
Does Venting Anger Feed or Extinguish the Flame? Catharsis, Rumination, Distraction, Anger, and Aggressive Responding

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Does distraction or rumination work better to diffuse anger? Catharsis theory predicts that rumination works best, but empirical evidence is lacking. In this study, angered participants hit a punching bag and thought about the person who had angered them (rumination group) or thought about becoming physically fit (distraction group). After hitting the punching bag, they reported how angry they felt. Next, they were given the chance to administer loud blasts of noise to the person who had angered them. There also was a no punching bag control group. People in the rumination group felt angrier than did people in the distraction or control groups. People in the rumination group were also most aggressive, followed respectively by people in the distraction and control groups. Rumination increased rather than decreased anger and aggression. Doing nothing at all was more effective than venting anger. These results directly contradict catharsis theory.

The belief in the value of venting anger has become widespread in our culture. In movies, magazine articles, and even on billboards, people are encouraged to vent their anger and “blow off steam.” For example, in the movie *Analyze This*, a psychiatrist (played by Billy Crystal) tells his New York gangster client (played by Robert De Niro), “You know what I do when I’m angry? I hit a pillow. Try that.” The client promptly pulls out his gun, points it at the couch, and fires several bullets into the pillow. “Feel better?” asks the psychiatrist. “Yeah, I do,” says the gunman. In a *Vogue* magazine article, female model Shalom concludes that boxing helps her release pent-up anger. She said,

I found myself looking forward to the chance to pound out the frustrations of the week against Carlos’s (her trainer) mitts. Let’s face it: A personal boxing trainer has advantages over a husband or lover. He won’t look at you accusingly and say, “I don’t know where this irritation is

coming from.” . . . Your boxing trainer knows it’s in there. And he wants you to give it to him. (“Fighting Fit,” 1993, p. 179)

In a *New York Times Magazine* article about hate crimes, Andrew Sullivan writes, “Some expression of prejudice serves a useful purpose. It lets off steam; it allows natural tensions to express themselves incrementally; it can siphon off conflict through words, rather than actions” (Sullivan, 1999, p. 113). A large billboard in Missouri states, “Hit a Pillow, Hit a Wall, But Don’t Hit Your Kids!”

Catharsis Theory

The theory of catharsis is one popular and authoritative statement that venting one’s anger will produce a positive improvement in one’s psychological state. The word *catharsis* comes from the Greek word *katharsis*, which literally translated means a cleansing or purging. According to catharsis theory, acting aggressively or even viewing aggression is an effective way to purge angry and aggressive feelings.

Sigmund Freud believed that repressed negative emotions could build up inside an individual and cause psychological symptoms, such as hysteria (nervous outbursts). Breuer and Freud (1893-1895/1955) proposed that the treatment of hysteria required the discharge of the emotional state previously associated with trauma. They claimed that for interpersonal traumas, such as

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insults and threats to the ego, emotional expression could be obtained through direct aggression: "The reaction of an injured person to a trauma has really only . . . a 'cathartic' effect if it is expressed in an adequate reaction like revenge" (p. PAGE?). Breuer and Freud believed that expressing anger was much better than bottling it up inside.

Freud's therapeutic ideas on emotional catharsis form the basis of the hydraulic model of anger. The hydraulic model suggests that frustrations lead to anger and that anger, in turn, builds up inside an individual, similar to hydraulic pressure inside a closed environment, until it is released in some way. If people do not let their anger out but try to keep it bottled up inside, it will eventually cause them to explode in an aggressive rage. The modern theories of catharsis are based on this model. Catharsis is seen as a way of relieving the pressure that the anger creates inside the psyche. The core idea is that it is better to let the anger out here and there in little bits as opposed to keeping it inside as it builds up to the point at which a more dangerous explosion results.

If venting really does get anger "out of your system," then venting should decrease aggression because people are less angry. Almost as soon as psychology researchers began conducting scientific tests of catharsis theory, the theory ran into trouble. In one of the first experiments on the topic (Hornberger, 1959), participants first received an insulting remark from a confederate. Next, half of the participants pounded nails for 10 minutes—an activity that resembles many of the "venting" techniques that people who believe in catharsis continue to recommend even today. The other half did not get a chance to vent their anger by pounding nails. After this, all participants had a chance to criticize the person who had insulted them. If catharsis theory is true, the act of pounding nails should reduce subsequent aggression. The results showed the opposite effect. The people who had hammered the nails were more (rather than less) hostile toward the confederate afterward than were the ones who did not get to pound any nails.

