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The Influence of Social and Temporal Comparison on Health-Relevant Self-Perceptions

by

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Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

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An Abstract of

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Comparative thought comprises a relatively large portion of daily thoughts and serves a variety of purposes. Two primary types of comparisons have been explored: social and temporal. Social comparison involves other people, whereas temporal comparison involves the self in the past or future. Both have been found to lead to either positive or negative effects, depending on the direction of the comparison (upward or downward) and the process presumed to be invoked (assimilation or contrast). Few studies, however, have examined social and temporal comparison together, and none have explicitly compared the underlying processes. The purpose of this dissertation was to examine the similarities and differences between social and temporal comparison processes and effects in a health-relevant context. In three studies, college student participants engaged in social or temporal comparison in the context of fitness, then evaluated their own fitness. Although there were some inconsistencies and small effects, overall the results suggested that downward social and upward temporal comparison result in more positive self-evaluations than upward social or downward temporal comparison. However,
evidence for the underlying processes was not found. Results are discussed in terms of implications for social comparison theory, temporal comparison theory, and low-cost health behavior interventions.
For Lindsay—my lab twin, my matched pair, my best friend—I truly do not know how I would have gotten through grad school without your unwavering support. This is for you.
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Chapter 1

Literature Review

Imagine an employee who receives a performance review from his boss. The feedback is mixed, and he does not know whether he should feel satisfied or dissatisfied with his work. In order to make sense of the mixed information, he may compare his performance with that of his coworkers. Alternatively, he may compare his recent performance review with one he received last year. If he is performing better than his coworkers or his past self, he will most likely interpret the ambiguous feedback positively. On the other hand, if his coworkers’ evaluations were more positive than his own, or if his performance is declining, he may be concerned about his work. Despite an abundance of objective information available, people often place more importance on their standing relative to other people (social comparison; Festinger, 1954) or to their past selves (temporal comparison; Albert, 1977). Such comparative thought can have either positive or negative effects on self-evaluations and subsequent behavior, depending on the nature of the comparison target and the comparison process itself.

The primary purpose of the present research was to examine the similarities and differences between social and temporal comparison in the context of health and fitness, a domain that lends itself well to comparison processes. Health and fitness are crucial for
both physical and psychological well-being, and comparison information is readily available in this domain (e.g., observing others’ exercise behavior, reflecting on one’s own dietary habits). The secondary purpose was to examine the underlying comparison processes that occur during social and temporal comparisons. Although some research suggests that social and temporal comparisons often show similar patterns, they are rarely studied together and research seldom examines underlying processes. Moreover, there is some reason to believe that temporal comparisons and social comparisons may be different in important ways (described later) that could alter both the process and outcome of comparisons. In sum, the present research examined both the processes and outcomes of social and temporal comparative thought in a health-relevant context.

1.1 Comparative Thought

Comparative information is crucial for putting one’s own characteristics into context and interpreting one’s standing. For example, a teacher who describes a child as “intelligent” most likely means that the child is more intellectually advanced than her peers. Without comparative thought, objective feedback is far less meaningful. The most thoroughly-researched type of comparative thought is social comparison (Festinger, 1954). Social comparison theory posits that people have an innate drive to evaluate their own opinions and abilities and that they use social information when objective information is unavailable (Festinger, 1954). Since this theory was posited, research has shown that social comparison is ubiquitous in daily life. Indeed, people compare themselves to others on a wide variety of traits and dimensions, such as academics, lifestyle, personality, abilities, social skills, and appearance (Wheeler & Miyake, 1992). Moreover, social comparison information is often preferred for self-evaluative purposes,
even when objective, diagnostically-superior information is available (e.g., Klein, 1997; Zell & Alicke, 2010). Although less researched, different versions of oneself can also serve as comparison targets, a process known as temporal comparison (Albert, 1977). For example, a student who receives an exam grade could evaluate his standing in relation to another student in the class (social comparison) or in relation to his own grade from a previous exam (temporal comparison). Temporal comparison is uniquely diagnostic in that it allows for the evaluation of one’s own progress in a particular domain (Zell & Alicke, 2009). As is described below, both social and temporal comparison can serve a variety of purposes.

1.1.1 Purposes of Comparative Thought

Comparative thought is driven by three primary motives: self-evaluation, self-enhancement, and self-improvement. The first motive to be established in the social comparison literature was self-evaluation (Festinger, 1954). Both social and temporal comparison are useful in reducing uncertainty about one’s present self, especially when the comparison target is similar to the present self (Albert, 1977; Festinger, 1954). Indeed, when motivated to evaluate themselves accurately, people tend to compare themselves to those who are close to themselves geographically (Zell & Alicke, 2010) or to recent past selves (Albert, 1977).

Second, self-enhancement is sometimes prioritized over accurate self-evaluation. Self-enhancement is typically accomplished by comparing the present self to someone who is worse off or by derogating someone such that they appear to be worse off (Hakmiller, 1966; Tesser & Smith, 1980; Wills, 1981). When making temporal
comparisons, self-enhancement can be accomplished by derogating a past version of oneself, giving the illusion of dramatic personal growth. For example, McFarland and Alvaro (2000) found that when participants thought of a negative personal event and felt threatened, they derogated their past selves more than did participants who were not reminded of a negative personal event.

Finally, self-improvement is sometimes encouraged by social and temporal comparison. Comparing to someone who is better off than oneself can be motivating when the comparison target’s success seems attainable (Lockwood & Kunda, 1997). Similarly, comparing the present self to a hypothetical future self can encourage people to work toward their goals in the hopes of improving (Peetz & Wilson, 2013). In health and fitness, self-improvement is an important motive for making comparisons (Knobloch-Western & Romero, 2011; Rancourt, Leahey, LaRose, & Crowther, 2015). For example, people often report feeling inspired by very fit, attractive individuals and may regularly view photos of such individuals to motivate themselves to achieve the same success (Knobloch-Western, 2015). Although comparing oneself to a superior other often leads to decreased self-esteem (Wood, 1989), viewing very fit comparison targets can sometimes lead to improved body image (Knobloch-Western, 2015) and positive affect (Vogel, & Rose, unpublished data).

1.1.2 Comparison Processes

Regardless of whether a comparison is made for self-evaluative, self-enhancing, or self-improving purposes, engaging in comparative thought requires the perceiver (i.e., the individual making the comparison) to access information about the self and the
comparison target (i.e., the person to whom the comparison will be made). According to the Selective Accessibility Model (Mussweiler, 2003)—the most prominent model related to comparison processes—comparative thought involves three stages: selection of a comparison target, comparison of the target and the self, and evaluation of the self. The selection of a target can be determined by the primary motive of the comparison (e.g., self-evaluation, self-enhancement, self-improvement) and/or the ease of availability of the comparison target (Festinger, 1954; Gilbert, Giesler, & Morris, 1995; Hakmiller, 1966; Halliwell & Ditmar, 2005; Mussweiler & Ruter, 2003). For example, an average runner may use her track and field teammates as comparison targets in order to assess her own abilities. Athletic abilities aside, she may view the fastest person on her team as being similar to her due to the fact that they are of the same age and gender, attend the same school, and have common interests. Alternatively, the athlete’s coach may prompt the comparison by directly suggesting that other athletes look up to their fastest teammate. In such situations, called forced comparisons, the perceiver does not select the comparison target.

After a target has been selected (or presented, in the case of a forced comparison), the perceiver engages in the second stage of the process: comparison. In this stage, the perceiver begins by forming an overall impression of the comparison target as being either similar to the self or different from the self. The perceiver then gathers evidence to support the initial impression. If the perceiver initially views the target as being similar to the self, they are likely to think of self-relevant information that confirms their similarity to the target (a process known as similarity testing). On the other hand, if the perceiver’s initial impression is that the target is different from the self, self-relevant information
confirming dissimilarity will become more salient (i.e., dissimilarity testing). Returning to the example above, a runner who feels similar to her fastest teammate is likely to engage in similarity testing and consider her best performances. If she initially views her teammate as dissimilar from herself, her own worst performances will most likely come to mind.

In the final stage of comparison, the perceiver uses the self-knowledge gleaned from similarity or dissimilarity testing to draw conclusions about the self. Similarity testing typically leads perceivers to assimilate their self-evaluations to the comparison target, while dissimilarity testing results in the perceiver contrasting self-evaluations away from the comparison target (Mussweiler, 2003). To finish the social comparison process, the runner mentioned above will most likely assimilate her self-evaluations to her talented teammate (due to perceived similarity) and conclude that she is a good runner. On the contrary, if her initial impression of her talented teammate is one of dissimilarity, she will be more likely to think of her worst performances and conclude that she is a poor runner.

Notably, the Selective Accessibility Model was designed to explain social comparison processes, not temporal comparison processes. However, some evidence suggests that temporal comparison may also involve assimilation and contrast. Specifically, Markman and McMullen (2003) posit that assimilation occurs when the past self is considered to overlap with the present self. Just as assimilation occurs in social comparison when the perceiver views the target as similar to the self, assimilation occurs in temporal comparison when the perceiver views the present self and past self as overlapping. Likewise, contrast occurs when the perceiver views the present self as
fundamentally different from the past self. For example, a college student who received poor grades last semester may view his recent past self as similar to his present self and therefore evaluate his academic ability negatively (i.e., assimilation). Alternatively, a college student who received poor grades in middle school may view his distant past self as dissimilar and evaluate his present academic ability positively (i.e., contrast).

Importantly, in both social and temporal comparison, the final outcome of assimilation and contrast (i.e., positive or negative self-evaluations) is strongly influenced by the direction of the comparison (discussed in more detail below). That is, assimilating self-evaluations to a positive target results in positive self-evaluations, while assimilating self-evaluations to a negative target results in negative self-evaluations. In sum, there is reason to believe that social and temporal comparisons may involve similar processes and outcomes. However, there may be important differences in social and temporal comparisons that shape whether assimilation or contrast is the default path that comparisons take.

1.1.3 Determinants of Comparison Processes

In addition to initial perceptions of similarity or dissimilarity, several factors determine whether a perceiver undergoes assimilation or contrast: attainability of the target’s standing, extremity of the target, and perceived psychological distance from the target. First, in order to assimilate to a target, the target’s standing must be perceived as attainable. For example, Lockwood and Kunda (1997) found that comparing oneself to a superior, more advanced student improved self-evaluations when perceivers believed that they, too, would be successful when they became more advanced students. They assimilated their self-evaluations to a positive comparison target and therefore felt good.
about their own prospects. Students who did not view the advanced student’s success as attainable contrasted their self-evaluations away from the target and therefore viewed themselves less positively. Similarly, Corcoran and Peetz (2014) found that participants who focused on their hypothetical future selves were more motivated to improve, but only in a domain in which improvement seemed attainable (social skills).

Second, people typically assimilate their self-evaluations to more moderate targets and contrast them away from more extreme targets. For example, Dijksterhuis and colleagues found that participants viewed themselves as less intelligent after thinking about an extremely intelligent exemplar (i.e., Dijksterhuis et al., 1998). The same pattern is found in temporal comparison, such that participants assimilated their current self-evaluations to a future self that was moderately different from their current self and contrasted their current self-evaluations away from a future self that was extremely different from their current self (Hanko, Crusius, & Mussweiler, 2010).

Third, assimilation is more likely to occur when individuals feel psychologically close to the target, such as when they have a close relationship or share a distinctive similarity such as a birthday (Brown, Novick, Lord, & Richards, 1992). When a psychologically close comparison target achieves success, the perceiver sometimes experiences the target’s success as a positive reflection on themselves (Cialdini et al., 1976), as long as the target’s success is not threatening to them (Tesser, 1988). Similarly, assimilation is more likely to happen in temporal comparison if one’s past or future self is perceived as being temporally close to the present self (Broemer, Grabowski, Gebauer, Ermel, & Diehl, 2008; Grabowski & Broemer, 2015).

### 1.1.4 Comparison Direction
The nature of self-evaluations following comparative thought is determined not only by the comparison process invoked (assimilation or contrast), but by the direction of the comparison. Comparisons take one of two directions: upward or downward. Upward comparisons are those made to targets who are better off than oneself (Wood, 1989), while downward comparisons are those made to targets who are worse off than oneself (Wills, 1981). In the previous example, an average runner made an upward comparison: she chose a comparison target who is an objectively stronger athlete than herself. Therefore, assimilation to the comparison target would result in positive self-evaluations and contrast would result in negative self-evaluations. If she chose to make a downward comparison—for instance, selecting the worst runner on her team as a comparison target—the same processes would lead to opposite outcomes. Similarity testing would increase the accessibility of the runner’s own worst performances, leading her to assimilate self-evaluations to her weaker teammate and evaluate herself poorly. Dissimilarity testing would increase the accessibility of her best performances, resulting in contrast effects and positive self-evaluations. In sum, the effect of a comparison on self-evaluations is determined by the interaction of the comparison direction (i.e., upward or downward) and comparison process (i.e., assimilation or contrast). Therefore, neither upward nor downward comparison has uniformly positive or negative effects on self-evaluations.

