Threat and Performance:
Do Upward Social Comparisons Bolster Performance?

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Abstract

This investigation examines how upward social comparisons, comparing oneself to another who is perceived as better than oneself, affects performance. The self-evaluation maintenance model states that if a person is threatened by another in a certain domain, he may withdraw effort from that domain and then refocus on a different domain where he can outperform the other person (Tesser 1988). For this investigation, we used Johnson and Stapel's (2007a, 2007b) procedure. Participants read about a successful student (either a freshman, senior, or a freshman with a disability) in either a verbal or science domain. Participants who read about a freshman, either with or without a disability, felt the freshman's successes were unattainable on the same timetable. If a person does not believe he can achieve the same things as his comparison target, he feels threatened (Lockwood & Kunda, 1997). Participants then took the Remote Associates Task (RAT), a test of verbal and creative abilities. We found support for Tesser's SEM model, such that participants who read about the science successful student and took the RAT (mismatched domains of comparison and testing) answered more RAT items correctly than participants who read about the verbal successful student (matched domains). Implications for using social comparisons in a beneficial manner and future directions of research are discussed.

Threat and Performance: Do Upward Social Comparisons Bolster Performance?

People are known to look to others and to engage in social comparison to learn about themselves, a concept and phenomenon first identified by Leon Festinger (1954) in the area of personality and social psychology and studied intensively since (e.g. Dijkstra, Gibbons, & Buunk 2010). With regard to opinions and emotions, people are highly motivated to compare with others, at least on ambiguous dimensions where no strict and easily measured standards are available, with an eye to assess identity and standing. How an individual seems to stack up has an impact on one's feelings, thoughts, and actions.

To illustrate, imagine two friends who take the same college course. One does much better than the other. The two friends will almost certainly compare with one another as to their outcomes, their efforts, their investment, and so forth, all with an eye to appraise their respective performances and their perceived basis for the outcomes. This process of comparative appraisal is the essential ingredient of social life that Festinger (1954) identified in the early 1950s. When social comparison is focused on the competence dimension, Festinger (1954) added a critical corollary: There is a "unidirectional drive upward" in the case of ability comparison, stemming largely from people's recognition that one end of the distribution is generally regarded as better than the other (i.e., high ability). For this reason, people strive to improve and to grow; hence, social comparison with similar others is forgone and comparison with superior others is preferred.

Downward social comparisons are also known to occur, and theorists and researchers have also devoted considerable attention to this sort of comparison since Festinger's first ideas were published centered on identifying the moderators (boundary conditions) that promote either upward or downward social comparison (e.g. Myers & Crowther, 2009; Cheng & Lam, 2007;

Jones & Buckingham, 2005). The basis for downward social comparison, not surprisingly, is different than the motivational basis for upward comparison. Specifically, people engage in downward social comparison to enhance their subjective well-being, especially to regain self-esteem after some type of ego threat (Willis 1981).

Researchers have long since been interested in how social comparisons affect actual behavior, including task performance. Research findings are mixed with some experiments showing that upward comparison can help while some work shows that upward comparison can harm an individual's performance. In one experiment, students who compared to extremely successful classmates performed better in school than students who compared to moderately successful classmates (Blanton, Buunk, Gibbons, & Kuyper, 1999). Researchers also found that one's peers in a task group impacts performance. Compared to participants who worked with an inferior partner, participants who worked with a superior partner performed better (Seta, 1982). In another study, participants primed with an exemplar academic figure (in one study, Albert Einstein) performed worse on an intelligence test than participants exposed to an exemplar comparison obviously selected for physical attractiveness (i.e. Claudia Schiffer; Dijksterhuis, Spears, Postmes, Stapel, Koomen, Knippenberg, & Scheepers, 1998). In another experiment, when participants compared upward their performance decreased, but when they compared downward their performance increased (Stapel & Suls, 2004).

Only a little research has been focused squarely on the reasons performance is sometimes helped and sometimes hindered after upward comparisons. One researcher argued that upward comparisons increase an individual's belief in the likelihood of success. This shift in probabilities inspires an individual to work harder and thus perform better (Seta, 1982). Other researchers contend that sometimes upward comparisons increase performance by reducing

stereotype threat (Marx & Roman, 2002). Stereotype threat (e.g., Steele and Aronson, 1995) is generally defined as an individual's feeling at risk of confirming a negative stereotype about her or his group – when one is a member of a group that could be characterized as uniquely defined by the stereotypical quality. For instance, a woman might perform badly on a mathematics test she believes will produce gender differences. The woman is concerned with confirming the negative stereotype that women are bad at math, and thus her performance suffers.