In 1973, Albert Bandura issued a statement calling for a moratorium on catharsis theory and the use of venting in therapy. Four years later, Geen and Quanty (1977) published their influential review of catharsis theory in *Advances in Experimental Social Psychology*. After reviewing the relevant data, they concluded that venting anger does not reduce aggression. If anything, they concluded, it makes people more aggressive afterward. More recent research has come to similar conclusions (e.g., Bushman, Baumeister, & Stack, 1999). Geen and Quanty also concluded that venting anger can reduce physiological arousal but people must express their anger directly against the provocateur. People also must believe that

the provocateur will not retaliate. Venting against substitute targets does not reduce arousal.

Cognitive Neoassociation Theory

According to cognitive neoassociation theory (Berkowitz, 1993), aversive events (e.g., frustrations, provocations, hot temperatures) produce negative affect. Negative affect, in turn, automatically stimulates thoughts, memories, expressive motor reactions, and physiological responses associated with both fight and flight tendencies. The fight associations give rise to rudimentary feelings of anger, whereas the flight associations give rise to rudimentary feelings of fear.

Cognitive neoassociation theory posits that aggressive thoughts are linked together in memory, thereby forming an associative network. Once an aggressive thought is processed or stimulated, activation spreads out along the network links and primes or activates associated thoughts as well. Not only are associated aggressive thoughts linked together in memory but thoughts are also linked along the same sort of associative lines to emotional reactions and action tendencies (Bower, 1981; Lang, 1979). Thus, the activation of aggressive thoughts can engender a complex of associations consisting of aggressive ideas, emotions related to violence, and the impetus for aggressive actions.

Cognitive neoassociation theory predicts that venting should increase rather than decrease angry feelings and aggressive behaviors. Venting involves behaving aggressively, often against "safe" inanimate objects. To vent, people punch pillows, wallop punching bags, beat on couches with foam baseball bats, throw dishes on the ground, kick trash cans, scream and swear into pillows, and so forth. In essence, venting is practicing how to behave aggressively. Such aggressive activity should prime aggressive thoughts, feelings, and behavioral tendencies, especially if the people think about the source of their anger while venting. Thus, venting should keep angry feelings active in memory and also should increase the likelihood of subsequent aggressive responses.

Rumination and Distraction

Most pop psychology and self-help books implicitly assume that people are ruminating about their provocateur while venting anger. Some authors, however, are more explicit. For example, John Lee (1993) gives the following advice to angry people in his popular book *Facing the Fire: Experiencing and Expressing Anger Appropriately*:

Punch a pillow or a punching bag. Punch with all the frenzy you can. If you are angry at a particular person, imagine his or her face on the pillow or punching bag, and vent your rage physically and verbally. You will be doing violence to a pillow or punching bag so that you

can stop doing violence to yourself by holding in poisonous anger. (p. 96)

Some devices for venting anger make it easy for people to ruminate about their provocateur. For example, consider the following advertisement from a toy catalog:

WHEN YOU NEED SOMETHING THAT WON'T HIT BACK. *Wham-It* stands 42" tall and takes abuse from kids and adults alike. When you feel like you just have to strike out, *Wham-It* is always on call. New clear vinyl pocket lets you insert a photo or drawing.

Rumination is defined as "self-focused attention," or directing attention inward on the self, and particularly on one's negative mood (Lyubomirsky & Nolen-Hoeksema, 1995). Any process that serves to exacerbate a negative mood, such as rumination, should increase anger and aggression. In contrast, any process that distracts attention away from an angry mood should reduce anger and aggression. If provoked individuals are induced to think about how they feel, they will maintain, or exacerbate, their angry mood. If they are induced to think about something else, however, the anger will dissipate in time.

Previous research has shown that rumination increases angry feelings. In one study (Rusting & Nolen-Hoeksema, 1998), college students were angered by reading a story about a professor who treated a student unfairly and were told to imagine themselves in a similar situation. Some students ruminated by writing about emotion-focused and self-focused topics (i.e., "Why do you think the way you do"), whereas others were distracted by writing about nonemotional, irrelevant topics (i.e., "the layout of the local post office"). Participants who ruminated for 20 minutes reported being angrier than did participants who were distracted. Another study found that aggression toward an insulting confederate was decreased by having people solve distracting math problems (Konecni, 1974). Solving the math problems presumably distracted people from the source of their anger. Two other studies found that rumination increased displaced aggression after a minor triggering event (Bushman, Pedersen, Vasquez, Bonacci, & Miller, 2001). In Study 1, provoked participants focused attention on or away from their negative mood and later engaged in displaced aggression against a competent or fumbling confederate. Provoked participants who ruminated engaged in more displaced aggression against the fumbling confederate than did participants who were distracted. Study 2 replicated the findings from Study 1 using different operational definitions and a substantially longer (8-hour) rumination period.