1.2 Effects of Comparative Thought in Health-Related Contexts
Comparative thought has been found to affect self-evaluations and important outcomes in a variety of domains, one of which is health. Health is an ideal domain in which to study the effects of comparative thought because: 1) it is crucial to improving quality of life, 2) voluntary behaviors play a large role in determining outcomes, and 3) the outcomes are often subjective (increasing the usefulness of social and temporal information). When evaluating their health and fitness, individuals can reflect on their behaviors and abilities at different times in their lives and engage in temporal comparison. Furthermore, other people’s statuses and behavior are often observable, thereby facilitating social comparison.

1.2.1 Effects of Social Comparison in Health-Related Contexts

Social comparison information regarding health behaviors is widely available. For example, someone who just joined a gym may take note of others’ abilities, appearances, and behaviors at the gym. Comparing himself to more experienced exercisers may make him feel poorly about himself, which could dampen his mood, impair self-evaluations, and lower his motivation to exercise. On the other hand, if he believes that he could become physically fitter too, he may evaluate himself positively and feel more inspired to work harder. Moreover, comparing himself to gym members who are less fit may make him feel more confident about his own standing. Confidence could lead to complacency and decreased effort, or it could lead to enhanced self-efficacy and increased effort. As such, self-perceptions affect important health behaviors and outcomes.

1.2.1.1 Assimilation of Self-Evaluations
As noted previously, assimilating self-evaluations to an upward comparison target results in more positive self-evaluations, and assimilating self-evaluations to a downward comparison target results in more negative self-evaluations. Upward assimilation typically leads to positive outcomes by providing hope and inspiration, or by changing perceptions to focus on positive aspects of the self. When upward assimilation occurs, the perceiver believes the self is as well off as the comparison target or that they will someday be as well off. Upward assimilation has been studied extensively in health contexts. For example, cancer patients, especially those who feel that their own health is poor, typically prefer to interact with and compare themselves with cancer patients who are better off than themselves (Brakel, Dijkstra, & Buunk, 2014; Stanton, Danoff-Burg, Cameron, Snider, & Kirk, 1999; Taylor & Lobel, 1989). Other patients who are doing well remind them that their condition may improve. Similarly, people with spinal cord injuries (Buunk, Zurriaga, & Gonzalez, 2006) and parents of children with muscular dystrophy (Hodges & Dibb, 2010) found upward comparison targets to be important sources of support and advice. Even exposure to seemingly unrealistic upward comparison targets can have positive effects on self-image. For example, Knobloch-Westerwick (2015) found that when young women viewed pictures of thin models repeatedly over time, they assimilated their self-evaluations to these upward comparison targets and were more satisfied with their own size and shape, even in the absence of actual dieting behavior or weight change.

On the other hand, downward assimilation occurs when the perceiver believes that they may someday be less fortunate or perceive themselves as currently poor off. For example, Brakel and colleagues found that cancer patients who were previously feeling
positively about their health reported lower quality of life and lower life satisfaction after hearing from cancer patients who were not doing well (Brakel et al., 2014). Similarly, individuals who perceived themselves to be similar to a comparison target who was at high risk for skin cancer also perceived their own risk to be high (Hoffner & Ye, 2009). In both situations, participants assimilated their self-evaluations to these downward comparison targets.

1.2.1.2 Contrast of Self-Evaluations

The effects of contrast on self-evaluations follow the opposite pattern as assimilation: upward contrast leads to negative self-evaluations and downward contrast leads to positive self-evaluations. Most research has focused on self-perceptions related to diet, exercise, and weight. Individuals who view idealized media images often engage in upward social comparison, view their own bodies as being inferior to the images (i.e., upward contrast), and experience body dissatisfaction as a result (e.g., Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). These contrast effects are more likely to occur after brief exposure to idealized images, based on initial perceptions of dissimilarity (Knobloch-Westerwick, 2015).

1.2.2 Effects of Temporal Comparison in Health-Related Contexts

Though research on the effects of social comparison on health-related self-evaluations and intentions/behaviors is extensive, much less is known about the effects of temporal comparison processes. The effects of temporal comparison on health-related self-perceptions have mostly been studied in the elderly. This research appeared to show that temporal comparison could engender beneficial, assimilative effects when elderly
individuals compared their current health status to their recent past (Spini, Clemence, & Ghisletta, 2007), but harmful, contrastive effects when comparing to the more distant past (Suls, Marco, & Tobin, 1991). Though not explicitly examined in these two disparate studies, this could be due to greater perceived similarity to the self in the recent past than in the distant past. However, aside from these studies, little is known about whether temporal comparison processes and outcomes operate similarly to social comparisons in health-relevant contexts. Moreover, the relative influence of social comparison and temporal comparison in young adults, who have not been through many distinct stages of life, has rarely been examined. Although older individuals have more life experience from which to draw when making temporal comparisons, research suggests no significant differences in the influence of temporal comparison on health-related self-evaluations between individuals at various stages of adult life (Robinson-Whelan & Kiecolt-Glaser, 1997).

1.2.3 Social and Temporal Comparison

Social and temporal comparison appear to invoke similar processes and have similar effects; however, very little research has actually examined social and temporal comparison processes and outcomes in the same study. Although it is likely that temporal and social comparison operate similarly in terms of assimilative and contrastive patterns in response to upward and downward comparisons (once engaged), the default tendencies to assimilate or contrast may differ between social and temporal comparisons. Specifically, all else equal, participants may be more likely to engage in assimilation for temporal comparisons but contrast for social comparisons. This is due to two key differences between social and temporal comparisons. First, temporal comparisons
involve self-based content, whereas social comparisons involve content based on other people. A past self is likely to be more similar to the present self than a different person would be. Second, the amount of information perceivers have about a temporal comparison target should be greater and held with more confidence than the information they have about a social comparison target (see related ideas in Rose, 2010). Moreover, having access to a greater wealth of self-information should make the temporal comparison target feel more familiar and close to the self, which should enhance perceptions of similarity and subsequent assimilative processes. On the other hand, having less information about the social comparison target should feel less familiar and more distant from the self (compared to the temporal target), which should enhance perceptions of dissimilarity and subsequent contrastive processes.

In sum, it was unclear how similar social and temporal comparison processes and outcomes are in health-relevant contexts. Moreover, there are fewer studies on temporal comparison than social (particularly in a health context) and there is a dearth of research that examines the processes and outcomes of social and temporal comparison simultaneously. The few studies that directly compared the effects of social and temporal comparison focused on novel, performance-based contexts in which test scores may be the perceiver’s only piece of information about their own ability. Notably, Zell and Alicke (2009) gave participants false feedback on the trajectory and relative standing of their performance on a series of tests. Results showed that both temporal and social comparisons uniquely influenced participants’ self-evaluations of their skills. When they were improving over time and/or performing better than others, participants evaluated themselves more positively than when they were performing worse than others. Based on
these results, it appears that participants contrasted their self-evaluations away from social comparison targets. However, the process underlying temporal comparison is less clear. While participants appear to have assimilated their self-evaluations to their performance trajectory, they may have contrasted self-evaluations away from their past selves. Those who were improving over time presumably started off poorly, suggesting that their positive self-evaluations of their present self contrasted with their negative past self. Moreover, this prior research represents an unusual type of temporal comparison context where direct, objective feedback is provided. Most temporal comparisons are more ambiguous and may involve different outcomes. Ultimately, determining the underlying processes is important in establishing the source and nature of the comparison effects.
Chapter 2

Current Research

The purpose of the present research was to expand upon prior comparison research in several ways. First, the present research was among the first to examine social and temporal comparison processes and outcomes under the same framework and in a health-relevant domain. Examining these issues in the context of health is important for theoretical reasons but also may have applied value as low-cost, low-risk interventions to change self-evaluations and subsequent health behaviors. For instance, public health programs could subtly suggest making comparisons with others that are likely to have a positive effect on people’s motivation to improve their lifestyles. Thinking of a friend who is very fit, or a time in their lives when they were very fit, may motivate novice exercisers to achieve their goals.

Second, unlike the Zell and Alicke (2009) study, in which participants received temporal and social comparison feedback on a test of social skills, the present research asked participants to generate their own social or temporal comparison information using their preexisting knowledge of their own health and fitness and that of others. This was important for ecological validity because, in many situations, people do not receive explicit, objective feedback about their performance. Comparison information can come
from simply observing others or reflecting on oneself (Summerville & Roese, 2008; Wheeler & Miyake, 1992).

Third, the present research not only examined the outcomes of comparison (i.e., self-evaluations, behavioral intentions), but also examined the processes that occur when making social and temporal comparisons, using the selective accessibility model (SAM) as a framework (Mussweiler, 2003). Specifically, Study 2 measured the extent to which participants were focused on similarities vs. differences when making comparisons, which would then trigger assimilative vs. contrastive processes, respectively.
Chapter 3

Pilot Study

3.1 Overview

A pilot study was conducted as an initial exploration of the influence of social and temporal comparison on health-relevant self-evaluations. In the pilot study, participants were given a writing prompt to engage their thinking about social and temporal comparison targets that were either upward or downward. The comparison targets were designed to be somewhat moderate (e.g., think about the most fit person you know) as opposed to extreme (e.g., think about a professional athlete). This was done for two reasons. First, it would be difficult to include extreme versions of a temporal comparison, as very few people could be classified as extremely fit on the level of, for example, a professional athlete. Second, the moderate prompt is more open-ended and offers a greater degree of flexibility when participants consider the comparisons. Moreover, the open-ended prompt allows participants to choose a target about whom they have enough knowledge to make an effective comparison. For example, they may not know very much about the exercise habits of a professional athlete, but may know a great deal about the habits of a close friend or roommate who is also very fit. Relevant knowledge is a key
component of the selective accessibility mechanism. Without relevant knowledge, participants cannot make an effective comparison. Third, moderate comparisons are more ecologically valid. Comparisons are made to many targets on a daily basis (Wheeler & Miyake, 1992), not just extreme exemplars. In fact, people typically compare themselves to a select few “routine standards” on a regular basis, who are likely to be moderate standards in most comparison domains (Mussweiler & Ruter, 2003). Therefore, moderate comparisons are likely to be more reflective of the comparisons participants make regularly and allowed a test of what types of social and temporal content are accessed and used on a default basis. After writing about the comparison target, participants then answered a series of questions about their own fitness abilities, skills, and behaviors.

3.2 Main Hypotheses

The effects of comparative thought on self-evaluations were hypothesized to depend on the direction (i.e., upward or downward) and type (i.e., social or temporal) of the comparison when considering moderate, somewhat ambiguous comparison targets. As indicated previously, for both social and temporal comparison, assimilative and contrastive processing to upward and downward comparisons should have similar effects regardless of comparison type. That is, upward assimilation and downward contrast should both produce higher self-evaluations than downward assimilation and upward contrast for both temporal and social comparison. However, whether assimilation or contrast is engaged at a default was expected to depend upon whether the comparison target was temporal or social.

3.2.1 Social Comparison
Although social comparisons can show either assimilation or contrast, in the current context using more open-ended comparison content, comparing oneself to another person should result in contrast of self-evaluations. Such effects are often observed in the literature when the comparison target has very desirable or very undesirable characteristics (e.g., Cash, Cash, & Butters, 1983; Morse & Gergen, 1970). Therefore, the hypothesis for the effects of social comparison on self-evaluations was as follows:

H1a: Upward social comparison would result in more negative self-evaluations than downward social comparison, due to dissimilarity testing and subsequent contrast.

3.2.2 Past Temporal Comparison

Like social comparison, temporal comparison can also lead to assimilation or contrast. However, in this context using more open-ended comparison content, participants were expected to assimilate their self-evaluations to their past selves because they should view their past selves as overlapping with their present selves (Albert, 1977, Broemer et al., 2008; Grabowski & Broemer, 2015). This hypothesis can be described as follows:

H2a: Upward temporal comparison would result in more positive self-evaluations than downward temporal comparison, due to similarity testing and subsequent assimilation.

3.3 Alternative Hypotheses

Although the core hypothesis was that assimilation would be default for temporal comparison and contrast default for social comparison in this context, other patterns may
also be plausible. In many ways, the current research was exploratory in that few studies have directly compared temporal and social comparison processes and outcomes. Thus, some flexibility in the hypotheses was warranted. Counter to the main hypotheses outlined above, assimilation was a possibility during social comparison because comparisons are typically made to targets who are similar to oneself (Festinger, 1954; Wood, 1989). Indeed, when asked to choose a target, participants may be more likely, for efficiency’s sake, to choose a “routine standard”—someone with whom they compare themselves often and who is likely to be similar to them (Corcoran & Mussweiler, 2009). Additionally, contrast was a possibility during temporal comparison because participants may instead choose to compare themselves with distant or dissimilar past selves when left open-ended and, thus, engage in dissimilarity testing and contrast. This may be especially likely to be true in the downward temporal comparison condition, as people often denigrate their past selves in order to enhance their present selves (Wilson & Ross, 2001). Therefore, the preceding hypotheses could be stated as follows:

**H1b**: Upward social comparison would result in more positive self-evaluations than downward social comparison, due to similarity testing and subsequent assimilation.

