheel/High
12- Stick/Mind/Dating
13- Sandwich/House/Golf
14- Wise/Work/Tower
15- Preserve/Ranger/Tropical
16- Control/Place/Rate
17- Measure/Worm/Video
18- End/Line/Lock
19- Loser/Throat/Spot
20- Piece/Mind/Dating
Appendix F. Study 2 Comparison Information

High Self-Esteem Condition:

Thank you for completing this task. As stated above, scores on this task are a good measure of your general intelligence. Scores are based on the number of correct responses you had, and how fast you were able to complete this task. Your score on this task is placed in the **80th percentile** of individuals having taken this task. In other words, your score is **higher than 80%** of individuals who took this test. Here is a distribution of scores, with the red line representing where your score lies, and the blue line representing the average score.

Low Self-Esteem Condition

Thank you for completing this task. As stated above, scores on this task are a good measure of your general intelligence. Scores are based on the number of correct responses you had, and how fast you were able to complete this task. Your score on this task is placed in the **20th percentile** of individuals having taken this task. In other words, your score is **lower than 80%** of individuals who took this test. Here is a distribution of scores, with the red line representing where your score lies, and the blue line representing the average score.
Appendix G. Study 3 Comparison Information

Low Justice Sensitivity Condition

The following graphic represents the incomes of individuals who match your profile. The graphic also tells you where you stand in that distribution (you are the red one), and where the average person stands in the distribution (they are in blue).
Advantageous Information Condition

The following graphic represents the incomes of individuals who match your profile. The graphic also tells you where you stand in that distribution (you are the red one), and where the average person stands in the distribution (they are in blue).
Disadvantageous Information Condition

The following graphic represents the incomes of individuals who match your profile. The graphic also tells you where you stand in that distribution (you are the red one), and where the average person stands in the distribution (they are in blue).
PARTICIPANT CONSENT FORM

What follows is a brief overview of the research we are completing with your assistance. The total time for participation is approximately 30 minutes depending on your responses.

PROJECT TITLE: A Study of Individual Differences in the Experience of Affect

PRIMARY RESEARCHER:

Nabhan Refaie, Graduate Student, Department of Psychology, University of Regina
nrw073@uregina.ca ; (613) 266-4241

RESEARCHER SUPERVISORS:

Sandeep Mishra, Ph.D., Faculty of Business Administration, University of Regina
sandeep.mishra@uregina.ca ; (306) 585-4783

Shadi Beshai, Ph.D., Department of Psychology, University of Regina
shadi.beshai@uregina.ca ; (306) 585-4026

INVITATION TO PARTICIPATE: You are invited to participate in this study as a member of Amazon’s Mechanical Turk community. Researchers in the Department of Psychology at the University of Regina are conducting the study. To be eligible to participate, you must be 18 years of age or older.

PURPOSE OF THE STUDY: Researchers and theorists have suggested that individual differences may change how one experiences emotions. Accordingly, the current study is designed to gain a better understanding of these differences. The current research asks participants to rate themselves on several psychological variables, and complete certain behavioural tasks so the researchers can assess the relationship between individual differences and emotions.

PROCEDURES: Should you agree to participate, you will be invited to complete a series of short questionnaires, memory tasks, and intelligence tests. The expected maximum time to complete the study is 20 minutes. After completing the study, you will be provided with a compensation of $2.00 (or equivalent) as a thank-you for your time.
POTENTIAL RISKS: There is a small chance of discomfort, as we will be asking you to recall some potentially aversive experiences, and we may be comparing your answers to that of other people. If you feel uncomfortable at any time, you can skip the question causing discomfort. There are no other anticipated risks associated with participation in this study.

POTENTIAL BENEFITS: Although there are no direct benefits associated with participation, participants will receive $2.00 (or equivalent) for completing the study. Participants may also benefit indirectly from knowing that they have advanced our understanding of psychological decision-making processes.

CONFIDENTIALITY: Participation will be completely anonymous.

STORAGE OF DATA: Original electronic data will be stored in password-protected files in the locked offices of the researchers. Only the primary researchers and the research assistants will have access to the original electronic data. The data will be stored for a period of no less than 7 years after collection. The data collected will be analyzed in aggregate and will be used to inform future research studies, submitted for publication in an academic journal and may be presented at conferences.

RIGHT TO WITHDRAW: Participation is entirely voluntary. If you decide to participate you are free to discontinue participation at any time without question or penalty. You will be given the option to discard the information you have provided at the end of the survey. Your responses are anonymous, so they will be not tied to you in any way.

QUESTIONS OR CONCERNS: If you have any questions, please feel free to ask a member of the research team. Any specific questions regarding the study can be answered by contacting the researchers using the contact information at the top of this form. The current research project was approved by the University of Regina Research Ethics Board (File 2018-064) on 01/05/2018. The final results will be made available online following completion of data collection and analysis. Participants can access this information on Dr. Mishra’s personal website after December 2021: http://www.sandeepmishra.ca/index.php/research/.