In addition to the impact on performance, research has also been focused on how people's self-evaluations are influenced by comparison to others. Previous research has found that upward social comparisons force an individual to confront her or his own inadequacies and so it is threatening to his self-esteem (Wood, 1989). These upward comparisons are particularly threatening when an individual is similar to the superior comparison target. For example, when women saw pictures of extremely attractive women, they rated their own attractiveness comparatively low. If the women were told the attractive comparison others were professional models, however, the participants and their comparison others were no longer similar. When this dissimilarity prevailed, participants rated their own attractiveness relatively higher (Cash, Cash, & Butters, 1983) than when they were led to feel they were similar to the comparison others.

Other evidence suggests that when an individual compares to a similar competitor, upward social comparisons are harmful to self-regard (Brickman & Bulman, 1977). For example, a young basketball player who compares to another young basketball player, and comes up wanting – comparatively -- will feel threatened. If that same young basketball player compares to basketball star Michael Jordan, he will not feel threatened and may, instead, feel inspired (Wood, 1989) – an enormously different result. Research also shows that upward comparisons may cause a threat to self-esteem when it seems plain that another's successful outcomes are unattainable

for oneself. For whatever reason, when a person does not believe she or he can achieve the same things as a comparison target, threat rather than inspiration may ensue. These feelings of unattainability can stem from a variety of factors, but one that has been used in research frequently is the age of the comparison other, or cohort (Lockwood & Kunda, 1997). To illustrate, when a collegiate sophomore compares to a senior who has achieved an exemplary academic record and social life it is possible that she or he will feel inspired to achieve something similar to what the senior scholar/socialite has accomplished. By contrast, when that same sophomore compares to another sophomore, one with a similarly exemplary academic record and social life, the comparison may yield feelings of threat rather than inspiration since the comparison other's results are no longer personally attainable.

Individuals must find some way to cope with these threats and restore or repair their self-esteem. Tesser's (1988) self-evaluation maintenance (SEM) model describes one way to cope with these threats. Specifically, a person threatened in one arena (say, mathematics) may withdraw effort in that domain (e.g., change one's major away from anything quantitative) and regroup in a different arena (e.g., something fundamentally verbal) where she or he can outperform the comparison other. To illustrate, a woman who compares her cooking skills to another woman's and comes up quite short might withdraw effort from cooking (e.g., quit cooking class) and dwell more extensively on her physical appearance, with a make-over, spa visit, and new wardrobe -- assuming she believes that she can outperform (i.e. look better than) her comparison other. Such a radical change in one's behavior may be more likely when the comparative appraisal is unavoidable, such as when two sisters compare to one another (and fratricide is ruled out), or two roommates spend a lot of time together (and changing roommates is not feasible). Quitting the cooking domain (and thus removing herself from the unremittingly

unflattering comparisons) and switching comparison dimensions while increasing her attractiveness should shore up the woman's self-esteem. Other research focusing on stereotypes also found that individuals maintain positive self-regard by withdrawing effort and shifting domains following a threat to the self (Crocker & Major, 1989).

Social Comparisons, Self-esteem, and Performance

In a series of studies, Johnson and Stapel (e.g. 2007a, 2007b) explored the connections between comparisons, self-evaluations, and performance. Previous research had not addressed all three of these components in the same study. First, they investigated the relationship between threatening upward comparisons and performance. They found that participants exposed to a threatening comparison other performed better, and those exposed to a non-threatening comparison other performed worse (than participants assigned to a control condition). Further, if participants self-affirmed before comparisons occurred, the performance increase disappeared. The authors believed this self-affirmation removed the threat from the upward comparison, and thus participants no longer needed to increase performance on the task as a method to repair their self-esteem. In addition, they found that performance increases only occurred when the domain of comparison was different from the domain of performance. This further demonstrated that participants were using the SEM (Tesser, 1988) model by performing well to counteract a threat to self-evaluations, implying that this was not due to increased goal activation or motivation caused by the mere exposure to a successful person. In sum, this experiment suggests that an individual's need to maintain and repair self-esteem produced the performance increases after social comparisons (Johnson & Stapel, 2007a).