**H2b**: Upward temporal comparison would result in more negative self-evaluations than downward temporal comparison, due to dissimilarity testing and subsequent contrast.

### 3.3.1 Future Temporal Comparison

Finally, some participants were assigned to consider a hypothetical future self. This condition was included due to a relative dearth of research on this form of temporal
comparison. However, such hypothetical selves are likely to seem psychologically distant to participants, and it is more difficult to consider concrete, specific features of psychologically distant selves (Trope & Liberman, 2003). Past selves are likely to bring up more examples of concrete self-knowledge that can be used for comparison purposes. Therefore, this condition was considered exploratory and not central to the dissertation.

3.4 Method

3.4.1 Participants and Design

Participants were 197 undergraduates (154 female) from a large, Midwestern university in the United States who participated in exchange for course credit. The original sample consisted of 203 participants. Two participants were excluded from analyses because they did not follow instructions and 4 were excluded due to reading comprehension issues. The final sample was 77% White, 11% Black, 1.5% Asian, 0.5% Native American, 1% Pacific Islander, 3% other or unknown race, and 6% mixed race. Participants were randomly assigned to conditions in a 2 (comparison direction: upward or downward) X 3 (comparison type: social, past temporal, future temporal) between-subjects design.

3.4.2 Measures and Procedure

Participants came to the lab in groups of 1-4, ostensibly for a study concerning college students’ health habits. After obtaining consent, the experimenter gave verbal instructions. Participants were told that, in order to help the researchers gather more data, they may be asked to provide information about another person or about themselves at a
different point in time. Participants completed a series of measures on the computer using MediaLab software (Jarvis, 2014). Measures relevant to the current project are described below.¹

3.4.3 Writing Prompts

Participants first completed the experimental manipulation: a writing prompt that encouraged them to think about a moderate comparison target. The upward (downward) social comparison prompt read, “Write about the most (least) physically fit person you know. For example, what kinds of exercise or physical activity do they do? What are their eating habits like? What do they look like?” The upward (downward) past temporal comparison prompt read, “Write about yourself during the time in your life when you were more (less) physically fit than you are now. For example, what kinds of exercise or physical activity did you do? What were your eating habits like? What did you look like?” Lastly, the upward (downward) future temporal comparison prompt read, “Write about what it would be like if you were more (less) physically fit in the future than you are now. For example, what kinds of exercise or physical activity would you do? What would your eating habits be like? What would you look like?”

3.4.4 Self-Evaluations

Participants answered a series of 9 questions about their perceptions of their own health and fitness abilities. As in prior research (e.g., Mussweiler, Ruter, & Epstude,

¹As part of a larger study, participants also answered questions about the comparison target, their intentions to engage in exercise, current health, self-esteem, social comparison tendencies, and social media use. These measures are not central to the purpose of the dissertation and will not be discussed further.
self-evaluations were assessed using both subjective and objective indices. Six items assessed subjective perceptions about exercise and fitness using 1-5 Likert-type scales. Sample items included “How many sit-ups could you perform?” (1 = no sit-ups or very few; 5 = very many sit-ups) and “How strong are you?” (1 = very weak; 5 = very strong). There were no missing data for subjective estimates of fitness, and composite subjective self-evaluation scores were approximately normally distributed (\( M = 3.41, SD = .66, \text{skewness} = -.05, \text{kurtosis} = .12 \)).

Four items assessed objective perceptions of abilities using open-ended free response questions. Sample items included, “Estimate how many sit-ups you could perform without taking a break” and “Estimate how many pounds you could lift”. All objective self-evaluation items were Z-scored, with speed recoded such that higher numbers reflected better athletic ability (Mussweiler et al., 2003). Objective estimates of fitness were cleaned using the following rules: 1) When a participant provided a range of estimates (e.g., 20-30 minutes), the mean of the provided range (e.g., 25 minutes) was entered as the response. 2) When the estimate included “more than” or “less than” (e.g., more than 300 pounds), the estimate was coded as one whole number higher or lower than the number provided (e.g., 301 pounds). 3) When a participant did not provide a numerical estimate (e.g., “not many”, “a lot”, or “I’m not sure”), the response was coded as missing. Across all four objective estimates, there were only 6 missing data points (approximately 0.8% of the data). Therefore, self-evaluation scores were still calculated for every participant using the data that were provided. Objective estimates, when standardized to maintain a consistent scale of measurement and then combined, were
approximately normally distributed ($M = -0.004$, $SD = 0.65$, skewness = 0.59, kurtosis = 3.30).

Standardized subjective and objective estimates showed good reliability ($\alpha = 0.80$) and were combined to form a self-evaluation composite.² See Appendix A. The composite score was approximately normally distributed ($M = -0.001$, $SD = 0.62$, skewness = 0.15, kurtosis = 0.42). There were no outlying self-evaluation composite scores.

Subjective and objective self-evaluations can also be examined separately, as they may be differentially affected by experimental manipulations (such as altering the anchors participants use to make judgments; Manis, Biernat, & Nelson, 1991). However, subjective and objective indices tend to be highly positively correlated when judging the self (Biernat, Manis, & Kobrynowicz, 1997). Due to the relatively high correlation in the present study ($r = 0.62$, $p < 0.001$) and high reliability ($\alpha = 0.80$) between the two indices, they were combined.³

² The core self-evaluation items involved the 9 exercise and fitness-relevant items. However, 2 items also asked about diet and nutrition. A principal components analysis with varimax rotation suggested that the diet items loaded poorly with the exercise items overall and showed poor reliability with one another. Moreover, in examining participant’s actual written responses for the comparison target, they mentioned exercise habits ($M = 3.28$, $SD = 1.73$) significantly more than dietary habits ($M = 2.71$, $SD = 1.49$), $t(196) = -3.54$, $p < 0.001$. Therefore, the core analyses focused on the exercise content.

³ Subjective and objective self-evaluations were also analyzed separately. Specifically, in the pilot study, a 2 (comparison direction: upward or downward) X 3 (comparison type: social, past temporal, future temporal) X 2 (evaluation type: subjective or objective) mixed-model ANOVA was conducted. In Studies 1 and 2, a 2 (comparison direction: upward or downward) X 2 (comparison type: social or temporal) X 2 (evaluation type: subjective or objective) mixed-model ANOVAs was conducted, with the last factor manipulated within-subjects. Across all three studies, the pattern of results (i.e., main effects and interactions) did not change when the evaluation type was included as a within-subjects factor in the model.
3.5 Results

To examine the effects of upward and downward social and temporal comparison on self-evaluations of fitness, composite self-evaluation scores were submitted to a 2 (comparison direction: upward or downward) X 3 (comparison type: social, past temporal, future temporal) between-subjects ANOVA. Results revealed no main effect of comparison direction ($F(1, 191) = 1.05, p = .31$, partial $\eta^2 = .005$) or comparison type ($F(2, 191) = .88, p = .42$, partial $\eta^2 = .009$). However, there was a significant interaction between comparison direction and comparison type, $F(2, 191) = 4.09, p = .02$, partial $\eta^2 = .04$. Based on the hypotheses described above, a series of planned contrasts was conducted to interpret the interaction. Two contrasts were deemed most important. First, the upward social comparison condition was compared to the downward social comparison condition. Second, the upward temporal comparison condition was compared to the downward temporal comparison condition. Overall, the main hypothesis was that these would show opposing patterns at a similar magnitude. The contrasts generally supported the primary hypotheses (H1a and H2a). First, participants provided higher self-evaluations for downward social comparisons ($M = .28, SD = .60$) than upward social comparisons ($M = -.14, SD = .51$), $p = .005$, $d = .75$. Second, the opposite pattern emerged for temporal comparisons, where participants provided higher self-evaluations for upward temporal comparisons ($M = .10, SD = .81$) than downward temporal comparisons ($M = -.09, SD = .43$). However, the effect was much weaker and, in fact, not statistically significant, $p = .24$, $d = .29$. Because the future temporal conditions were considered exploratory, they were not included in the planned contrasts. See Table 3.1 for descriptive statistics and Figure 3-1 for an illustration of the interaction effect.
Table 3.1: Standardized self-evaluations in pilot study (by condition).

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Evaluations of Fitness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upward Social Comparison</td>
<td>-.14</td>
<td>.51</td>
</tr>
<tr>
<td>Upward Temporal (Past) Comparison</td>
<td>.10</td>
<td>.81</td>
</tr>
<tr>
<td>Upward Temporal (Future) Comparison</td>
<td>-.09</td>
<td>.72</td>
</tr>
<tr>
<td>Downward Social Comparison</td>
<td>.28</td>
<td>.60</td>
</tr>
<tr>
<td>Downward Temporal (Past) Comparison</td>
<td>-.09</td>
<td>.43</td>
</tr>
<tr>
<td>Downward Temporal (Future) Comparison</td>
<td>-.06</td>
<td>.56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-.001</td>
<td>.62</td>
</tr>
</tbody>
</table>

Figure 3-1: Self-evaluations by comparison direction and type (pilot study).
3.6 Discussion

The purpose of the pilot study was to examine the effects of social and temporal comparison on self-evaluations related to health and fitness. The results revealed that social and temporal comparisons tended to show opposite patterns. Indeed, social comparisons tended to show evidence more consistent with contrast, whereas temporal comparisons tended to show evidence more consistent with assimilation (although the latter pattern was clearly more modest). Specifically, participants who compared themselves to a healthy person (upward social comparison) tended to perceive themselves as being less healthy than those who compared themselves to an unhealthy person (downward social comparison). On the other hand, participants who compared their present selves to their healthy past selves (i.e., upward temporal comparison) tended to perceive themselves as being healthier than those who compared their present selves to their unhealthy past selves (downward temporal comparison). As described in the introduction, one plausible explanation for this pattern of results is that different comparison processes occurred, with social comparison eliciting contrast and temporal comparison eliciting assimilation—possibly due to dissimilarity testing for social and similarity testing for temporal comparisons. More definitive evidence for such processes was tested in Study 2 (described later). Interestingly, the contrastive pattern for social comparisons was more apparent than the assimilative pattern for temporal comparisons. This may be due to the fact that the prompts differed slightly for social and temporal comparison, such that the social comparison targets were a bit more extreme (discussed in more detail below) and could have produced stronger results. Furthermore, social comparisons are more common in daily life than temporal comparisons (Summerville &
Roese, 2008), and research has shown that comparisons become more efficient when they are made routinely (Corcoran & Mussweiler, 2009).

Overall, the results of this study are suggestive of the fact that social and temporal comparison may differ in terms of their impact on self-evaluations. However, there are some notable limitations to this study. First, this study does not provide direct evidence that assimilation and contrast occurred. Although the results suggested that these processes differed among conditions, additional measures were needed to establish the importance of these mechanisms. Second, although participants in both the social and temporal comparison conditions chose somewhat moderate targets, it is possible that the comparison types may have differed in unintended ways. Notably, participants in the social comparison conditions were asked to think of the most or least fit person they knew, while those in the temporal comparison conditions were asked to envision a more or less fit version of themselves. Thus, it is possible that the social target ended up being somewhat more extreme than the temporal target. Importantly, target extremity has been found to influence comparison processes in both social (Dijksterhuis et al., 1998; Mussweiler, 2003) and temporal (Hanko et al., 2010) comparisons, such that people typically assimilate self-evaluations to less extreme targets and contrast self-evaluations away from more extreme targets. Third, although the interaction effect involving self-evaluations was significant, the overall interaction effect and follow-up tests/effect sizes (particularly for the temporal condition) were somewhat small. This may be due to aspects of the procedure or comparison target. These issues were addressed in Studies 1 and 2 (described below).
Chapter 4

Study 1

4.1 Overview

The main goals of Study 1 were twofold. First, changes were made to the procedure to bolster the effects of the comparison and attempt to replicate the results of the pilot study. The second goal was to rule out target extremity as an explanation for the results. As noted above, target extremity may have been a confounding variable in the pilot study, such that the more extreme social comparison targets (“the most/least fit person you know”) produced contrast and the more moderate temporal comparison targets (“a time in your life when you were more/less fit than you are now”) produced assimilation. Although target extremity has been found to influence comparison processes, it likely did not account for the entirety of the pilot study results for two main reasons. First, studies that show an effect of extremity typically use very extreme exemplars, such as professional athletes (e.g., Michael Jordan), accomplished scientists and academics (e.g., Albert Einstein), infamous celebrities (e.g., Pamela Anderson), and world leaders (e.g., Bill Clinton, Adolf Hitler; see Herr, 1986; Mussweiler et al., 2004). In the pilot study, participants did not compare themselves to extreme exemplars, but rather to someone they knew. Despite the differences in fitness level, they were likely to
be similar to this person in other ways (e.g., age, gender, geographic location), whereas this is less likely to be the case with truly extreme exemplars. Second, participants in the temporal condition may have chosen relatively extreme comparison targets as well. Although they were simply told to think of a time when they were more or less fit than they are now, many participants likely chose the time in which they were most or least fit due to the easy accessibility of those memories. Taken together, target extremity was not expected to fully account for the results pattern. Participants reported the comparison target’s exercise habits to account for potential differences in extremity between social and temporal comparison targets in Study 1 by examining equivalence in fitness.