INVESTIGATORS: Nabhan Refaie, B.A.; Sandeep Mishra, Ph.D.; Shadi Beshai, Ph.D.

UNDERSTANDING: The Research Ethics Board at the University of Regina has approved this project. If a participant has any questions or concerns about their rights or treatment as a research participant, they may contact the Chair of the Ethics Board at 1-
306-585-4775 (out of town participants may call collect) or by e-mail: research.ethics@uregina.ca. Participants also understand that in the event they require assistance related in any way to their participation in this investigation, they can contact
any member of the research team and thereafter be provided, or guided to a provider of, the assistance they require.

RESEARCH ETHICS BOARD CONTACT INFORMATION:

Research Office, Research and Innovation Centre,
Room 109, University of Regina,
3737 Wascana Parkway,
Regina, SK S4S 0A2

Email: research.ethics@uregina.ca

Phone: 306-585-4775
Appendix I. Debriefing Form

PARTICIPANT DEBRIEFING

What Causes Socio-Emotional Comparisons?

You were told that the purpose of this study was to examine the relationship between individual differences and affective experiences. Actually, we were interested in what causes negative affect resulting from social comparisons. To protect the integrity of this research, we could not fully divulge all the details of this study at the start of the procedure.

To this end, you completed various questionnaires relating to negative affect resulting from social comparisons, as well as experimental manipulations of some potential causal factors of this construct.

During these manipulations, you may have been compared to a distribution of other people based on your income or your intelligence levels. These distributions were fictitious, and the comparisons made were not valid.

These experiments were also designed to put you in a negative mood. Although these changes are usually short-lived, we want to ensure you do not leave our survey with these negative feelings. Therefore, we have prepared a 10-minute mood-enhancing activity to reduce these feelings. If you are experiencing such negative feelings, we highly
encourage you to participate in this mood-enhancing activity, although it is optional. You will not be compensated for the extra time spent in this activity.

Do you wish to participate in this mood-enhancing activity?

Yes _____  No ______

Thank you for participating in this study! Your time and effort is very appreciated. If you have any further comments or questions about this research project, please contact us:

**PRIMARY RESEARCHER:**

Nabhan Refaie, Graduate Student, Department of Psychology, University of Regina
* nrw073@uregina.ca  (613) 266-4241

**RESEARCHER SUPERVISORS:**

Sandeep Mishra, Ph.D., Faculty of Business Administration, University of Regina
* sandeep.mishra@uregina.ca  (306) 585-4783

Shadi Beshai, Ph.D., Department of Psychology, University of Regina
* shadi.beshai@uregina.ca  (306) 585-4026

**ADDITIONAL RESOURCES**

General Helplines:
Australia: 13 11 14
Canada: 1-866-872-0113
Ireland: +44 (0) 8457 90 90 90
New Zealand: 0800 111 777
USA: 13 11 14

The Research Ethics Board at the University of Regina has approved this project. If you have any questions or concerns about your rights or treatment as a research participant, you may contact the Chair of the Ethics Board at (306) 585-4775 (you may call collect if you wish) or by email: research.ethics@uregina.ca. If you require any assistance related
to your participation in this study, you can contact any member of the research team and thereafter be provided, or guided to a provider, of the assistance they require.

Do you wish to withdraw the information you provided to this study? If you select yes, all of your data will be erased, but you will still receive the compensation.

Yes ___
No ___
Appendix J. Ethics Application

Application for Behavioural Research Ethics Review

**Evaluating Applications**
The matters of greatest concern to the Behavioural Research Ethics Board (Beh-REB) are the issues of informed consent of participants, voluntary participation, protection of individual privacy (confidentiality and anonymity), and safeguarding participants from any harmful results due to participation or non-participation in the proposed investigation or research project. Our evaluation of an application is based on the degree to which each of these concerns are satisfied; when filling out the application, researchers are urged to consider these points, and to explain to the Beh-REB the steps they will take to address the concerns. Researchers are also urged to consult the Tri-Council Policy Statement 2 for more information and guidance.

The Beh-REE acknowledges the variety of paradigms and methodologies currently available to researchers, and that each of these paradigms entails its own particular ethical issues. Thus, there may be more than one way to address an ethical issue. Researchers should feel free to suggest alternative approaches or to explain why a particular requirement is not appropriate in the context of a given project.

**All text boxes will expand once <Enter> is selected or the cursor moves to the next section.**

### PART 1: IDENTIFICATION

1. **Project Title**: GN 1.1
   - What are the causes of socio-emotional comparisons?