Second, these authors further investigated the relationship between threatening comparisons in matched versus unmatched domains. Domains are said to be matched when both the domain in which a person compares and the domain in which a person is tested are the same. Domains are said to be mismatched when the domain of comparison and the domain of testing are different. They found that participants comparing to a threatening target showed increased performance when domains were unmatched. This increase in performance reflected a desire to repair self-regard. Next, the researchers explored the mechanism by which unmatched domains allow for better performance. When participants compared in one domain and tested in another, their performance expectancies increased. Thus unmatched domains allow feelings of threat and incompetence to change to expectations of success. The researchers also found that both the comparison other and testing domain do not need to be general or specific to cause performance increases. Their study showed that when the comparison other was generally successful and the testing domain was specific, threatening comparison others led to better performance. In sum, this experiment suggests that when an individual compares to a threatening comparison other, performance will increase only in an unrelated domain (Johnson & Stapel, 2007b).

Third, they investigated further how increased performance leads to a repair of self-esteem after an unflattering comparison. They found that, as their previous work suggested, self-esteem was repaired only when the comparison domain and testing domain are different. Next, they found that self-esteem was repaired only when the test was indicative of an important ability. Moreover, their study found that when the threat to self-esteem is reduced, performance suffers because threat motivates individuals to perform better. In sum, this experiment suggests that allowing an individual to increase performance (and thus self-affirm) restores self-esteem which, in turn, harms performance (Johnson, Norton, Nelson, Stapel, & Chartrand, 2008).

Finally, they investigated how upward comparisons affect goals. They found that participants shift their goals away from the domain of comparison toward a general goal (Johson & Stapel, 2010). For example, a student might have the goal to increase his multiplication skills. After comparing to another student who excels at multiplication, the student might lower his commitment to the original goal of improving multiplication skills and instead commit to the more general goal of improving his academic achievement.

With the exception of the studies noted above (Johnson & Stapel, 2007a, 2007b, 2010; Johnson et al., 2008), there has been no research on the effects of comparisons, self-regard, and performance. The purpose of the present study is to replicate previous findings that a threat to self-regard causes increased performance in an unrelated domain. We also wish to take a step beyond previous work by testing the effect of a different, and perhaps even greater, level of threat on performance. Specifically, we compare performance levels on the Remote Associates Test (Mednick, 1968; Mednick & Mednick, 1967) of a control group of individuals to individuals under low threat, moderate threat, and high threat. We instantiated these conditions by having participants compare to a superior other of an older age, a superior other of the same age, or a superior other of the same age but who also had been diagnosed with a learning disability. Johnson and Stapel (2007a, 2007b) previously used and tested the validity of age as a manipulation of threat. Thus our low, moderate, and control conditions all have a proven track record in prior research. To create a high threat group, we decided to create a dual-threat condition. By dual-threat we mean a threat to the individual that stems from two different factors.

One threat stems from the comparison other's age; the other from his learning disability. That is, we had participants compare to a student of the same age but who also had been

diagnosed as dyslexic. Past research showed that people view learning disabled people as

having/being low general ability (May & Stone, 2010), poor social skills, more behavioral

problems, and as being less likeable (Haager, Watson, & Willows, 1995). Consequently, we

anticipated that the threat of being outperformed by a person believed to be inferior in such a

significant way would present a very real threat to the participant's self-regard.

Method

Participants

128 undergraduate students (83 male – 45 female; 91 white, non-Hispanics) were

recruited from the Introductory Psychology course at Ohio State University and each participant

received partial credit toward a course requirement. One participant's data were not analyzed

because he did not understand the correct way to answer the RAT items. Participants were

between the ages of 18-50 (average age of 20) and were 65.6% Caucasian.

Materials

We manipulated the age and domain of the comparison other by having participants read

stories about one of six successful Ohio State students: a verbal/creative successful freshman, a

verbal/creative successful senior, a verbal/creative successful freshman with dyslexia, a science

successful freshman, a science successful senior, a science successful freshman with dyslexia, or

a report on campus construction (the control group). In all the experimental conditions,

participants read about a successful student, James Marshall, who won a prestigious award worth

$8,000. He was described as being academically and socially successful. To manipulate the

domain of comparison, James was described as either interested in the hard sciences or the

humanities. The award was open to either "chemistry, math, biology, engineering, and health

science majors" or "communication, education, business, and English majors." His success in winning the award was attributed to "exemplary analytical and mathematical abilities" or his "exemplary verbal and creative abilities." To manipulate the age of the comparison other and thus the level of threat experience, James was described as either a freshman who had been diagnosed with a learning disability, merely as a freshman, or as a senior (see Appendix A).