Overall, Study 1 was quite similar to the pilot study. In Study 1, participants wrote about either a social or temporal comparison target who was well off (upward) or poor off (downward) in terms of their overall health and fitness. Comparison targets in all conditions were moderate (i.e., a person you know who is more physically fit than you, a time when you were more fit than you are now). Notably, a few changes were also made to the procedure in order to bolster the comparison effects (described in detail below). After writing about the comparison target, participants evaluated their fitness. Overall, Study 1 used a 2 (comparison direction: upward or downward) X 2 (comparison type: social or temporal) between-subjects design. Based on the results of the pilot study and prior research, the following pattern of results was expected:

**H1:** Upward social comparisons were expected to lead to less positive self-evaluations of fitness than downward social comparisons.

**H2:** Upward temporal comparisons were expected to lead to more positive self-evaluations of fitness than downward temporal comparisons.
4.2 Method

4.2.1 Participants and Design

Participants were 183 undergraduates (155 female) from the University of Toledo psychology subject pool. No participants were excluded from analyses. The racial makeup of the sample was 71% White, 15.9% Black, 3.8% Asian, 1.6% unknown race, and 7.7% mixed race. Students received course credit as compensation for participating. Participants were randomly assigned to one cell in a 2 (comparison direction: upward or downward) X 2 (comparison type: social or temporal) between-subjects design.

4.2.2 Measures and Procedure

Participants came to the lab in groups of 1-4 and were seated at individual computers. The experimenter obtained informed consent from each participant. Then, participants completed the remainder of the experiment using MediaLab software (Jarvis, 2014). Measures are described below.

4.2.3 Writing Prompts

As in the pilot study, participants first completed the experimental manipulation by answering questions about a comparison target. Unlike the pilot study, Study 1 used guided questions rather than open-ended writing prompts. First, participants were directed to consider a comparison target. The upward (downward) social comparison prompt read, “Think about a person you know who is more (less) physically fit than you. You will answer a number of questions about this person.” The upward (downward) temporal comparison prompt read, “Think about yourself during a time in your life when
you were more (less) physically fit than you are now. You will answer a number of questions about your younger self.” In order to promote greater consideration of the comparison target and bolster the impact of the comparison, participants answered more specific questions about the target. The first 5 questions were free-response; the last 2 used Likert-type scales. See Appendix B for all items.

4.2.4 Self-Evaluations

Participants answered the same series of 9 questions described in the pilot study. As in the pilot study, objective estimates of speed were recoded such that higher numbers reflected higher estimates of fitness. Objective estimates of fitness were cleaned according to the rules described in the pilot study. Across all four objective estimates, there were 13 missing data points (approximately 1.8% of all objective estimates). Because the amount of missing data was quite small, self-evaluation scores were still calculated based on the estimates participants did provide. Objective estimates, when standardized in order to form a consistent scale of measurement and then combined, were approximately normally distributed, though somewhat leptokurtic ($M = .0043$, $SD = .55$, skewness = 1.41, kurtosis = 16.11).

There were no missing data for subjective estimates of fitness. Subjective estimates were approximately normally distributed ($M = 3.31$, $SD = .62$, skewness = -.21, kurtosis = .14). Moreover, composite self-evaluation scores (including both standardized subjective and standardized objective estimates) were approximately normally distributed ($M = 0$, $SD = .58$, skewness = .50, kurtosis = 2.41, $a = .75$). There were no outlying composite self-evaluation scores.
4.2.5 Target Extremity

Participants in the social comparison conditions answered a series of 5 questions about the comparison target’s current exercise habits, using a 1-5 Likert-type scale (1 = 0 days per week, 5 = 6-7 days per week). These items were intended to give an objective measure of the target person’s fitness level. Sample items include, “In a typical week, how often does this person lift weights or do strengthening exercises?” and “In a typical week, how often does this person do cardiovascular exercise?” An additional question asked whether the comparison target works at a gym or recreation center. Participants in the temporal comparison conditions answered comparable versions of the same questions, focusing on their younger selves and their specific exercise habits during the time period they described. The Likert-type items in both conditions demonstrated good

4 Participants also answered five questions regarding their current exercise habits that were similar in wording to the questions about the comparison target’s exercise habits (i.e., the target extremity measure) and whether they currently work at a gym. The five Likert-type items were combined into a composite present health habits score (α = .81, M = 2.29, SD = .87). The present health habits score and currently employment status were entered as covariates in the 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) ANOVA. Present health habits were a highly significant covariate (F(1, 177) = 103.96, p < .001, partial η² = .37) in predicting self-evaluations of fitness, and the interaction between comparison direction and comparison type was greatly reduced and became non-significant, F(1, 177) = .25, p = .62. Because this study involved a short-term, relatively subtle manipulation conducted in a lab setting, it is not surprising that long-term exercise habits were a stronger predictor of fitness-related self-evaluations. However, it is important to note that the manipulation may have also affected participants’ reports of their current exercise habits. Participants were randomly assigned to conditions and completed all measures after making a comparison. When current exercise habits were submitted to the 2 X 2 between-subjects ANOVA described above (in place of self-evaluation scores), the comparison type X comparison direction interaction was statistically significant, F(1, 179) = 8.00, p = .005. The pattern was very similar to that observed when self-evaluations were entered as the dependent variable, suggesting that the experimental manipulation may have unintentionally influenced participants’ reports of their current exercise habits as well.
reliability \((\alpha = .89)\) and were combined into a composite target fitness score \((M = 2.69, SD = 1.17, \text{skewness} = .14, \text{kurtosis} = -1.26)\). See Appendix C for all items.

### 4.3 Results and Discussion

#### 4.3.1 Self-Evaluations

Self-evaluation scores were submitted to a 2 (comparison direction: upward or downward) X 2 (comparison type: social or temporal) between-subjects ANOVA. There were no main effects of comparison direction \((F(1, 179) = .12, p = .73, \text{partial } \eta^2 = .001)\) nor comparison type \((F(1, 179) = .11, p = .74, \text{partial } \eta^2 = .001)\). However, as in the pilot study, there was a significant interaction between comparison direction and comparison type, \(F(1, 179) = 4.74, p = .03, \text{partial } \eta^2 = .03\). A series of planned contrasts was conducted to interpret the interaction in accordance with hypotheses. First, self-evaluation scores in the upward social comparison condition were compared to those in the downward social comparison condition. As hypothesized, downward social comparison \((M = .09, SD = .61)\) resulted in more positive self-evaluations than upward social comparison \((M = -.06, SD = .55)\), though this difference was not statistically significant, \(p = .20, d = .26\). A contrast comparing upward temporal comparison \((M = .09, SD = .65)\) to downward temporal comparison \((M = -.12, SD = .48)\) also showed that results were in the hypothesized direction, though only marginally significant, \(p = .08, d = .37\). Overall, hypotheses were partially supported. The interaction between comparison direction and comparison type was significant and all effects were in the expected directions, but planned contrasts did not reach significance. See Figure 4-1.
4.3.2 Target Extremity

The goal of this analysis was to determine whether participants in the social and temporal comparison conditions chose targets that differed in extremity with respect to their fitness. First, target fitness scores were standardized in order to reflect their distance from the mean fitness score in the sample. Second, standardized scores were recalculated as absolute values, in order to reflect extremity regardless of direction. For instance, a score that is 2 standard deviations above the mean (upward comparison) would be equally extreme as one that is 2 standard deviations below the mean (downward comparison).

The resulting extremity scores were submitted to a 2 (comparison direction: upward or downward) X 2 (comparison type: social or temporal) between-subjects ANOVA. Results showed no main effect of comparison direction, indicating that
participants in the upward and downward conditions chose targets that did not differ in extremity, \( F(1, 179) = 2.70, p = .10, \) partial \( \eta^2 = .015. \) There was a main effect of comparison type, such that participants in the social comparison conditions generally chose more extreme targets \((M = .96, SD = .44)\) than those in the temporal comparison conditions \((M = .81, SD = .47)\), \( F(1, 179) = 5.54, p = .02, \) partial \( \eta^2 = .03. \) This main effect was qualified by a significant interaction between comparison direction and comparison type, \( F(1, 179) = 8.79, p = .003, \) partial \( \eta^2 = .047. \) Simple effects analysis showed that among participants assigned to make downward comparisons, those in the social comparison condition chose more extreme targets \((M = 1.11, SD = .29)\) than those in the temporal comparison condition \((M = .77, SD = .45)\), \( p < .001, d = .90. \) Within the upward comparison conditions, the extremity of social comparison \((M = .81, SD = .50)\) and temporal comparison \((M = .85, SD = .49)\) targets did not significantly differ, \( p = .66, d = .08. \) Simple effects analysis also showed that among participants assigned to make social comparisons, those in the downward social comparison condition \((M = 1.11, SD = .29)\) chose more extreme targets than those in the upward social comparison condition \((M = .81, SD = .50), p = .001, d = .76. \) Within the temporal comparison conditions, the extremity of upward \((M = .85, SD = .49)\) and downward \((M = .77, SD = .45)\) comparison targets did not significantly differ, \( p = .35, d = .17. \) In sum, downward social comparison targets were more extreme than other targets (see General Discussion). However, it is notable that, when target extremity was entered as a covariate in the aforementioned analysis involving self-evaluations, the interaction between comparison direction and comparison type was not dramatically reduced in significance or effect size, \( F(1, 178) = \)
3.08, \( p = .08 \), partial \( \eta^2 = .02 \) (original analysis was \( F(1, 179) = 4.74, p = .03 \), partial \( \eta^2 = .03 \)). This suggests that extremity accounted for some, but not all, of the effect.

Because target extremity did appear to account for a significant portion of the effect, self-evaluations were regressed onto comparison type, comparison direction, and target extremity. For the comparison type variable, social comparison was coded as “0” and temporal comparison was coded as “1”. For the comparison direction variable, downward comparison was coded as “0” and upward comparison was coded as “1”. Target extremity was calculated by computing the absolute value of standardized exercise habit scores, as described above. The main effects of these three predictor variables were entered in Step 1. Two-way interactions between the predictor variables were entered in Step 2, and the three-way interaction was entered in Step 3. In Step 1, results showed main effects of comparison direction (\( \beta = -.17, t = -2.00, p = .047 \)) and target extremity (\( \beta = .36, t = 4.19, p < .001 \)) on self-evaluations. These predictors accounted for a significant 9.0% of the variance in self-evaluations, \( R^2 = .09, F(3, 179) = 5.92, p = .001 \). In Step 2, the two-way interactions accounted for an additional 9.4% of the variance, \( R^2 \Delta = .09, F(3, 176) = 6.79, p < .001 \). Additionally, the comparison type X comparison direction interaction was significant (as reported in the ANOVA results above), \( \beta = .46, t = 2.67, p = .008 \). These main effects and two-way interactions were qualified by a three-way interaction between comparison type, comparison direction, and target extremity in Step 3, \( \beta = 1.07, t = 2.24, p = .03 \). Step 3 accounted for an additional 2.3% of the variance, \( R^2 \Delta = .02, F(1, 175) = 5.02, p = .03 \).

A simple slopes analysis showed that target extremity influenced self-evaluations in the upward temporal comparison condition, such that self-evaluations were more
positive when the target was more extreme than when the target was moderate \((t = 3.35, p = .001)\). Self-evaluations also differed by target extremity in the downward social comparison condition. Contrary to the simple effects reported above, participants in the downward social comparison condition had more positive self-evaluations when the comparison target was moderate rather than extreme, although the effect was only marginally statistical significance \((t = -0.58, p = .048)\). Finally, slope difference tests indicated that the effect of target extremity on self-evaluations was more pronounced in the upward temporal comparison condition than in the upward social \((t = 2.03, p = .04)\) and downward social \((t = 3.42, p = .001)\) comparison conditions. Slope difference tests also showed a larger effect of extremity in the downward social comparison condition than the upward social \((t = 1.99, p = .048)\) and downward temporal \((t = 1.99, p = .048)\) comparison conditions. Again, these effects were not highly significant and should be interpreted with caution.