2. **Principal Investigator**: GN 1.2
   - Full Name: Nabhan Refaie
   - Mailing Address: 68 Cambridge Ave. unit 202, Regina, SK, S4N5N5
   - Email: nabhanrefaie@gmail.com
   - Phone: (613) 286-4241
   - NSID number (U of S Faculty only):

3. **University/Institutional Affiliation of Principal Investigator**: GN 1.3
   - Position: Master’s Student
   - Department: Experimental and Applied Psychology
   - Division: N/A

4. **If this is a student/graduate/resident project, please provide the following information**: GN 1.4
   - a) Student Name(s) and Student ID or NSID (s):
   - b) Supervisor Name:
     - Nabhan Refaie 200380967
     - Sandeep Mishra and Shadi Beshai

5. **Project Personnel** (include graduates/post graduates/residents): GN 1.5
   - Full Name: Nabhan Refaie
     - University/Institutional Affiliation: University of Regina
     - Email: nabhanrefaie@gmail.com
     - Phone: (613) 286-4241
   - Full Name: Sandeep Mishra
     - University/Institutional Affiliation: University of Regina
     - Email: mishr@gmail.com
     - Phone: (306) 737-3250
   - Full Name: Shadi Beshai
     - University/Institutional Affiliation: University of Regina
     - Email: shadi.beshai@uregina.ca
     - Phone: (306) 585-4026

---

**REB Application for Behavioural Research Ethics Review (last update 11-May-2012)**
### 1.0 Primary Contact Person for Correspondence (if different than Section 1.2) [GN 1.6]

<table>
<thead>
<tr>
<th>Full Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address:</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td></td>
</tr>
<tr>
<td>Phone:</td>
<td></td>
</tr>
</tbody>
</table>

### 1.7 Research Site(s) where project will be carried out: [Data collection for this study will take place online.]

### 1.8 Proposed Project Period: [GN 1.4 From (MM/DD/YYYY) to (MM/DD/YYYY)]

<table>
<thead>
<tr>
<th>From (MM/DD/YYYY)</th>
<th>05/01/2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>To (MM/DD/YYYY)</td>
<td>08/01/2020</td>
</tr>
</tbody>
</table>

#### 1.8.1 Has this project applied for and/or received ethical approval from any other Research Ethics Board? Will you be seeking REB approval through the Sask. ethics harmonization process? [GN 1.5]

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### 1.8.2 Please be advised that approvals may need to be sought if you are collecting data from schools, within health regions and may be required from other organizations, agencies, or community groups. Will you be contacting potential participants or collecting data from any such organizations? [GN 1.5.2]

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

### 1.10 Status of Funds: [GN 1.10]

<table>
<thead>
<tr>
<th>Awarded</th>
<th>Pending</th>
<th>Unfunded</th>
</tr>
</thead>
</table>

### 1.10.2 Provide name of funding source: [SSHRC grant, supervisor funding]

### 1.10.3 Source of Funds:

<table>
<thead>
<tr>
<th>Industry</th>
<th>National Institute of Health (NIH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tri-Council Grant</td>
<td>Cooperative Group (NCIC, COG, RTOG)</td>
</tr>
<tr>
<td>Not-for-Profit Foundation</td>
<td>Internally funded</td>
</tr>
</tbody>
</table>

### 11.1 Name of Sponsor if different from above funding source: [ ]

### PART 2: CONFLICT OF INTEREST

#### 2.1.1 Is there any real, potential or perceived conflict of interest (any personal or financial interest in the conduct or outcome of this project)? [GN 2.1]

| No, there is no personal or financial interest in the conduct or the outcome of this project. |

#### 2.1.2 Will any of the researcher(s), members of the research team and/or their immediate family members:

- Receive personal benefits in connection with this project over and above the direct costs of conducting the project, such as remuneration or employment?
- Receive significant payments of other sorts from the sponsor such as grants, compensation in the form of equipment or supplies or retainers for ongoing consultation and honoraria?
- Have a non-financial relationship with a sponsor (such as unpaid consultant, board membership, advisor or other non-financial interest)?
- Have any direct involvement with the sponsor such as stock ownership, stock options or board membership.
- Hold patents, trademarks, copyrights, licensing agreements or intellectual property rights linked in any way to this project or the sponsor?
- Have any other relationship, financial or non-financial, that if not disclosed, could be construed as a conflict of interest?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

### PART 3: BRIEF OVERVIEW OF RESEARCH PROJECT

---

**RES Application for Behavioural Research Ethics Review (last update 16-May-2012)**
Briefly describe the project, its objectives and potential significance (250-500 words): GN 3.1

Socio-emotional comparisons (SEC) can be defined as negative affect resulting from a disadvantaged social comparison. Three factors contribute to it: feelings of anger, resentment and envy toward others, negative thoughts about the self, and low distributive justice. It is highly correlated with depressive symptoms and risk-taking behaviours (Mishra, Beshai, & Feeney, 2017). Unfortunately, we do not know the directionality of these associations. Does SEC cause these outcomes, or do these outcomes cause higher SEC feelings. In order to answer these questions, we must first establish an experimental procedure to induce SEC feelings.