We wanted to assess how this manipulation affects performance on the Remote Associates Test, the RAT (Mednick, 1968; Mednick & Mednick, 1967). The RAT involves asking participants to generate a word that relates to the three given words. For example, participants were given three words such as "Shopping; Washer; Picture" could complete the problem by citing the word "Window" which effectively connects the three words conceptually (see Appendix B). This test has been used successfully to test creative ability (e.g., Ansburg, 2000; Bowers, Regehr, Balthazard, & Parker, 1990; Beeman & Bowden, 2000). We also collected pretest and posttest scores in order to see how the type of comparison other affects one's perception of the test (see Appendix C).

Procedure

This experiment was a 2 x 3 between subjects factorial design. Conditions varied on the level of threat (either low, moderate, or high) and on the matching of the comparison and testing domains (either matched or mismatched). Participants were randomly assigned to one of six experimental conditions, with an additional "hanging" control condition. The experiment took approximately 30 minutes for each participant to complete.

Participants were recruited from a website used routinely to recruit participants for psychological research. On arrival, they were led into a large computer room, assigned to a specific seat, and soon after they were instructed to begin the experiment. Groups ranging in size

from one to eight participants completed the experiment in any given session. Participants read

directions for the study and then were first asked to read about and then to reflect on a

comparison target named James Marshall. James was described as an extremely successful

student whose success was attributed in the story either to analytical (mismatched condition) or

verbal/creative skills (matched condition). The student was the same age as participants but did

not have a disability (moderate threat condition), older than participants with no disability (low

threat condition), or the same age as participants but described as having been diagnosed with

dyslexia (high threat condition) within the narrative provided.

After reading the paragraph and reflecting for 2 minutes, participants then read

instructions for the RAT and performed a pretest rating for the RAT measuring perceptions of

difficulty for the RAT. Participants rated (on a Likert-type scale with 1 and 10 as the end-point

anchors) "…how difficult the RAT appears to be." Participants then completed the RAT. We

measured participants' performance on this test by counting the number of correct answers given

and time taken to complete this test. Next, participants performed two posttest ratings for the

RAT measuring perceptions of RAT difficulty and performance satisfaction. Participants rated

(same Likert-type scale) "…how difficult you found the RAT" and "how satisfied you were with

your performance on the RAT." After completing these ratings, participants were thoroughly

debriefed, thanked, and then dismissed.

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Results

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Descriptives

Participants ranged in age from 18 to 50 with a mean age of 20.   71% of participants

were white (non-Hispanic); 58.6% were freshman. 64% were males with a mean reported high

school GPA of 3.6 and a mean reported college GPA of 3.1. None of these measures accounted

for any variance in the scores obtained, and so were not included in the analyses. Because data were gathered over two separate quarters, we controlled for a quarter of administration statistically in all of our analyses by adding it as a covariate in ANOVA analyses.

Performance

A Univariate ANOVA revealed a main effect of domain of the comparison other on performance, $F(6, 121) = 4.47$, $p < .04$. Participants in the matched domains conditions showed decreased performance by solving fewer RAT items ($M = 2.97$, $SD = 2.81$) while those in the unmatched conditions showed an increased performance by solving more RAT items ($M = 4.03$, $SD = 2.93$).

There was no main effect of the supposed age of comparison other on performance, $F(6, 121) = 0.65$, $p = .52$. Participants who read about a senior ($M = 3.40$, $SD = 2.65$), a freshman ($M = 3.19$, $SD = 3.07$), or a freshman with a learning disability ($M = 3.91$, $SD = 3.00$) performed comparably. Additionally, no interaction of age and domain emerged on the performance measure, $F(6, 121) = .788$, $p = .457$ (see Table 1).

Time

The second measure, elapsed time while taking the test, yielded no effects on the Univariate ANOVA. There was also no main effect of domain of comparison other, $F(6, 120) = .373$, $p = .542$, and no interaction. Thus there was no time difference for participants in the matched condition ($M = 5.49$, $SD = 3.15$), or when the domains did not match ($M = 5.18$, $SD = 2.28$).

Further, there was no main effect of age of comparison other on elapsed time, $F(6, 120) = .44$, $p = .646$. Thus there was no time difference for participants who read about a senior ($M = 5.34$, $SD = 3.16$), a freshman ($M = 5.04$, $SD = 2.17$), or a freshman with a disability ($M = 5.60$,

SD = 2.83). There was also no interaction of age and domain of success of the comparison other on elapsed time, $F(6, 120) = .262$, $p = .770$ (see Table 2).