Finally, the effects of target extremity on self-evaluations were assessed by dichotomizing extremity into favorable comparisons (i.e., comparisons to relatively unfit targets) and unfavorable comparisons. Because favorable comparisons would be more self-enhancing, they were predicted to lead to more positive self-evaluations. The favorability of a comparison was calculated by examining target extremity within the bounds of each comparison prompt. Specifically, the median standardized target fitness score for each experimental condition was calculated, and participants’ comparison targets were categorized into favorable (if the target’s fitness score was below the median) or unfavorable (if the target’s fitness score was above the median). Self-evaluations were submitted to a 2 (comparison type: social or temporal) X 2 (comparison...
direction: upward or downward) X 2 (comparison favorability: favorable or unfavorable) between-subjects ANOVA. Results showed a significant main effect of comparison favorability ($F(1, 175) = 21.84, p < .001$, partial $\eta^2 = .11$) such that participants who made unfavorable comparisons had more positive self-evaluations ($M = .17, SD = .57$) than those who made favorable comparisons ($M = -.21, SD = .51$). The comparison type X comparison direction interaction remained significant, $F(1, 175) = 4.78, p = .03$, partial $\eta^2 = .03$. There were no other significant main effects or interactions in the model.

4.3.3 Discussion

The results of Study 1 followed a similar pattern as the results of the pilot study. Specifically, there was a significant interaction between comparison type and direction such that downward social and upward temporal comparison resulted in more positive self-evaluations, while upward social and downward temporal comparison resulted in more negative self-evaluations (though simple effects were not large nor statistically significant). Though the use of more moderate targets in both the social and temporal conditions likely helps to assuage concerns about extremity differences, participants did choose somewhat more extreme targets in the social comparison condition than in the temporal comparison condition. Although this latter finding complicates the exact interpretation of the results (see General Discussion), the general patterns uncovered nevertheless provide some support for the hypothesis that social comparison prompted contrast and temporal comparison prompted assimilation. The purpose of Study 2 was to empirically investigate assimilation and contrast mechanisms.
Chapter 5

Study 2

5.1 Overview

The first goal of Study 2 was to expand on the results of the pilot study and Study 1 by exploring underlying assimilation and contrast processes. To that end, Study 2 involved a very similar design to Study 1, but additionally measured participants’ focus on similarities vs. differences after writing about either a social comparison target or a temporal comparison target. Shortly after assimilating their self-evaluations to a comparison target, people temporarily have a stronger focus on similarities rather than differences in general. Similarly, contrast effects are reflected in a relative focus on dissimilarities rather than similarities (Mussweiler, 2001). Similarity/dissimilarity focus was tested as a potential mediator of the relationship between comparison type (i.e., social or temporal) and self-evaluations, moderated by comparison direction (i.e., upward or downward). According to the SAM, self-evaluation is the final step in the comparison process, directly following similarity or dissimilarity testing (Mussweiler, 2003). This study was the first to apply the SAM to temporal comparison, not just social comparison. The similarity/dissimilarity testing process was expected to mediate the relationship between comparison type and self-evaluations in the following ways:
H1: Upward social comparison would lead to more negative self-evaluations of fitness than downward social comparison (a contrast effect).

H2: The effect of social comparison on self-evaluations would be mediated by a focus on dissimilarity (vs. similarity), and moderated by comparison direction. In other words, participants who engaged in social comparison would focus on dissimilarities between themselves and the target, which would influence their self-evaluations. Subsequently, if they engaged in upward social comparison, they would have more negative self-evaluations of their fitness whereas if they engaged in downward social comparison, they would evaluate their fitness more positively.

H3: Upward temporal comparison will lead to more positive self-evaluations of fitness than downward temporal comparison (an assimilation effect).

H4: The effect of temporal comparison on self-evaluations will be mediated by a focus on similarity (vs. dissimilarity), and moderated by comparison direction. In other words, participants who engaged in temporal comparison would focus on similarities between themselves and the target, which would influence their self-evaluations. Subsequently, if they engaged in upward social comparison, they would have more positive evaluations of their fitness whereas if they engaged in downward temporal comparison, they would evaluate their fitness more negatively.

The second goal of Study 2 was to extend the self-evaluation findings by examining how participants responded to their self-evaluations once impacted by the comparisons. In particular, a behavioral manifestation was used to assess participants’ intentions to engage in exercise. Research has suggested that self-evaluations affect
health behaviors in a number of different ways. First, realizing that one is doing poorly can motivate people to make behavior changes such as quitting smoking (Dijkstra & Buunk, 2008), eating healthier (Shakya, Christakis, & Fowler, 2015), and using dental floss (Schmiege, Klein, & Bryan, 2010). However, in other cases, poor self-evaluations lead to negative health behaviors, such as heavy drinking (Lane, Gibbons, O’Hara, & Gerrard, 2011) and lack of adequate sun protection (Hoffner & Ye, 2009). Second, positive self-evaluations can lead to continued positive behaviors, such as reduced alcohol use (Shakya et al., 2015), but can also lead to complacency and decreased health behaviors (Mahler, Kulik, Gerrard, & Gibbons, 2010). As such, inclusion of this variable was largely exploratory.

5.2 Method

5.2.1 Participants and Design

Participants were 179 (127 female) undergraduates from the University of Toledo subject pool. They received course credit as compensation. No participants were excluded from analyses. The racial make-up of the sample was 67% White, 19% Black, 5% Asian, 6.7% multiple races, and 2.2% unknown race. Participants were randomly assigned to one cell in a 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) between-subjects design.

5.2.2 Measures and Procedure

Participants came to the lab in groups of 1-4 and were seated at individual computers. The experimenter obtained informed consent from each participant. Then,
they completed the remainder of the experiment using MediaLab software (Jarvis, 2014). As in Study 1, participants answered questions about a comparison target and evaluated their own fitness. Additional measures are described below. Participants first answered questions about the comparison target, then completed the similarity focus assessment, and then evaluated their fitness.

5.2.3 Similarity Focus Assessment

A similarity focus assessment was used to measure participants’ relative focus on similarities versus dissimilarities (Mussweiler, 2001). Participants were given two pictures, ostensibly for the purpose of pretesting for a future study on visual perception (Mussweiler et al., 2004). The pictures were taken from Mussweiler & Ockenfels, 2013 (see Appendix D). Participants were given a few minutes to carefully examine both pictures. First, they were asked to list as many similarities and differences as they could find (Mussweiler, 2001). The order of the two questions was counterbalanced using a random number generator. Two independent coders reviewed participants’ responses and counted the number of similarities and differences participants listed. Agreement was high for both similarities ($r = .93$) and differences ($r = .89$). Final similarity and difference scores were calculated by computing the mean of the two coders’ scores. Second, participants used a 1-9 Likert-type scale to indicate how similar the pictures were to one another ($1 = \text{not at all similar}, 9 = \text{completely similar}$; Mussweiler et al., 2004).

5.2.4 Self-Evaluations

Participants answered the same series of 9 questions described in the pilot study and Study 1. There were no missing data for subjective estimates of fitness, and
composite subjective estimates were approximately normally distributed ($M = 3.31, SD = .67$, skewness $= .04$, kurtosis $= -.41$). Objective estimates were cleaned using the rules described in the pilot study. Objective estimates of speed were recoded and all items were standardized. Standardized objective estimates were approximately normally distributed ($M = -.001, SD = .63$, skewness $= .13$, kurtosis $= 3.62$). Across all four estimates, there were 5 missing data points (approximately $0.7\%$ of the data). As in the pilot study and Study 1, objective self-evaluation scores were calculated based on the estimates provided. Standardized subjective and objective self-evaluation scores were combined to form a composite self-evaluation of fitness score ($\alpha = .81$). The composite self-evaluation scores were approximately normally distributed ($M = -.0007, SD = .63$, skewness $= .12$, kurtosis $= .002$). There were no outliers.

5.2.5 Behavior-Based Intentions

To assess behavior-based intentions, participants were given the option of receiving an email newsletter about health. Specifically, they were told: “The University of Toledo is in the process of designing a monthly email newsletter with information about health and strategies for leading a healthy life. Would you like to receive this newsletter? If you check ‘yes’ below, you will be asked to enter your email address on a separate page. Your email address will not be stored with your personal information or your responses to this study.” Importantly, opting to receive a newsletter cannot necessarily be taken as an indicator of actual exercise behavior. However, opting to receive information and advice likely indicates an interest in making healthy choices and intentions to do so. Note that participants did not actually provide their email addresses and long-term behavior was not tracked.
5.3 Results and Discussion

5.3.1 Similarity Focus

First, a difference score was computed to reflect the relative number of similarities and differences participants reported (Mussweiler, 2001). Positive scores indicate more similarities than differences (similarity focus score = similarities – differences). Difference scores were submitted to a 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) between-subjects ANOVA. There was no main effect of comparison type (\(F(1, 175) = .01, p = .91, \text{partial } \eta^2 < .001\)), no main effect of comparison direction (\(F(1, 175) = .05, p = .82, \text{partial } \eta^2 < .001\)), and no interaction, \(F(1, 175) = .27, p = .60, \text{partial } \eta^2 = .002\).

Second, responses to the question, “Overall, how similar are these two pictures?” (1 = not at all similar, 9 = completely similar; Mussweiler et al., 2004) were submitted to a 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) between-subjects ANOVA. There was no main effect of comparison type (\(F(1, 174) = .10, p = .76, \text{partial } \eta^2 = .001\)), no main effect of comparison direction (\(F(1, 174) < .001, p = .99, \text{partial } \eta^2 < .001\)), and no interaction, \(F(1, 174) = .94, p = .34, \text{partial } \eta^2 = .005\). Inconsistent with the outlined hypotheses, participants’ perceptions of similarity between the two pictures did not significantly differ based on the comparisons they made. See Table 5.1 for descriptive statistics.
Table 5.1: Mean similarities and differences in the picture comparison task in Study 2 (by condition).

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Similarities$^a$</td>
<td>Differences$^b$</td>
<td>Difference Score$^c$</td>
<td>Rating$^d$</td>
</tr>
<tr>
<td>Upward Social</td>
<td>4.58 (1.86)</td>
<td>4.89 (1.71)</td>
<td>-.31 (1.84)</td>
<td>5.42 (1.58)</td>
</tr>
<tr>
<td>Downward Social</td>
<td>4.09 (1.77)</td>
<td>4.63 (1.61)</td>
<td>-.53 (2.05)</td>
<td>5.18 (1.51)</td>
</tr>
<tr>
<td>Upward Temporal</td>
<td>3.91 (1.42)</td>
<td>4.41 (1.49)</td>
<td>-.50 (1.65)</td>
<td>5.26 (1.68)</td>
</tr>
<tr>
<td>Downward Temporal</td>
<td>4.17 (1.81)</td>
<td>4.58 (1.68)</td>
<td>-.41 (2.47)</td>
<td>5.49 (1.63)</td>
</tr>
</tbody>
</table>

$^a$Refers to the mean number of similarities between the two pictures reported by participants in each condition.

$^b$Refers to the mean number of differences between the two pictures reported by participants in each condition.

$^c$Refers to the number of similarities reported minus the number of differences reported.

$^d$Refers to participants’ rating of the similarity between the two pictures, on a scale of 1 (Not at all similar) to 9 (Completely similar).

5.3.2 Self-Evaluations

As in the pilot study and Study 1, objective and subjective self-evaluations were standardized and combined into a composite score ($\alpha = .81$). Speed was recoded such that higher scores reflected higher estimates of fitness. Self-evaluation scores were submitted to a 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) between-subjects ANOVA. There were no main effects of comparison type ($F(1, 175) = .47, p = .49$, partial $\eta^2 = .003$) or comparison direction ($F(1, 175) = .60, p = .44$, partial $\eta^2 = .003$). Importantly, the interaction between comparison type and comparison direction was not significant either, $F(1, 175) = 2.46, p = .12$, partial $\eta^2 = .01$. To better understand the pattern of results in the context of the pilot study and Study 1, the same series of planned contrasts was also conducted. First, the upward and downward
social comparison conditions were compared. Self-evaluations were higher in the upward social comparison condition \((M = .07, SD = .68)\) than the downward social comparison condition \((M = -.005, SD = .63)\), but this difference was not significant, \(p = .58, d = .11\).

Second, the upward and downward temporal comparison conditions were compared. Self-evaluations were higher in the downward temporal comparison condition \((M = .08, SD = .61)\) than in the upward temporal comparison condition \((M = -.14, SD = .60)\); however, this difference was only marginally significant, \(p = .096, d = .36\). This pattern of results differed from the pilot study and Study 1, in which upward temporal and downward social comparison produced higher self-evaluations, though the effect size differences were notably smaller and non-significant here. See Figure 5-1.

Figure 5-1: Self-evaluations by comparison direction and type (Study 2).
5.3.3 Mediated Moderation Model

Though some of the core elements of the hypotheses were not supported above, the mediated moderation model was still conducted. Specifically, model 15 of the PROCESS macro developed by Hayes (2012) was used to test the relationships between four variables: comparison type, similarity focus, comparison direction, and self-evaluations. First, comparison type (social or temporal) was entered as a predictor variable. Second, similarity focus scores were entered as a mediator. Third, self-evaluation scores were entered as the criterion variable. Finally, comparison direction (upward or downward) was entered as a moderator. Comparison direction was expected to moderate the “C” path (direct effect of comparison target on self-evaluations) as well as the “B” path (effect of similarity focus on self-evaluations). See Figure 5-2 for an illustration of the model that was tested.