Another gap in the SEC literature is the factors that cause SEC. We do not know what these factors are, and if there are any confounds in the relationship between them and SEC. This study will aim to address both of these gaps, by examining whether experimental manipulations of SEC factors will lead to heightened SEC levels. Further, we will examine whether negative affect will lead to heightened levels of SEC, to either confirm or reject the proposition that negative affect confounds the relationship between SEC and its factors. Lastly, this study will examine whether a combination of manipulations of causal factors will lead to greater increases in SEC feelings than manipulations of individual factors.

The results of this study will have two main implications. First, it will determine what specific factors cause SEC feelings. Second, it will establish an experimental procedure that can be used in future studies to test the causal relationship between SEC and outcomes like risk-taking and depressive symptoms. Considering the high correlations between SEC and negative outcomes, the results can inform where future interventions targeted at reducing these outcomes should focus.
Provide a description of research design and methods to be used: **GN 3.2**

This study will consist of five experiments. The general procedure for each experiment will be the same, except there will be different experimental manipulations. Participants will be recruited using the online Amazon Mechanical Turk (AMT) platform. AMT allows participants to complete behavioral tasks in return for nominal compensation. Participants recruited from AMT will follow a link to an online data collection portal (hosted by Qualtrics).

Participants will be provided with a thorough written introduction to the study, and will be assured of complete anonymity and the right to withdraw at any time. Participants will be told that by continuing in the study they will be providing their consent to participate in the study. After the introduction, participants will complete pre-test measures, which include demographic information, one form of the Socio-emotional Comparison Scale and three Visual Analogue Scales. Following these measures, they will be exposed to one of five experimental manipulations. Following these manipulations, they will complete the post-test measures, which include a second form of the Socio-emotional Comparison Scale, three Visual Analogue Scales, the Brief HEXACO Inventory - 90, the Iowa-Netherlands Comparison Orientation Measure, and a single-item domain-importance question. Lastly, they will be given the option to complete a mood-enhancing activity. This will be optional, as to not unduly increase the study’s administration time. Participants will then be debriefed.

**DEMOGRAPHIC INFORMATION**

Age, gender, education, employment status, marital status, income, and location will be collected (city, state, country).

**SOCIO-EMOTIONAL COMPARISONS SCALE (SECS)**

The SECS is a 26 item self-report measure of socio-emotional comparisons through three factors: feelings of anger, resentment and envy toward others, negative thoughts about the self, and low distributive justice (Mishra, Beshai, & Feneley, 2017). The scale will be divided into two forms. The first form will be administered prior to the experimental manipulation, and the second form will be administered following the experimental manipulation.

**VISUAL ANALOGUE SCALE (VAS)**

The VAS is a visual slider scale. It is generally used to measure current mood (Luria, 1975). This study will use 3 VAS, one for sadness, anger, and happiness each. Participants will indicate their responses by sliding a marker on the scale to the level of emotion they are currently feeling.

**BRIEF HEXACO INVENTORY - 90 (BHI - 90)**

The BHI-90 (Ashton & Lee, 2009) will be used to assess the six core personality traits conceptualized by the HEXACO model of personality. This scale contains 60 items.

**IOWA-NETHERLANDS COMPARISON ORIENTATION MEASURE (INCOM)**

The INCOM (Gibbons & Buunk, 1999) will be used to assess social comparison orientation in participants. It is an 11-item self-report scale.

**DOMAIN-IMPORTANCE ITEM**

3.2 A single item will ask whether the subject of the experiment is important to the participant’s self-concept or not. For example, in the second experiment (negative thoughts about the self), they will be asked whether intelligence is important to the participant’s self-concept.

**EXPERIMENTS**

Experiment 1: Malicious Envy. Participants will be asked to recall an event in their lives that elicited a specific emotion. They will be randomly assigned to one of two conditions. In the malicious envy condition, participants will be asked to recall an experience where someone was superior to them in some way and they felt angry. In the positive affect condition, participants will be asked to recall an experience where they felt happy. In each case, they will be asked to describe how they felt in that moment in as much detail as possible.