Perceptions of Test

A similar Univariate ANOVA was conducted on the measures of ratings of test difficulty and ratings of performance satisfaction. Once again, no main effects or interactions emerged on either measure. There was no main effect of domain of comparison other on our pretest of test difficulty, $F(6, 120) = .204$, $p = .653$, our posttest of test difficulty, $F(7, 119) = .451$, $p = .503$, or our posttest of performance satisfaction, $F(7, 119) = .048$, $p = .827$. There was also no main effect of age of comparison other on our pretest of test difficulty, $F(6, 120) = 1.572$, $p = .212$, our posttest of test difficulty, $F(7, 119) = .465$, $p = .629$, or our posttest of performance satisfaction, $F(7, 119) = .193$, $p = .824$. Further, there was no interaction effect between age and domain of success of the comparison other on our pretest of test difficulty, $F(6, 120) = .356$, $p = .701$, our posttest of test difficulty, $F(7, 119) = 1.479$, $p = .232$, or our posttest of performance satisfaction, $F(7, 119) = .993$, $p = .374$ (see Table 3).

Discussion

Based on the existing literature we expected that participants who feel threatened because of an upward comparison to a successful student would show increased performance if they are provided an opportunity to counteract that threat by becoming successful themselves in some different domain. By contrast, participants who feel threatened, but who do not have the opportunity to counteract the threat in a different domain, were expected to show performance decrements. As a secondary, subordinate hypothesis, it was also anticipated that although participants might not be able to increase their performance, they might try especially hard to do so and thus would devote a longer period of time to taking the test. Specifically, we predicted

that participants who feel threatened and who are given the opportunity to counteract that threat would show an increase in elapsed time taking the test. By contrast, it was expected that participants who felt threatened but did not have an opportunity to counteract the threat would show decreased time-on-task. In sum, we expected to find a main effect of threat level, a main effect of comparison domain, and an interaction of these two variables on both the measures of performance and elapsed time-on-task.

Results did reveal the main effect of comparison domain on performance. However, there was no main effect of threat level on performance and the predicted interaction of domain and threat also did not emerge. In addition, the results showed there were no effects on the measure of time elapsed while taking the test.

These results suggest that upward social comparisons may be most helpful (as inspiration for greater achievement) when the domain of comparison and the domain of testing are mismatched. We found that participants who read about a successful student in the science arena performed better on a test of verbal/creative ability than those who read about a successful student in the verbal/creative arena. When people are threatened in one domain, yet must perform in some other domain, this may permit a disengagement from the threatened domain and, consequently, inspire an increase of effort in the tested domain. If so, this would permit the threat to the self to be managed effectively (i.e., deflected).

This finding would seem to lend support to Tesser's (1988) analysis of the implications of social comparisons, outlined in 1988, and termed his Self-Evaluation Maintenance model. He argued that a person threatened in one arena may be motivated to withdraw effort in that arena specifically, and then refocus her or his investment of effort on a different arena where outperforming the comparison other is more likely.

It is interesting to note that this difference between conditions where domains were matched versus mismatched was especially pronounced when the threat was moderate. Specifically, when participants compared to a successful freshman, the impact of match of domain was the most notable. This suggests that similarity of a comparison other to the self is an important dimension of threat, which is still one more confirmation that Festinger's original theorizing was itself inspired. We did not include a manipulation check of threat so there is no way to know if participants truly felt more threatened by comparison to a most similar other in this condition; however, past research has shown that comparisons to high, as opposed to low, similarity targets leads to differential outcomes. For instance, Cash, Cash, and Butters (1983) found that female students felt less attractive after they were exposed to pictures of an attractive woman (high similarity condition), but this effect did not emerge when female students knew that the attractive woman was a supermodel (low similarity condition). It follows, then, that participants would feel most threatened by comparison to a similar target, i.e. another freshman student with no disabilities.

Limitations and Future Research

Threat Manipulation. Threat was varied through a manipulation of perceived attainability in the present study. Comparison to a successful senior was expected to produce identification and inspiration, because participants should believe that they might be able to achieve comparably to the other, and on the same timeline. In short, comparison to a senior should produce high relative judgments of attainability, and feelings of threat should be comparably low, in light of that attainability. By contrast, comparison to a successful freshman should produce low relative judgments of attainability, and participants should feel highly threatened by the success because they should sense that they are not able to achieve those successes – and

certainly not in the same timeframe. In short, comparison to a freshman makes attainability unlikely, even impossible, and thus should produce feelings of threat.