Figure 5-2: Moderated mediation model for self-evaluations (Study 2). *p < .05.
As also noted above, results revealed no significant effect of comparison type on similarity focus, \( \beta = -.04, t = -.12, p = .91 \). Furthermore, similarity focus did not predict self-evaluations, \( \beta = -.02, t = -.73, p = .46 \). Comparison direction did not moderate the relationships between similarity focus and self-evaluations (\( \beta = .10, t = 1.97, p = .05 \)) or comparison type and self-evaluations (\( \beta = -.29, t = -1.51, p = .13 \)). There was no direct effect of comparison type on self-evaluations, \( \beta = .09, t = .65, p = .52 \), and no indirect effects of comparison type on self-evaluations for participants in the downward (\( \beta = .0008, 95\% \text{ CI } [-.02, .03] \)) or upward (\( \beta = -.003, 95\% \text{ CI } [-.06, .04] \)) comparison conditions. In sum, there was no evidence of moderated mediation. See Figure 5-2.

### 5.3.4 Behavior-Based Intentions

Logistic regression and moderated mediation were used to assess the effects of comparison target and comparison direction on intentions to receive a health-related newsletter.

#### 5.3.4.1 Logistic Regression

Comparison type and comparison direction were entered into a logistic regression analysis as predictors of intentions to receive a health-related newsletter. A test of the full model against a constant-only model was not statistically significant, indicating that the predictor variables did not significantly enhance the predictive power of the model (\( \chi^2 = 1.12, p = .77 \); Nagelkerke’s \( R^2 = .008 \)). See Table 5.2 for full results.4

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4 The present health habits score and current employment status were entered as covariates in Step 1 of the logistic regression analysis. Main effects of comparison type and direction and their interaction were entered in Step 2. Results showed that present employment was a significant covariate (\( \beta = 1.95, SE = .83, p = .02 \)), and the model did
Table 5.2: Logistic regression analysis predicting intentions to receive a health-related newsletter (Study 2).

<table>
<thead>
<tr>
<th>Variable</th>
<th>β (SE)</th>
<th>Lower</th>
<th>Odds Ratio</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.37 (.31)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison Target</td>
<td>-.13 (.43)</td>
<td>.37</td>
<td>.88</td>
<td>2.05</td>
</tr>
<tr>
<td>Comparison Direction</td>
<td>.19 (.43)</td>
<td>.52</td>
<td>1.20</td>
<td>2.80</td>
</tr>
<tr>
<td>Target X Direction</td>
<td>.23 (.61)</td>
<td>.38</td>
<td>1.25</td>
<td>4.11</td>
</tr>
</tbody>
</table>

a \( p > .05 \) for each of the predictors in the model.

5.3.4.2 Moderated Mediation

As described above, self-evaluations can have a variety of effects on behavior-based intentions. A moderated mediation analysis was conducted to examine the effects of comparison type and comparison direction on self-evaluations and, subsequently, behavior-based intentions. Model 8 of the PROCESS macro (Hayes, 2012) was used to test the relationships between these variables. First, comparison type (social or temporal) was entered as a predictor variable. Second, self-evaluation scores were entered as a mediator. Third, behavior-based intentions were entered as the criterion variable. Finally, comparison direction (upward or downward) was entered as a moderator. Comparison significantly predict intentions to receive the newsletter (\( \chi^2 = 7.42, p = .03; \) Nagelkerke’s \( R^2 = .06 \)). However, the predictors of interest (comparison target and direction) remained non-significant (\( p’s > .68 \)).
direction was expected to moderate the “C” path (direct effect of comparison type on self-evaluations) as well as the “A” path (effect of comparison type on self-evaluations).

Results revealed no significant effect of comparison type on self-evaluations, $\beta = .08$, $t = .62$, $p = .53$. Comparison direction did not moderate the relationships between comparison type and self-evaluations ($\beta = -.30$, $t = -1.57$, $p = .12$) or comparison type and behavior-based intentions ($\beta = .08$, $Z = .13$, $p = .89$). There was no direct effect of comparison type on behavior-based intentions, $\beta = -.09$, $Z = -.21$, $p = .83$, and no indirect effects of comparison type on behavior-based intentions for participants in the downward ($\beta = -.04$, 95% CI [-.30, .06]) or upward ($\beta = .11$, 95% CI [-.02, .40]) comparison conditions. In sum, there was no evidence of moderated mediation. However, self-evaluations did significantly predict behavior-based intentions, such that participants who evaluated their present fitness more positively were less likely to opt to receive the newsletter with fitness advice, $\beta = -.51$, $Z = -2.02$, $p = .04$. See Figure 5-3.5

5 When present health habits and employment status were entered into the moderated mediation model as covariates, results showed that present health habits were a significant predictor of self-evaluations, such that participants with a higher activity level evaluated themselves as more fit ($\beta = .47$, $SE = .04$, $p < .0001$). Furthermore, present employment at a gym predicted intentions to receive the newsletter ($\beta = 1.96$, $SE = .84$, $p = .02$). However, the overall pattern of results did not change as a result of entering these covariates.
5.3.5 Discussion

In Study 2, comparison type and comparison direction did not predict participants’ evaluations of their current fitness. This pattern of results diverges from that observed in the pilot study and Study 1 (see General Discussion). Furthermore, Study 2 did not provide evidence that participants’ general focus on similarities differed between experimental conditions. Thus, Hypotheses H1 through H4 were not supported. Lastly, behavior-based intentions to engage in healthy habits were measured as an exploratory variable. Comparison type and direction did not predict intentions; however, self-evaluations did predict intentions, such that positive evaluations of one’s present fitness were associated with lower intentions to receive a health-related newsletter.


Chapter 6

General Discussion

The purpose of the present set of studies was to assess the similarities and differences between social and temporal comparison processes and outcomes in a health-relevant context. In each of three studies, participants answered questions about a comparison target: either another person (social comparison conditions) or a past self (temporal comparison conditions). The comparison target was either healthier than them (upward comparison conditions) or less healthy than them (downward comparison conditions). Following these comparisons, participants evaluated their present fitness. In Study 2, participants also completed a picture comparison task intended to measure their relative focus on similarities versus dissimilarities (Mussweiler, 2001; Mussweiler et al., 2004) and indicated whether or not they would like to receive a newsletter related to health and fitness in the future (an exploratory measure of behavior-based intentions to pursue healthy habits). Across all three studies, two core hypotheses were formed. First, participants were expected to assimilate their self-evaluations to their past selves and contrast their self-evaluations away from others. Second, similarity focus was predicted to mediate the relationship between comparison type and self-evaluations, moderated by comparison direction. There were several notable results across the set of studies.
6.1 Results and Explanations

6.1.1 Self-Evaluation Effects

Results of the pilot study and Study 1 demonstrated that participants who engaged in downward social comparison (i.e., a comparison to an unhealthy person) or upward temporal comparison (i.e., a comparison to a healthy past self) evaluated their present fitness more positively than those who made upward social comparisons or downward temporal comparisons. These results suggested that in a fitness-related context, participants assimilated their self-evaluations to their past selves and contrasted their self-evaluations away from others. There are several plausible explanations for the finding that social comparisons resulted in contrast whereas temporal comparisons resulted in assimilation. Importantly, these different explanations may relate to the different stages in which comparison processing occurs. The Selective Accessibility Model (SAM; Mussweiler, 2003) describes different stages of processing under which comparisons occur: selection of a comparison target, comparison of the target and the self, and evaluation of the self.

First, as originally hypothesized, it is possible that the difference between social and temporal comparison occurs primarily in the comparison stage. More specifically, results may have been driven by higher perceived similarity between the present self and past self (temporal comparison target) than the present self and someone else (social comparison target). According to the SAM, initial perceptions of similarity prompt a search for evidence that confirms this similarity and leads to assimilation of self-evaluations. Initial perceptions of dissimilarity, on the other hand, lead to contrast
(Mussweiler, 2003). Participants in the temporal comparison conditions may have perceived similarities between their past selves and their present selves and therefore engaged in assimilation. On the other hand, social comparison appeared to produce contrast effects in this context. Contrast effects have been observed in the social comparison literature (e.g., Cash et al., 1983; Morse & Gergen, 1970), generally when the target has very desirable or very undesirable characteristics. If participants in the social comparison conditions initially perceived the target as different from themselves, contrast would be likely to occur. Prior research on temporal comparison has shown variability in the extent to which participants view their past selves as overlapping with their present selves (e.g., Peetz & Wilson, 2013; 2014). Moreover, perceived closeness to the present self has been found to produce assimilation effects, while greater perceived distance produces contrast effects (e.g., Broemer et al., 2008; Grabowski & Broemer, 2015; Wilson & Ross, 2001).

However, inconsistent with this account, participants in Studies 1 and 2 did not report perceiving greater similarity between themselves and the target in the temporal comparison conditions. Instead, Study 1 showed a main effect of comparison direction.

As a supplementary measure, participants in Studies 1 and 2 were asked, “How similar is this person’s fitness level to your own fitness level?” (social comparison conditions) or “How similar is your fitness level during that time to your fitness level now?” (temporal comparison conditions). Participants responded using a 1 (Not at all similar) to 9 (Completely similar) Likert-type scale (Mussweiler et al., 2004). These responses were submitted to a 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) between-subjects ANOVA. In Study 1, there was a main effect of comparison direction ($F(1, 179) = 9.51, p = .002$, partial $\eta^2 = .05$) such that participants perceived greater similarity to upward comparison targets ($M = 5.03, SD = 2.13$) than downward comparison targets ($M = 4.04, SD = 2.18$), $d = .46$. There was no main effect of comparison type ($F(1, 179) = 1.44, p = .23$, partial $\eta^2 = .008$) nor an interaction, $F(1, 179) = .005, p = .95$, partial $\eta^2 < .001$. In Study 2, there was again a main effect of comparison direction ($F(1, 175) = 11.55, p = .001$, partial $\eta^2 = .06$, such that participants
such that participants perceived greater similarity to upward comparison targets than downward comparison targets, possibly due to desires for self-enhancement. Moreover, participants in Study 2 reported being more similar to an upward social comparison target than a downward social comparison target, while there was little difference in perceived similarity in the temporal comparison conditions. Taken together, there was minimal evidence of a difference in similarity versus dissimilarity testing between the social and temporal comparison conditions in the current set of studies.

Second, differences between social and temporal comparison may have occurred at the target selection stage. Although participants were randomly assigned to engage in either a social or temporal comparison, the extremity of the comparison target may have affected results. In the pilot study, extremity of the target was a potential confounding variable, due to the difference in the wording of the social comparison prompts and the temporal comparison prompts. Participants in the social comparison conditions were prompted to choose moderately extreme targets, while those in the temporal comparison conditions perceived greater similarity to upward comparison targets ($M = 4.91, SD = 2.04$) than downward comparison targets ($M = 3.94, SD = 2.00$), $d = .48$. There was a marginal main effect of comparison type such that participants perceived more similarity to their past selves ($M = 4.69, SD = 2.07$) than to others ($M = 4.16, SD = 2.04$), $F(1, 175) = 3.41$, $p = .067$, partial $\eta^2 = .019$, $d = .26$. Last, there was a significant interaction, $F(1, 175) = 14.68$, $p < .001$, partial $\eta^2 = .077$. Simple effects analysis showed that within the social comparison conditions, participants perceived greater similarity to upward comparison targets ($M = 5.20, SD = 2.01$) than downward comparison targets ($M = 3.11, SD = 1.48$), $p < .001$, $d = 1.18$. In the temporal comparison conditions, there were no differences in perceived similarity to upward ($M = 4.63, SD = 2.05$) versus downward comparison targets ($M = 4.76, SD = 2.12$), $p < .001$, $d = .06$. It is unclear why results diverged across the two studies, as target extremity scores were very similar across the studies (Study 1: $M = 2.69, SD = 1.17$; Study 2: $M = 2.67, SD = 1.17$) and there were no procedural differences at the point that participants reported their perceived similarity to the target.
conditions were prompted to choose moderate targets. Importantly, the same pattern of results was observed in Study 1, when the prompts were equalized. However, despite the equalized wording of the prompts, participants still may have chosen targets that differed in extremity. Indeed, based on participants’ assessments of the targets’ exercise habits, it appeared that the social comparison targets were more extreme than the temporal comparison targets.