Experiment 2: Negative thoughts about the self. Participants will complete the Remote Association Task (Mednick, 1962), which they will be told is important in assessing intelligence. They will be randomly assigned to one of two conditions. In the low self-esteem condition, they will receive a more difficult version of the task. After completing the task, they will be told that they scored worse than 80% of people who took this test. They will also be shown a graph of a distribution of scores on this test, and will be shown that they are in the lower fifth of the distribution. In the high self-esteem condition, participants will complete an easier version of the task. They will be told that they scored better than 80% of people who took this test. They will be shown a graph of a distribution of scores on this test, and will be shown that they are in the highest fifth of the distribution.
Experiment 3: Distributive justice. Participants will be asked to provide their personal income, industry in which they work, employment status, number of hours worked per week, information about their general levels of effort at work, and their education level. They will then be randomly assigned to one of two conditions. In the low distributive justice condition, they will be told that their income is 10% lower than what it should be based on the information they provided us. They will be shown an infographic, showing a distribution of incomes where it will be indicated that they are in the lower third of the distribution. In the high distributive justice condition, they will be told that their income is 1% higher than what it should be based on the information they provided us. They will be shown an infographic, showing a distribution of incomes where it will be indicated that they are near the middle of the distribution.

Experiment 4: Negative affect. Participants will be exposed to 40 pictures of the International Affective Picture System. Each picture will be presented for 20 seconds, and will be paired with music that has been shown to induce the emotion in question. Participants will be randomly assigned to one of three conditions. In the negative affect without arousal condition, pictures and music ("Russian under the Yorke" played at half-speed) will be used to elicit sadness. In the negative affect with arousal condition, pictures and music ("Night on Bald Mountain") will be used to elicit anger. In the positive affect condition, pictures and music ("Brandenburg Concerto No. 3") will be used to elicit happiness.

Experiment 5: Combination. Participants will be assigned to one of two conditions. In the experimental condition, each experimental condition from the first three experiments will be administered. In the control condition, each of the control conditions from the first three experiments will be administered.

MOOD-ENHANCING ACTIVITY
This activity will employ a similar procedure as the positive affect condition of the fourth experiment described above. Participants will be exposed to 40 positive pictures from the IAPS, as well as music used to induce a positive affect ("Brandenburg Concerto No. 3").

Provide details regarding the duration and location of data collection event(s): **3.3**
All data will be collected online using Amazon’s Mechanical Turk. This will allow participants to complete the study from wherever they choose, as long as an internet-connected computer is at their disposal. The study should take approximately 30-45 minutes to complete.

3.3
- [x] Questionnaire
- [ ] Individual Interviews
- [ ] Group Interview
- [ ] Video/audio recording
- [ ] Home Visits
- [ ] Other: ________________
- [ ] Participant Observation
- [ ] Focus Groups
- [ ] Non-invasive physical measurements
- [ ] Secondary use of data or analysis of existing data
- [ ] Ethnography

PART 4: PROJECT DETAILS

4.1.1 Will you have any internet-based interaction with participants? **4.1**
- [x] Yes
- [ ] No

4.1.2 If you are using a third party research tool, website survey software, transaction log tools, screen capturing software, or masked survey sites, how will you ensure the security of data gathered at that site? Amazon Mechanical Turk (AMT) is an online crowdsourcing platform for behavioral tasks, and will be used for the recruitment of subjects. AMT users are only identified using random 14-digit codes (e.g., A12E1Z235GQ1RQ). No other identifying information for participants is available (including IP address, name, account username, etc.).

Participants will use the AMT portal to access our study, which will be hosted on Qualtrics. Qualtrics is an internet-based data collection platform for presenting questionnaires and surveys. All communications to/from the Qualtrics servers are encrypted using TLS (Transport Layer Security). Data at rest is also encrypted. For additional security, surveys may be password protected or deidentified using a difficult to guess survey ID. The Qualtrics servers are protected by Web Application Firewalls and Qualtrics employs an Intrusion Detection System (IDS) to monitor system access for unauthorized uses.