For this study, we added a dual-threat condition by having participants compare to a freshman who was described as possessing a learning disability. We expected that this information would heighten the threat that participants experienced: not only would participants not be able to achieve comparable success to the other, and on the same timeline, but the comparison-other's accomplishment (overcoming an obstacle, the disability) would make a comparable performance entirely impossible. In the future, a manipulation check should be included to ensure that the level of threat is being manipulated sufficiently strongly and clearly. Although unanticipated, our results indicate that similarity played an important role in threat level. Similarity, either like me or not like me, seemingly overwhelmed the attainability dimension of threat. Future research could profitably explore whether similarity is a more potent factor in creating threat than is attainability.

Further, with 20-20 hindsight, it seems very important to ensure participants are threatened in an arena that is personally relevant to them. Previous research found that when self-esteem is not contingent on a domain, a threat in that domain does not cause large decreases in esteem (Crocker & Wolfe, 2001). Thus if participants' self-esteem is not contingent on academics, our threat manipulation would be anticipated to have little effect on them. In the future, researchers might pretest to identify students with an academic contingent on self- worth, thus ensuring that their self-esteem would be directly affected by threats in the academic domain.

Further, it might be useful to include different sorts of identity threats in future research. For example, a threat could be created through other-enhancement, which occurs when individuals give a comparison other an advantage. Previous research has examined other-

enhancement as a self-protection strategy related to self-handicapping (Shepperd & Arkin, 1991). The other's advantage is used to obscure the comparison between the self and the other. Thus when a failure occurs, the advantage can be used to excuse failure and a person's own competence is not implicated. However, if a success occurs despite the advantage, the person's competence and ability is given a boost. We believe that using an other-advantage as self-threat could be used in future studies and as a new tool for self-researchers. For example, as in extension of our study, participants could read about a successful student who was older than the participants (low threat through attainability), the same age as participants (moderate threat through attainability), or the same age as participants but who also has connections, money, etc. (high threat through attainability and additional advantages).

Additionally, it will be important to examine the effect of public vs. private beliefs of advantages. Examining whether just the person himself, the general public, or both need to believe in the significance of the advantage for the threat to occur will have important implications for the use of other-enhancement as a threat manipulation. If only the person himself believes in the advantage and not the general public, will other people ascribe the individual's failure to the advantage or to personal incompetence? On the other hand, if the general public believes in the advantage but not the individual himself, others might excuse a failure due to the advantage. But will the person himself take the blame and suffer a blow to self-esteem? Future research should address these questions. For example, in our study, some participants compared to a successful student with dyslexia. Examining the participants' beliefs about dyslexia as a moderator of threat would be interesting and could explain why our threat manipulation did not work as expected.

Performance Measure. In the present study, we used performance on the Remote Associates Test as our chief dependent measure. Our subjective impression was that participants had a very hard time with this test. Performance scores ranged from 0 to 13 out of 20, with a mean of only 3.5 items correct, and participants described the test as very challenging during debriefing. Although we found some effects, using a dependent measure that is more sensitive and that yields more variability, may be helpful for future researchers as more variance will allow researchers to see the effects of a threat manipulation more easily. Future research might profitably use items from the Graduate Management Admission Tests (GMAT), the Graduate Record Examination (GRE), or any similar standardized test. These measures could better separate high and low performance and thus effects could be seen more easily.

Implications

People compare to others countless times and to a wide variety of people every day. Our research suggests that people looking for inspiration should compare to an extremely successful person who is similar to them, either by age or other dimensions such as native ability. In this circumstance, the individual will be motivated to perform better…but, ironically, only when the individual has the opportunity to perform in some domain other than the one where the comparison took place! For instance, comparing to a fellow student or roommate can be beneficial, even when the other is vastly superior, but only so long as the students have different majors or are enrolled in separate classes. Thus knowing who to compare to so as to become motivated and in such a way as to help performance is an extremely important skill that could benefit many people. However, performance might suffer if participants are not given the opportunity to counteract the threat in a different domain. A comparison to a wildly successful roommate who takes all the same classes, is in the same clubs, etc. would hurt a student's

performance in those domains since there is no vehicle for the individual to counteract the threats experienced.

Conclusion

The present study contributes to a clearer understanding of the relationship between social comparisons, self-regard, and performance. The findings suggest that not all social comparisons are equal. Sometimes, comparisons to others are quite threatening to the self; other times, they are seemingly less so. The similarity of the comparison target and the attainability of the target's successes both emerged as important dimensions that must be taken into account when anticipating the threat a person may feel when engaging in comparison and the likely impact on that individual's performance and commitment. Importantly, it is clear that merely increasing threat level is not enough to boost performance – participants must have the opportunity to counteract the threat – but in a novel, noncomparable domain. Further, what feels uncomfortable to people, such as engaging in upward comparison to a threatening individual, actually helps performance more than comparing to a non-threatening individual, something people feel comfortable and safe in doing. In a sense then, the familiar phrase "No pain, no gain" seems not only applicable to the exercise and physical fitness domain, but it may be the best mantra for one to find inspiration in other domains as well. This includes the intellectual performance where comparison to others is routine in our highly Western, individualistic society.