This difference in target selection may have been due to the potential threats to self-identity posed by temporal comparison, or it may have been due to a discrepancy in available information about social versus temporal comparison targets. Although individuals often do derogate their past selves in order to enhance their present selves (Wilson & Ross, 2001), they may have been hesitant to evaluate their own selves particularly poorly, as this can be experienced as a threat to the self (Peetz & Wilson, 2014). Choosing an extreme downward social comparison target, on the other hand, would not be threatening to the self. Alternatively, it is possible that participants simply had a wider range of social comparison targets from which to choose. The temporal comparison prompt was more restrictive than the social comparison prompt, in that it required participants to choose a version of themselves. This effect may have been especially pronounced in a college student sample, because young adults do not have as many “past selves” as older adults do. It is possible that results would be different in a sample of older adults. Indeed, Suls and colleagues found that elderly adults seemed to assimilate their self-evaluations to their recent past selves and contrast self-evaluations away from their distant past selves (Suls et al., 1991). This age group would have had a broader range of comparison targets in the temporal comparison condition and may have
shown more contrastive effects. Furthermore, it is important to note that young people are generally healthy and most college students have not experienced drastic changes in their health and fitness. Therefore, the difference in extremity between social and temporal comparison targets may be less pronounced when target selection in the temporal comparison conditions is less constrained. If participants had experienced major changes in the domain of interest (i.e., health and fitness), they would have had a wider selection of past selves from which to choose.

Finally, it is important to note that these explanations are not necessarily mutually exclusive, and it is plausible that the social and temporal comparisons made in these studies differed at both the target selection and comparison stages. For instance, target selection is likely to influence initial perceptions of similarity (Mussweiler, 2003), such that choosing an extreme target would likely lead to initial perceptions of dissimilarity and choosing a moderate target would lead to perceptions of similarity. These initial perceptions would then lead to similarity or dissimilarity testing and subsequent assimilation or contrast effects. Research has shown that target extremity affects self-evaluations in both social and temporal comparison such that moderate targets promote assimilation and extreme targets provoke contrast (e.g., Dijksterhuis et al., 1998; Hanko et al., 2010; Herr, 1986; Mussweiler et al., 2004). However, the present research is among the first to assess the extremity of the targets people naturally choose and the effects of target selection on self-evaluation. These results tentatively suggest that social comparison targets in a fitness context, when chosen naturally, are more extreme than temporal comparison targets. Because there is little evidence that perceived similarity to the target differed across types of comparison, differences in target extremity are more
likely to account for the results observed in the pilot study and Study 1. Importantly, although the effects of comparison type and direction were lessened in magnitude when accounting for target extremity, they did not disappear entirely. Therefore, target extremity may not account for the entirety of the effects observed in the pilot study and Study 1. In the present research, target extremity was measured by participants’ reports of the target’s exercise habits. A different measure of extremity (e.g., subjective evaluations of the target’s fitness) may have more fully accounted for the differences between conditions observed in this study.

### 6.1.2 Replicability of Core Self-Evaluation Findings

The influence of several key moderators could also be considered in explaining these results. First, trait self-esteem may have affected participants’ responses to comparative thought. Specifically, research has shown that downward social comparisons have stronger positive effects on participants with low self-esteem than high self-esteem (Aspinwall & Taylor, 1993; Gibbons & Gerrard, 1989). This suggests that contrast effects following downward social comparison are stronger in low self-esteem participants. In the present research, these contrast effects would be expected to manifest as a three-way interaction between comparison direction, comparison type, and trait self-esteem. Specifically, participants with low self-esteem would have more positive self-evaluations after making downward social comparisons than upward social comparisons or temporal comparisons. Trait self-esteem was measured in Studies 1 and 2 using the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Composite self-evaluation scores were regressed on comparison direction, comparison type, and trait self-esteem. Results across the two studies were not consistent with the hypothesis. In Study 1, the three-way interaction was not statistically significant ($\beta = .26, t = 1.89, p = .06$). In Study 2, the three-way interaction was significant ($\beta = .32, t = 2.00, p = .048$). Simple slopes analysis showed that in the downward social comparison condition, participants with low self-esteem had less positive self-evaluations than those with high self-esteem ($t = 2.04, p = .048$). The hypothesized contrast effect was not found. Second, female participants were overrepresented in these studies, which could have influenced results. Therefore, participant gender was entered as a covariate in a 2 (comparison type: social or temporal) X 2 (comparison direction: upward or downward) between-subjects ANOVA. Participant gender was a significant covariate in Studies 1 ($p = .04$) and 2 ($p < .001$), such that males had more positive self-evaluations than did females. However, the overall pattern of results (i.e., main effects and interactions) did not change when gender was included in the model as a covariate.
Notably, the pattern of results observed in the pilot study and Study 1 was not replicated in Study 2, despite a similar procedure and adequate statistical power. This failure to replicate may have been caused by the inclusion of the picture comparison task. In the pilot study and Study 1, participants evaluated their fitness immediately after making a comparison. In Study 2, participants first answered questions about the comparison target, then completed the picture comparison task, and finally completed the self-evaluation measure. Participants were told that the picture comparison task was part of an unrelated study, which may have prompted them to shift their attention away from the comparison they had just made. When they evaluated their fitness after the picture comparison task, the initial social or temporal comparison may not have been salient and therefore did not affect self-evaluations. Previous research using the picture comparison task placed it after self-evaluations (e.g., Mussweiler et al., 2004). Thus, as the only major change from Study 1 to Study 2 was the inclusion of the similarity task in-between, it is entirely possible that its inclusion directly altered the results of Study 2.

6.1.3 Lack of Similarity-Dissimilarity Effects

The similarity task in Study 2 was designed to measure participants’ relative focus on similarities versus differences after making a comparison (Mussweiler, 2001; Mussweiler et al., 2004). Participants viewed 2 pictures, listed the similarities and differences between them, and reported their overall judgment of the pictures’ similarity on a Likert-type scale after engaging in social or temporal comparisons. A difference score was computed to reflect the number of similarities listed versus the number of differences listed. Neither the difference score nor the Likert-type item differed between conditions. There are several potential reasons for the lack of significant effects. First, the
measure may not have adequately captured similarity focus. Participants were given one of two versions of the questionnaire: one that asked them to list similarities first (Form A), or one that asked for differences first (Form B). The forms were counterbalanced using a random number generator, and including the form as a factor in the model did not alter the pattern of results. However, order effects may have contributed to error variance in the data and thus contributed to the lack of significant results. Indeed, participants who received Form A (similarities first) had significantly higher similarity scores than those who received Form B. Second, a difference in similarity focus may not be the best explanation for the results observed in the pilot study and Study 1. When participants were directly asked to rate the degree of similarity between themselves and the comparison target, neither direct nor indirect measures of perceived similarity or similarity focus yielded significant differences across conditions. In sum, although measurement error may have contributed to the lack of significant results, it appears unlikely that participants differed in similarity focus across conditions.

6.1.4 Lack of Behavior-Based Intention Effects

Study 2 also included a measure of behavior-based intentions, in which participants opted to receive or not receive an email newsletter with information and advice regarding health and fitness. This variable was considered exploratory due to the mixed literature on the behavioral effects of comparative thought (Dijkstra & Buunk, 2008; Hoffner & Ye, 2009; Lane et al., 2011; Mahler et al., 2010; Schmiege et al., 2010; Shakya et al., 2015). Results showed that comparison direction and comparison type did not influence participants’ decision to receive or not receive the newsletter. This was likely due to the lack of significant effects of comparison type and direction on self-
evaluations (see above). When comparative thought influences behavior, it typically alters self-evaluations first, which then influence behavior (e.g., Shakya et al., 2015). In this study, comparative thought did not appear to influence self-evaluations. Therefore, comparative thought did not alter behavior-based intentions.

6.1.5 Relationship between Self-Evaluations and Behavior-Based Intentions

Although most analyses for Study 2 were not consistent with hypotheses, the moderated mediation analyses showed that self-evaluations significantly predicted intentions, such that participants with more positive evaluations of their present fitness were less likely to receive the newsletter. The negative association between self-evaluations and behavior-based intentions is consistent with some of the extant literature (e.g., Mahler et al., 2010). This finding may be due to the nature of the purported newsletter (i.e., one that provided information and advice). Even if participants intended to engage in healthy habits in the future, those who were satisfied with their current fitness may have believed that the newsletter would not be helpful or necessary for them. In support of this explanation, conducting the same analysis using a more direct measure of intentions to exercise revealed a positive association between self-evaluations and behavioral intentions. As a supplementary measure, participants answered 4 questions regarding their intentions to engage in exercise in the near future using a 1-5 Likert-type scale (1 = Almost certainly will not, 5 = Almost certainly will). Sample items include, “How likely are you to go to the gym within the next 7 days?” and “How likely are you to play sports
6.2 Limitations and Future Directions

The present research had several notable limitations. First, participants had only brief exposure to comparison information. Although brief exposure to comparison information can be impactful even weeks later, as demonstrated in other lab-based studies (e.g., Mahler et al., 2010; Schimege et al., 2010), future research could explore additive effects of exposure to comparison information over time. For instance, participants could be instructed to make a specific comparison every day. In addition to writing prompts or guided questions, future research could use more ecologically valid stimuli such as photos to prompt comparisons. In daily life, people compare themselves to a variety of targets, both upward and downward (e.g., Summerville & Roese, 2008; Wheeler & Miyake, 1992). Future research could examine the effects of health-related social and temporal comparisons made in naturalistic social environments, using methodology such as ecological momentary assessment or a daily diary. This methodology and setting would allow for a closer examination of the effects of multiple comparisons throughout the day. Extant research has shown the affective consequences of comparative thought (i.e., changes in mood) often linger even after the cognitive effects have dissipated (Gilbert et al., 1995). Lingering effects of one comparison may influence target selection in a subsequent comparison (e.g., making an extreme downward comparison to repair the negative affective consequences of an upward comparison; Wills, 1981). The various effects of comparisons made throughout a day may have a stronger influence on self-

within the next 7 days?” These items demonstrated good reliability and were combined to form a composite behavioral intentions score ($\alpha = .72, M = 3.37, SD = 1.04$).
perceptions and behavior than any single comparison would. Moreover, this study used self-report measures. It would be informative to measure behavior after long-term exposure to comparison information.

Second, the methodology of the present research did not allow for examination of the effects of perceived similarity to the comparison target separate from the effects of target extremity. In order to simulate the types of comparisons that people make in everyday life, participants were asked to generate their own comparison information. Other research that has examined both social and temporal comparison (e.g., Zell & Alicke, 2009) has provided comparison information in the form of false feedback about others’ performance (social comparison) and the participant’s own performance (temporal comparison). The methodology used in the present research allowed for a broader examination of the factors influencing self-evaluations following comparative thought, but did not retain full experimental control over participants’ comparison information. Although this can be considered a limitation, differences in target choice (i.e., extremity) across the social and temporal comparison conditions are important in understanding the different effects of social and temporal comparison.

Third, all effects measured in the present research were in the context of fitness. This domain was deemed well-suited to the purposes of the present research because of its importance in daily life and because people have access to abundant comparison information in this domain. It is unclear whether results of these studies would generalize to other domains, health-related or otherwise. For example, social comparison research involving cancer patients has found evidence mostly consistent with assimilation effects, such that patients evaluate their own health more positively after making an upward
comparison and more negatively after making a downward comparison (Brakel et al., 2014; Stanton et al., 1999; Taylor & Lobel, 1989). In the context of fitness, social comparison mostly produces contrast effects. One possible explanation for the differences between these two domains is that fitness is largely controllable. Therefore, the purpose of comparative thought—self-evaluation or self-enhancement—may differ, and this difference may be important independent of the comparison typology (social or temporal). For instance, cancer patients may have minimal control over the progression of their disease beyond adhering to medical care. In this ambiguous and stressful situation, they may look to other patients as sources of information so that they know what to expect for themselves (i.e., self-evaluation). On the other hand, most individuals are capable of becoming fitter by changing their behavior. These changes, such as exercising more frequently and intensely, are often uncomfortable and difficult to make. Therefore, a downward social comparison may be self-enhancing. That is, an individual who can remind themselves that they are better off than someone else may feel better about their own behavior and may be less inclined to change. Future research could examine the effects of social and temporal comparative thought in domains that differ in controllability.

Fourth, the samples obtained in these studies were predominantly White and female. It is unclear whether results would generalize to other demographic groups, or whether White, female college students respond differently to social and temporal comparison in a fitness context than other groups would. Several key elements of this demographic group may have influenced comparison processes in the present study. First, research suggests that Caucasians are particularly susceptible to sociocultural
norms promoting thinness and report relatively high body dissatisfaction and preoccupation with their weight (e.g., Dye, 2016; Lokken, Worthy, Ferraro, & Attmann, 2008; Penkal & Kurdek, 2007; Russell & Cox, 2003). In a fitness context, race may have played a major role in determining susceptibility to comparison information. The relatively homogeneous samples in the present research do not have sufficient statistical power to analyze race as a moderator of the effects observed. Second, on average, women are more sensitive to social comparison than are men (Guimond et al., 2007). This gender difference is particularly relevant in a fitness context, because women in Western cultures face greater cultural pressure to be thin (Buote, Wilson, Strahan, Gazzola, & Papps, 2011). A predominantly male sample may have shown a weaker pattern of results. Third, college students are highly susceptible to body dissatisfaction and disordered eating predicated by exposure to sociocultural norms that value thinness (e.g., Forney & Ward, 2013). Older adults, or young adults in a different social environment, may not have shown the same effects of comparative thought in a fitness context. In sum, several important demographic characteristics are known to influence constructs relevant to the present research, and future research should aim to recruit a more diverse sample.