4.1.3 Describe how permission to use any third party owned site(s) will be obtained, if applicable:
The University of Regina has a license with Qualtrics. All members of the University of Regina can use Qualtrics for research purposes.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 4.1.4 How will you protect the privacy and confidentiality of participants who may be identified by email addresses, IP addresses, and other identifying information that may be captured by the system during your interactions with these participants?  
The data collected by Qualtrics is determined by the author of each individual survey. Researchers have the option to exclude identifiable information, such as email addresses and IP addresses. However, some surveys, by the author’s design, will collect individually identifiable information. As Qualtrics cannot determine in advance the nature of the information in its custody all information is treated as confidential and the property of the customer. Survey information is only available to the survey author and those who are granted access by the author.  
4.1.5 If you do not plan to identify yourself and your position as a researcher to the participants, from the onset of the research study, explain why you are not doing so, at what point you will disclose that you are a researcher, provide details of debriefing procedures, if any, and if participants will be given a way to opt out, if applicable:  
No deception regarding the researchers will be used. |  |
| 42 | Yes ☑️ No |
| 4.2.1 Will your research involve Aboriginal Peoples including First Nations, Inuit and Métis peoples?  
[GN 4.2] |  |
| 43 | Yes ☑️ No |
| 4.3.1 Will the project involve community-based participatory research?  
[GN 4.3] |  |
| 44 | Yes ☑️ No |
| Will deception of any kind be necessary in this project?  
[GN 4.4] |  |
| 45 |  
Indicate how the participants will be debriefed following their participation (if applicable), and describe how the information on the results of the research will be made available to participants once the study has ended. Debriefing is particularly important if deception has been used.  
[GN 4.5]  
After completing the study participants will receive a thorough written debriefing, including the full purpose of the study. Participants will also be provided with a link where the complete results of the study will be posted. Participants will be invited to bookmark this link if they are interested in the results. |  |
| 46 | Yes ☑️ No |
| Will participants be compensated?  
[GN 4.6] |  |
| 47 | Yes ☑️ No |
| Please include details:  
Participants will receive compensation through the AMT system. Participants will each receive $1 for their time. This is in line with standard compensation rates for the AMT system (e.g., Buhrmester, Kwang, & Gosling, 2011). |  |
| 4.7.1 Will participants be anonymous in the data gathering phase of the study? (Anonymous means that no link can be established between the participant and the research - no one including the researcher knows who has participated in the research):  
☑️ Yes ☑️ No |  |
| 4.7.3 If yes, are there any limits to confidentiality:  
☒ Limits due to the nature of group activities (e.g. focus groups): the researcher cannot guarantee confidentiality  
☒ Limits due to context: individual participants could be identified because of the nature or size of the sample or because of their relationship with the researcher.  
☒ Limits due to selection: procedures for recruiting or selecting participants may compromise the confidentiality of participants (e.g. participants are referred to the study by a person outside the research team)  
☒ Other: |  |

---

**PART 5: ESTIMATION OF RISKS AND BENEFITS**
3.1.1 Do you consider this project to be: **GN 3.1**
- [X] Minimal Risk
- [ ] Above Minimal Risk

5.12 Indicate if the participants might experience any of the following:

<table>
<thead>
<tr>
<th>Risk of psychological or emotional harm or discomfort (e.g. trauma, anxiety, stress)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The experimental manipulations will be used to induce negative affect or negative thoughts about oneself. If these manipulations are successful, it is likely that participants will experience higher levels of negative mood. Although these mood changes are transient and previous literature has consistently used mood-changing procedures like the ones we are proposing, it is still important to safeguard against this potential harm.</td>
</tr>
</tbody>
</table>

Legal repercussions for participating in the study (e.g. possibility of being sued, charged with criminal activity, disclosure of past or future criminal activities, etc.)

5.1
- [ ] There is a risk of legal repercussions from participation in this study.

Social repercussions (e.g. ostracized, being negatively judged by peers or employer, fired from your job)

5.1
- [ ] There are no social repercussions from participation in this study.

Risk of physical harm or discomfort (e.g. falling, muscle pain, tiredness, weakness, nausea)

5.1
- [ ] There is no risk of physical harm or discomfort from participation in this study.

5.1.3 Describe how the risk will be managed (including an explanation as to why an alternative approach could not be used). If appropriate, identify any resources, e.g. physician or counselor, to which participants can be referred. **GN 5.1.3**

An optional mood-enhancing activity will be proposed to participants at the end of the study. The activity proposed has been shown in the past to enhance positive mood, and has been used in other protocols at the University of Regina (see file #2015-203).

5.1.4 If above minimal risk, what are the likely benefits of the research to the researcher, participant, the research community and society that would justify asking participants to participate? **GN 5.1.4**

*N/A*

### PART 6: PARTICIPANT RECRUITMENT

6.1 Describe the participants and the criteria for their inclusion or exclusion. Indicate the number of participants and a brief rationale for the intended number of participants: **GN 6.1**

We will recruit 723 participants from the Amazon Mechanical Turk (AMT) platform. AMT users are a diverse group of adults age 18 and older. Participants must correctly answer the two attention check questions, for their results to be included in the analyses. In addition, their country of residence must be in the Anglosphere (Canada, United States of America, United Kingdom, Ireland, Australia, and New Zealand). There will be no other eligibility criteria. Indefinite samples-t-tests will be used in the first three experiments and the fifth experiment. A sample size of 110 participants is required to be able to detect a medium size effect with an alpha level of p<.05 to achieve a power of .85; thus, recruiting 440 participants will be needed for these experiments. A one-way between subjects ANOVA will be used in the fourth experiment. A sample size of 182 participants is required to be able to detect a medium effect size with an alpha level of p<.05 and three groups in the ANOVA to achieve a power of .85. Therefore, a total sample size of 602 participants will need to be recruited. A sample of 723 will be recruited in order to ensure we achieve desired power levels after excluding participants, as a result of meeting our exclusion criteria (e.g. younger than 16 years old, failing attention check item).