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Appendix A: Comparison Stories

Control

Starting on May 15, 2010 and with a projected completion of August 1, 2013, the Ohio State University is conducting a 1.72 million dollar renovation of five south campus dormitories. Siebert, Stradley, Park, Smith, and Steeb Halls will be revamped. Stradley and Park Halls as well as Smith and Steeb Halls will be connected with an addition turning four buildings into two large buildings. Siebert Hall will also be renovated and improved. All the community bathrooms will be converted into private bathrooms. Finally, all rooms will become air conditioned with the addition of a new chiller plant.

The University believes that this construction is necessary to improve the quality of life for students in those dormitories as well as creating new construction jobs for Ohio residents.

Domain: Unmatched   Threat: High

James Marshall is a freshman at the Ohio State University. He has dyslexia, a learning disability that affects reading skills. He is interested in the hard sciences and can easily organize and integrate scientific information. He is an academically and socially successful student. He has a high GPA, is involved in numerous clubs, plays recreational sports, and has a large, diverse group of friends. He is a considerate and interesting member of the student body.

This past summer, James was considered for a prestigious award open to chemistry, math, biology, engineering, and health science majors. Due to his exemplary analytical and mathematical abilities, James won the award and the $8,000 prize.

Domain: Unmatched   Threat: Moderate

James Marshall is a freshman at the Ohio State University. He is interested in the hard sciences and can easily organize and integrate scientific information. He is an academically and socially successful student. He has a high GPA, is involved in numerous clubs, plays recreational sports, and has a large, diverse group of friends. He is a considerate and interesting member of the student body.

This past summer, James was considered for a prestigious award open to chemistry, math, biology, engineering, and health science majors. Due to his exemplary analytical and mathematical abilities, James won the award and the $8,000 prize.

Domain: Unmatched   Threat: Low

James Marshall is a senior at the Ohio State University. He is interested in the hard sciences and can easily organize and integrate scientific information. He is an academically and socially successful student. He has a high GPA, is involved in numerous clubs, plays recreational sports, and has a large, diverse group of friends. He is a considerate and interesting member of the student body.

This past summer, James was considered for a prestigious award open to chemistry, math, biology, engineering, and health science majors. Due to his exemplary analytical and mathematical abilities, James won the award and the $8,000 prize.

Domain: Matched   Threat: High

James Marshall is a freshman at the Ohio State University. He has dyslexia, a learning disability that affects reading skills. He is interested in the humanities and can easily communicate complicated ideas to others. He is an academically and socially successful student. He has a high

GPA, is involved in numerous clubs, plays recreational sports, and has a large, diverse group of friends. He is a considerate and interesting member of the student body.

This past summer, James was considered for a prestigious award open to communication, education, business, and English majors. Due to his exemplary verbal and creative abilities, James won the award and the $8,000 prize.

Domain: Matched   Threat: Moderate

James Marshall is a freshman at the Ohio State University. He is interested in the humanities and can easily communicate complicated ideas to others. He is an academically and socially successful student. He has a high GPA, is involved in numerous clubs, plays recreational sports, and has a large, diverse group of friends. He is a considerate and interesting member of the student body.

This past summer, James was considered for a prestigious award open to communication, education, business, and English majors. Due to his exemplary verbal and creative abilities, James won the award and the $8,000 prize.

Domain: Matched   Threat: Low

James Marshall is a senior at the Ohio State University. He is interested in the humanities and can easily communicate complicated ideas to others. He is an academically and socially successful student. He has a high GPA, is involved in numerous clubs, plays recreational sports, and has a large, diverse group of friends. He is a considerate and interesting member of the student body.

This past summer, James was considered for a prestigious award open to communication,

education, business, and English majors. Due to his exemplary verbal and creative abilities,

James won the award and the $8,000 prize.

Appendix B: RAT Test

This is the Remote Associate Test. It will measure your verbal abilities. Each of the 20 problems below consists of three words. For each problem, please write a fourth word that relates to each of the other three words in the blanks. Please work on this test until all problems are completed or until you feel as though you cannot answer any more problems.