Finally, the present research was based on a cognitive model of social comparison (i.e., the Selective Accessibility Model) and did not directly account for participants’ motivation when making comparisons. Motivation primarily affects social comparison at the target selection stage of social comparison. For example, when faced with self-threat, people may choose to self-enhance by making a downward comparison (Wills, 1981). Provoking self-enhancement or self-improvement motives for comparative thought may have influenced the extremity of the targets participants chose. Moreover, in the present
study, target selection was somewhat constrained, as participants were assigned to make one of four possible comparisons (i.e., upward social, downward social, upward temporal, or downward temporal). However, as discussed above, target extremity appeared to differ across the social and temporal comparison conditions. Participants may have avoided making extreme downward temporal comparisons, so as not to derogate their past selves excessively (Peetz & Wilson, 2014). Future research would benefit from incorporating motivational factors and assessing the effects of target selection on self-views. For instance, an experimental design in which participants choose a social or temporal comparison target after experiencing a threat to their self-esteem would be informative.

6.3 Implications and Conclusions

The present research has both theoretical and practical implications. Results tentatively suggest that, in the context of fitness, social comparison leads to contrast effects and temporal comparison leads to assimilation effects. This finding is particularly interesting when put in the context of prior research (particularly Zell & Alicke, 2009) showing that social and temporal comparisons both lead to contrast-like effects. There were several notable differences between prior research and the present research that may have caused the seemingly disparate results. First, Zell and Alicke (2009) assessed the relative impacts of social and temporal comparison. All participants were given both social and temporal comparison information, whereas in the present study, they were randomly assigned to one or the other. As in the present study, participants in Zell and Alicke’s study contrasted their self-evaluations away from social comparison targets. Furthermore, participants appeared to only use temporal comparison information when it
would be self-enhancing (i.e., when their scores were improving). When the information was potentially self-threatening (i.e., when their scores were declining), they discounted the information. This is consistent with the temporal comparison literature overall, which suggests that downward temporal comparisons are used to self-enhance (e.g., McFarland & Alvaro, 2000; Wilson & Ross, 2001). On the other hand, participants in the present study who engaged in temporal comparison did not have social comparison information readily available. Therefore, they likely used temporal comparison differently. However, assimilation in temporal comparison remains less consistent with the extant literature. In this study, it may be the result of differences in target extremity between the social and temporal comparison conditions.

Second, participants in Zell & Alicke’s (2009) study were given feedback repeatedly over time. Although participants appeared to contrast their self-evaluations away from their initial performance (when they were improving over time), they assimilated their self-evaluations to the trajectory of their performance. Because the present research only measured self-evaluations at one time point, it is not possible to determine whether participants would have contrasted their self-evaluations away from their initial status if given more information about their progress. Research has shown that temporal landmarks—intervening events between a past self and a present self—increase perceived distance between the past and present selves, and greater perceived distance encourages contrast effects (Broemer et al., 2008; Peetz & Wilson, 2013). The feedback participants were given at different points during the Zell and Alicke study could have served as temporal landmarks in the context of performance, thus making
their past self (i.e., their performance at the first time point) seem distant from their present self and producing contrast effects.

Third, comparison information was more constrained in the Zell and Alicke (2009) study than in the present research. Participants in their study were given false feedback about their performance, in the form of objective scores, whereas participants in the present research were asked to choose a comparison target (within the bounds of the prompt) and answer open-ended questions about that individual. This is a key difference between the two sets of research. As previously discussed, the data from the present research suggest that participants in the social comparison conditions chose more extreme targets than those in the temporal comparison conditions. In Zell and Alicke’s study, participants did not have this option. Interestingly, although they could not control the temporal comparison information they received in the Zell & Alicke study, participants did appear to use that information selectively. Specifically, participants’ tendencies to discount potentially threatening information about their own performance is consistent with participants’ choice of temporal comparison targets in the present research. In the upward comparison conditions, the extremity of social and temporal comparison targets did not differ. However, in the downward comparison conditions, participants chose more moderate temporal comparison targets and more extreme social comparison targets. Choosing a more extreme downward temporal comparison target would likely have produced contrast effects similar to those observed in Zell and Alicke’s study (Hanko et al., 2010). In both cases, participants avoided threatening downward temporal comparison information—either by discounting the information or by not making an extreme downward comparison in the first place. Thus, the assimilation effects observed
in the present research were likely a byproduct of the less extreme temporal comparison targets.

Moreover, this difference in extremity also has implications for the importance of the target selection stage in the SAM. The original hypotheses for the present research stated that temporal comparison would result in assimilation effects due to greater perceived similarity to one’s past self than to other people (e.g., Broemer et al., 2008; Grabowski & Broemer, 2015; Wilson & Ross, 2001). In other words, the major difference between social and temporal comparison would have occurred at the comparison (similarity testing) stage, not the target selection stage. However, both implicit and explicit measures of similarity revealed no significant differences between the social and temporal comparison conditions. The data suggest that social and temporal comparison likely diverged at the target selection stage instead. Based on prior research, more extreme social comparison targets would ultimately lead to contrast effects in the self-evaluation stage, and more moderate temporal comparison targets would lead to assimilation effects (e.g., Dijksterhuis et al., 1998; Hanco et al., 2010; Herr, 1986; Mussweiler et al., 2004). Indeed, this pattern of results was observed across two of the three studies.

The importance of target selection has practical implications in addition to the aforementioned theoretical implications. Both social and temporal comparisons are commonly made in daily life, often without a conscious choice to engage in comparative thought (e.g., Gilbert et al., 1995; Mussweiler & Ruter, 2003; Summerville & Roese, 2008). Results of the present research suggest that individuals who would like to improve their self-perceptions and their behavior may benefit from comparing their present selves
to a healthier past self or to someone else who is less healthy. Specifically, those who evaluated their present fitness more positively were more likely to intend to engage in exercise. Negative self-evaluations may also encourage healthy behavior, if they are accompanied by resources for improvement. In Study 2, negative self-evaluations were associated with a greater likelihood of choosing to receive a newsletter with fitness advice. This is consistent with the extant literature, which has shown that both positive and negative self-evaluations invoked by comparative thought can lead to changes in health behaviors (e.g., Dijkstra & Buunk, 2008; Hoffner & Ye, 2009; Lane et al., 2011; Mahler et al., 2010; Schmiege et al., 2010; Shakya et al., 2015). Prompting positive self-evaluations may lead to increased self-efficacy, which can then lead to improvement in health behaviors (Shakya et al., 2015). On the other hand, prompting negative self-evaluations may lead to improvement in behaviors by increasing individuals’ awareness of their unhealthy habits (e.g., Dijkstra & Buunk, 2008; Shakya et al., 2015; Schmiege et al., 2010). Pairing such awareness with resources for positive change (e.g., information and advice) may be useful in promoting positive change, as suggested by the results of Study 2. Importantly, the effects of comparative thought on self-evaluations appeared to be fleeting in the present research. Specifically, completing a picture comparison task immediately after engaging in social or temporal comparison in Study 2 appears to have negated the effects of comparative thought on self-evaluations. Any intervention should aim to bolster the effects of comparative thought in order to impact subsequent behavior. Timing of an intervention may also be important. For example, engaging in comparative thought immediately before exercising may be more effective than making a comparison earlier in the day.
As previously discussed, it is unclear whether these results have similar implications in other domains or whether they are specific to fitness. Zell and Alicke’s (2009) study, which produced a somewhat different pattern of results, provided participants with quantitative feedback on their social skills. Even within the domain of fitness, quantitative comparisons (e.g., measures of endurance, speed, or strength) may have produced different results than qualitative comparisons.

In sum, the present research was among the first to examine the processes and outcomes of social and temporal comparison simultaneously, in a health-related context. Specifically, the effects of comparison target (i.e., social or temporal) and comparison direction (i.e., upward or downward) on self-evaluations were examined using the Selective Accessibility Model (SAM) as a theoretical framework (Mussweiler, 2003). Results tentatively suggested that social comparison led to contrast and temporal comparison led to assimilation, such that upward temporal comparison and downward social comparison produced positive self-evaluations of fitness. This finding is partially consistent with a study that demonstrated strong contrast effects following social comparison and some evidence of contrast following temporal comparison (but only when the added temporal comparison information would be self-enhancing; Zell & Alicke, 2009). The present research also illustrates the importance of the target selection stage in the SAM, as social and temporal comparison appeared to diverge at this initial stage, such that participants chose more extreme social comparison targets than temporal comparison targets. This difference in target extremity partially accounted for the contrast effects observed in the social comparison condition and the assimilation effects observed in the temporal comparison condition. This finding is important because in daily life,
comparisons are typically not constrained. Taken together, this research suggests that individuals choose different social comparison than temporal comparison targets, and that these different comparisons can alter their views of themselves.
References


Appendix A

Self-Evaluations

1. How many sit-ups could you perform?

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<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>No sit-ups or very few</td>
<td>A few sit-ups</td>
<td>A moderate amount of sit-ups</td>
<td>Quite a few sit-ups</td>
<td>Very many sit-ups</td>
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</table>

2. Estimate how many sit-ups you could perform without taking a break.

____________________

3. How fast can you run, bike, or swim?

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<tbody>
<tr>
<td>Very slowly or not at all</td>
<td>Slowly</td>
<td>Moderate</td>
<td>Fast</td>
<td>Very fast</td>
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4. Estimate how many seconds would you need to run 100 meters (the straight part of one side of a running track).

____________________

5. How is your endurance (your ability to exercise for a long time without taking a break)?

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<tbody>
<tr>
<td>Very poor</td>
<td>Poor</td>
<td>Moderate</td>
<td>Good</td>
<td>Very good</td>
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</table>

6. Estimate how many minutes you could run or do other intense cardiovascular exercise without stopping.

____________________

7. How strong are you?

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<tbody>
<tr>
<td>Very weak</td>
<td>Weak</td>
<td>Moderate</td>
<td>Strong</td>
<td>Very strong</td>
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</table>
8. Estimate how many pounds you could lift. _____________

9. How healthy is your diet?

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<tbody>
<tr>
<td>Very unhealthy</td>
<td>Unhealthy</td>
<td>Moderate</td>
<td>Healthy</td>
<td>Very healthy</td>
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10. Estimate how many servings of fruits and vegetables you eat in an average day. _____________

11. How physically fit (“in shape”) are you currently?

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<tbody>
<tr>
<td>Not at all physically fit</td>
<td></td>
<td></td>
<td></td>
<td>Very physically fit</td>
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12. Enter any other comments about your fitness here.  
__________________________________________________________________  
__________________________________________________________________  
__________________________________________________________________  
__________________________________________________________________  
__________________________________________________________________  

86
Appendix B

Comparison Target Questions

1) What makes this person (made you) unfit and unhealthy (fit and healthy)?

2) Does this person (did you) play any sports, either for school, club, or recreation? What sports do (did) they (you) play?

3) Describe this person’s physical strength (your physical strength during that time). Are they (were you) capable of lifting heavy things?

4) Describe this person’s endurance (your endurance during that time). Are they (were you) capable of running a race? Going for a long walk or bike ride?

5) Describe this person’s (your) general weight and body type (during that time).

6) How does this person’s (did your) physical fitness compare to other people of their (your) age and gender?

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<tr>
<td></td>
<td>Much less fit than average</td>
<td>Less fit than average</td>
<td>Average</td>
<td>Fitter than average</td>
<td>Much fitter than average</td>
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7) How similar is this person (your past self) to you (your present self)?

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<tr>
<td></td>
<td>Not at all similar</td>
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<td>Completely similar</td>
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Appendix C

Target Extremity Questions

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<tr>
<td></td>
<td>0 days per week</td>
<td>1-2 days per week</td>
<td>3 days per week</td>
<td>4-5 days per week</td>
<td>6-7 days per week</td>
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1. In a typical week, how often does this person (did you) go to a gym or recreation center?
2. In a typical week, how often does this person (did you) lift weights or do other strengthening exercises?
3. In a typical week, how often does this person (did you) play a sport?
4. In a typical week, how often does this person (did you) participate in outdoor physical activities?
5. In a typical week, how often does this person (did you) do cardiovascular exercise (defined as physical activity that raises your heart rate)?

To your knowledge, does this person (During the time period you described, did you) work at a gym or recreation center?

YES       NO
Appendix D

Picture Comparison Task
1. List as many **similarities** between the two pictures as you can find.
2. List as many **differences** between the two pictures as you can find.
3. Overall, how similar are these two pictures?

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</tr>
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<tbody>
<tr>
<td>Not at all similar</td>
<td></td>
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<td></td>
<td>Completely similar</td>
</tr>
</tbody>
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