6.2 Provide a detailed description of the method of recruitment. **GN 6.2**

Our study will be posted as a a behavioral task that can be completed on the AMT platform. Users can then self-select to participate if they choose to. The study can be completed on-demand by following a hyperlink.

6.2.1 Provide a detailed description of the method of recruitment. **GN 6.2**

Our study will be posted as a a behavioral task that can be completed on the AMT platform. Users can then self-select to participate if they choose to. The study can be completed on-demand by following a hyperlink.

6.2.2 How will prospective participants be identified?

Participants will not be identified; anyone on the AMT platform can participate in our study.

6.2.3 Who will contact prospective participants? Describe the source of the contact information, how they will be contacted and as applicable, who originally collected the contact information. Ensure any letters of initial contact or other recruitment materials are attached, e.g. advertisements, flyers, telephone script, etc.

In cases where the research involves special or vulnerable populations, distinct cultural groups, or in cases where the research is above minimal risk, the researcher should describe their experience in training in working with the population. If none of these criteria apply, this section may be omitted **GN 6.3**

*N/A*

6.4 Where relevant, please explain any relationship (pre-existing, current or expected to have) between the researcher(s) and the researched (e.g. instructor-student, manager-employee, co-workers, family members/intimate relationships, etc.). Please pay special attention to relationships in which there may be a power differential. Describe any safeguards and procedures to prevent possible undue influence, coercion or inducement. **GN 6.4**

No relationship between the researchers and the researched will be possible.

* * *

**RED Application for Behavioral Research Ethics Review (last update: 15-May-2012)**
### PART 7: CONSENT PROCESS

Describe the process that will be used to obtain informed consent. Please note that it is the content of the consent, not the format that is important. If the research involves collection of personally identifiable information from a research participant or extraction of personally identifiable information from an existing database, please describe how consent from the individuals or authorization from the data custodian will be obtained. If there will be no written consent, please provide a rationale for oral or implied consent (e.g., cultural appropriateness, online questionnaire, etc.) and explain how consent will be recorded.

#### 7.1 Describe the consent process. [GN 7.1]

Participants will be given a thorough written introduction to the study before participating. Participants will be informed that the researchers seek to gain a better understanding of the relationship between mood and social comparisons, and that the study will take approximately 30 minutes to complete. It will be made explicitly clear to participants that they may withdraw from the study at any time without penalty.

The written introduction will also include brief summaries of (a) the rationale for the project, (b) the role of participants, (c) potential benefits of the research, (d) mechanisms in place to ensure anonymity, (e) the right to withdraw from the study at any time, and (f) contact information for the researchers if there are any questions, concerns, or assistance required. Details of ethics approval and contact information of the University of Regina Research Ethics Board will be provided. Participants will then be asked to provide their consent to proceed by checking and "I agree" box.

#### 7.1.2 Who will ask for consent?

Participants will be asked for consent online via written instructions/introduction.

#### 7.1.3 Where, and under what circumstances will consent be obtained?

Consent will be obtained after a detailed introduction to the study. Participants will be provided with the researchers' contact information should they have any questions or concerns regarding the study before they sign the consent form.

#### 7.1.4 Describe any situation in which the renewal of consent for this research might be appropriate and how this would take place (e.g. longitudinal studies, multiple data collection events, etc.).

N/A

#### 7.2 If any or all of the participants are children and/or are not competent to consent, describe the process by which capacity/competency will be assessed, the proposed alternate source of consent - including any permission/information letter to be provided to the person(s) providing the alternate consent - as well as the assent process for participants. [GN 7.2]

All participants will be age 18 and older.

#### 7.3 Describe your plans for providing project results to the participant? [GN 7.3]

After completion of the study, we will provide participants with a link where the study results (once completed) will be posted in full.

#### 7.4 How and when are participants informed of the right to withdraw? What procedures will be followed for participants who wish to withdraw at any point during the study? [GN 7.4]

Participants will be informed during the written introduction and consent process of the right to withdraw at any point in time during the study. Participants can withdraw from completing the study by simply closing their web browser.

### PART 8: DATA SECURITY AND STORAGE

Indicate the procedures you plan to implement to safeguard and store the data. Identify the person who will be assuming responsibility for data storage (University regulations require the researcher or the supervisor, in the case of student research, to securely store the data at the University of Saskatchewan for a minimum of five years upon the completion of the study) - (Procedures for Stewardship of Research Records at the University of Saskatchewan 2010).

#### 8.1 Who will conduct the data collection? [GN 8.1]

Nabhan Refae will be responsible for managing data collection. Drs. Mishra and Beshai will oversee the data collection and assist where necessary. Dr. Mishra will assume responsibility for data storage after collection is complete.