Example:

Shopping	Washer	Picture	*Window*

1. Widow	Bite	Monkey	_____
2. Bass	Complex	Think	_____
3. Bald	Screech	Emblem	_____
4. Blood	Music	Cheese	_____
5. Room	Blood	Salts	_____
6. Chamber	Staff	Box	_____
7. Lick	Sprinkle	Mines	_____
8. Cherry	Time	Smell	_____
9. Walker	Main	Sweeper	_____
10. Wicked	Bustle	Slicker	_____
11. Chocolate	Fortune	Tin	_____
12. Mouse	Sharp	Blue	_____
13. Envy	Gold	Beans	_____
14. Athletes	Web	Rabbit	_____
15. Board	Magic	Death	_____
16. Puss	Tart	Spoiled	_____
17. Stop	Petty	Sneak	_____
18. Inch	Deal	Peg	_____

19. Jump   Kill   Bliss   _____

20. Note   Dive   Chair   _____

Appendix C: Pre and Post-test Measures

Pretest Rating:

Please rate how difficult the Remote Associates Test appears to be [by selecting the response that best matches how difficult this task appears from the instructions]:

☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐

1   2   3   4   5   6   7   8   9   10

Not at all   Extremely
Difficult   Difficult

Posttest Ratings:

Please rate how difficult you found the Remote Associates Test to be [by selecting the response that best matches how difficult this task felt during the task]:

☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐

1   2   3   4   5   6   7   8   9   10

Not at all   Extremely
Difficult   Difficult

Please rate how satisfied you are with your performance on the Remote Associates Test [by selecting the response that best matches how satisfied you felt after completing the task]:

☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐   ☐

1   2   3   4   5   6   7   8   9   10

Not at all   Extremely
Satisfied   Satisfied

Table 1: Descriptive Statistics of Performance

Threat level	Domains	Mean	Std. Deviation	N
High	Unmatched	4.05	2.872	21
	Matched	3.77	3.176	22
	Total	3.91	2.999	43
Low	Unmatched	3.91	2.671	22
	Matched	2.85	2.581	20
	Total	3.40	2.651	42
Moderate	Unmatched	4.14	3.351	21
	Matched	2.27	2.511	22
	Total	3.19	3.065	43
Total	Unmatched	4.03	2.928	64
	Matched	2.97	2.806	64
	Total	3.50	2.905	128

Table 2: Descriptive Statistics of Time

Threat level	Domains	Mean	Std. Deviation	N
High	Unmatched	5.64	2.64	21
	Matched	5.57	3.06	22
	Total	5.60	2.83	43
Low	Unmatched	4.97	2.12	22
	Matched	5.77	4.03	20
	Total	5.35	3.16	42
Moderate	Unmatched	4.95	2.08	21
	Matched	5.14	2.31	21
	Total	5.04	2.17	42
Total	Unmatched	5.18	2.28	64
	Matched	5.49	3.15	63
	Total	5.33	2.74	127

Table 3: Descriptive Statistics of Perceptions of Test

Pretest – Test Difficulty				
Threat level	Domains	Mean	Std. Deviation	N
High	Unmatched	5.76	2.189	21
	Matched	5.45	2.483	22
	Total	5.60	2.321	43
Low	Unmatched	5.32	2.079	22
	Matched	5.60	2.349	20
	Total	5.45	2.189	42
Moderate	Unmatched	5.05	1.687	21
	Matched	4.52	2.657	21
	Total	4.79	2.215	42
Total	Unmatched	5.38	1.988	64
	Matched	5.19	2.507	63
	Total	5.28	2.253	127
Posttest – Test Difficulty				
Threat level	Domains	Mean	Std. Deviation	N
High	Unmatched	7.86	2.455	21
	Matched	7.55	2.064	22
	Total	7.70	2.242	43
Low	Unmatched	7.55	2.176	22
	Matched	8.60	1.759	20
	Total	8.05	2.036	42
Moderate	Unmatched	7.90	1.895	21
	Matched	7.71	1.678	21
	Total	7.81	1.770	42
Total	Unmatched	7.77	2.158	64
	Matched	7.94	1.874	63
	Total	7.85	2.016	127
Posttest – Test Difficulty				
Threat level	Domains	Mean	Std. Deviation	N
High	Unmatched	3.05	1.857	21
	Matched	3.82	2.648	22

	Total	3.44	2.302	43
Low	Unmatched	4.00	2.430	22
	Matched	3.45	2.502	20
	Total	3.74	2.450	42
Moderate	Unmatched	3.38	1.687	21
	Matched	3.52	1.806	21
	Total	3.45	1.728	42
Total	Unmatched	3.48	2.031	64
	Matched	3.60	2.318	63
	Total	3.54	2.170	127