#### 8.2 Who will have access to the original data of the study? [GN 8.2]

Nabhan Refae and Drs. Mishra and Beshai will have access to the original data. All have experience with and are aware of their responsibilities concerning the safeguarding of participant data.
How will confidentiality of original data be maintained as well as preserving or destroying data after the research is completed. For all data (e.g. paper records, audio or visual recordings, electronic recordings), indicate the

### 8.3

| **8.3.1** Person responsible for data storage: |
| Dr. Mishra will be responsible for the appropriate storage of electronic data. |

| **8.3.2** Data security during transportation from collection site: |
| All communications to/from the Qualtrics servers are encrypted using TLS (Transport Layer Security). Data at rest is also encrypted. For additional security, surveys may be password protected or obfuscated using a difficult to guess survey ID. The Qualtrics servers are protected by Web Application Firewalls and Qualtrics employs an Intrusion Detection System (IDS) to monitor system access for unauthorized uses. |

| **8.3.3** Means and location of storage (e.g. a locked filing cabinet, password protected computer files, encryption): |
| The original electronic data will be stored by Qualtrics in Ireland. Once downloaded, it will be stored in a password-protected file on a password-protected computer in a locked office. |

| **8.3.4** Time duration of storage (Must be > 5 Years): |
| Data will be stored for a period of no less than seven (7) years from date of completion. |

| **8.3.5** Final disposition (archive, shredding, electronic file deletion): |
| Final disposition of data will consist of electronic file deletion. |

| **8.4** |
| Indicate how the data collected is intended to be used (thesis, journal articles, conference presentation, media, etc). |

<p>| <strong>8.4.1</strong> |
| The data collected will be analyzed in aggregate and will be used in Naban Refaie’s Master's Thesis, submitted for publication in an academic journal (e.g., Psychological Assessment; Journal of Anxiety; Journal of Research in Personality; Journal of Gambling Studies), and will be presented at conferences (e.g., Canadian Psychological Association). |</p>
<table>
<thead>
<tr>
<th>Document</th>
<th>Included?</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruit Material(s)</td>
<td>☑ Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>☒ N/A</td>
<td></td>
</tr>
<tr>
<td>Letter(s) of Initial Contact</td>
<td>☑ Yes</td>
<td></td>
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<td></td>
<td>☒ N/A</td>
<td></td>
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<tr>
<td>Consent Form(s)</td>
<td>☒ Yes</td>
<td></td>
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<tr>
<td></td>
<td>☑ N/A</td>
<td></td>
</tr>
<tr>
<td>Accept Form(s)</td>
<td>☑ Yes</td>
<td></td>
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<tr>
<td></td>
<td>☒ N/A</td>
<td></td>
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<tr>
<td>Research Tool(s) (e.g. Questionnaires, focus group guides, interview scripts, etc.)</td>
<td>☐ N/A</td>
<td>Measures: SECS Form A and Form B, VAS Scales, INCOM, BH-60 domain-relevance single-item</td>
</tr>
<tr>
<td>Transcript Release Form(s)</td>
<td>☑ Yes</td>
<td></td>
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<tr>
<td></td>
<td>☒ N/A</td>
<td></td>
</tr>
<tr>
<td>RQHR Operational/Departmental Approval Form</td>
<td>☑ Yes</td>
<td></td>
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<td></td>
<td>☒ N/A</td>
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</tr>
<tr>
<td>Other (please specify):</td>
<td>☐ N/A</td>
<td>Debriefing with full information about the purpose of the study.</td>
</tr>
<tr>
<td>Debriefing form</td>
<td>☐ N/A</td>
<td>Debriefing with full information about the purpose of the study.</td>
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Appendix K. Ethics Approval Certificate

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Research Ethics Board Certificate of Approval

PRINCIPAL INVESTIGATOR
Nabhan Refaie

DEPARTMENT
Department of Psychology

REB# 2018-064

SUPERVISOR: Dr. Sandeep Mishra and Dr. Shadi Beshai

TITLE: What are the causes of socio-emotional comparisons?

APPROVED ON: May 1, 2018

RENEWAL DATE: May 1, 2019

APPROVAL OF:
Application for Behavioural Research Ethics Review, Recruitment Message, Consent Form, Measures: Socio-emotional Comparisons Scale (SECS) Form A and B, Visual Analogue Scales (VAS), Brief HEXACO Inventory-60, Iowa-Netherlands Comparison Orientation Measure, Domain Importance Item, Remote Association Task, Debriefing form

Full Board Meeting □ Delegated Review ☒

The University of Regina Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol, or related documents.

Any significant changes to your proposed method, procedures or related documents should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for the renewal and closure forms: https://www.uregina.ca/research/for-faculty-staff/ethics-compliance/human/ethicsforms.html

Raven Sinclair, BA, CISW, BISW, MSW, PhD
REB Chair

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Please send all correspondence to:

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