To date, no research has examined the effects of rumination and distraction in the effects of venting activities

on anger and subsequent aggression. According to cognitive neoassociation theory, ruminating while venting should prime aggressive thoughts, feelings, and behavioral tendencies.

Overview

In the present study, 600 college students (300 men, 300 women) were first angered by another participant who criticized an essay they had written. In fact, there was no other participant. Next, participants were randomly assigned to rumination, distraction, or control groups. Participants in the rumination group hit a punching bag as long, as hard, and as many times as they wanted to. While they hit the bag, they were told to think about the other participant who had criticized their essay. For a visual aid, they were shown a photo ID of a same-sex college student described as the "other participant" on a 15-inch computer monitor. Participants in the distraction group also hit a punching bag as long, as hard, and as many times as they wanted to. While they hit the bag, they were told to think about becoming physically fit. As a visual aid, they were shown a photo ID of a same-sex athlete from a health magazine on a 15-inch computer monitor. Participants in the control group did not hit the punching bag. Instead, they sat quietly for a couple minutes while the experimenter supposedly worked on the other participant's computer. No attempt was made to reduce the anger of participants in the control group. Anger was measured using a mood form. Aggression was measured by allowing participants to blast their provocateur with loud and long noises through a pair of headphones on a competitive reaction time task. Catharsis theory would predict the lowest levels of anger and aggression among participants in the rumination condition. Cognitive neoassociation theory would predict the exact opposite results.

METHOD

Participants

Participants were 600 undergraduate college students (300 men and 302 women) enrolled in introductory psychology courses.¹ Students received extra course credit in exchange for their voluntary participation. The data from 2 women were discarded because they refused to hit the punching bag. The final sample consisted of 300 men and 300 women. There were 100 men and 100 women in each of the three experimental conditions (i.e., rumination, distraction, control).

Procedure

Participants were tested individually, but each was led to believe that he or she would be interacting with

another participant of the same sex. They were told that the researchers were studying first impressions.

After giving informed consent, each participant wrote a one-paragraph essay on abortion, either pro-choice or pro-life (whichever the participant supported). After finishing, the participant's essay was taken away to be shown to the other participant (who was in fact nonexistent) for evaluation. Meanwhile, the participant was permitted to evaluate the partner's essay, which expressed the opposite view on abortion (e.g., if the participant's essay was pro-choice, the partner's essay was pro-life).

A short time later, the experimenter brought the participant's own essay back with comments ostensibly made by the other participant. All participants received bad evaluations consisting of negative ratings on organization, originality, writing style, clarity of expression, persuasiveness of arguments, and overall quality. The ratings ranged from -10 to -8 on a 21-point scale ranging from -10 (*very bad*) to +10 (*very good*). There was also a handwritten comment stating "This is one of the worst essays I have read!" Previous research has shown that this procedure makes people quite angry (e.g., Bushman & Baumeister, 1998; Bushman et al., 1999; Bushman, Baumeister, & Phillips, 2001).

After reading the evaluation, the participant rated how much they wanted to perform each of 10 activities on a list. Included in this list of activities was "hitting a punching bag." Other activities included playing solitaire, reading a short story, watching a comedy, and playing a computer game. Ratings were made on a 10-point scale ranging from 1 (*not at all*) to 10 (*extremely*).

The punching bag manipulation came next. Two thirds of participants received the punching bag procedure. If the participant did not rank the punching bag activity first, the experiment asked if the participant would be willing to hit the punching bag, explaining that ratings were needed for each activity on the list and that more ratings were needed for the punching bag activity. By requesting the participant to agree, we were able to ensure that the punching bag activity was the result of choice by all participants, including those who had not originally listed it as their top choice.

Participants who received the punching bag procedure were told that because physical appearance could influence their impression of their partner, a coin would be tossed to determine whether they would know what their partner looked like. On the basis of the coin toss, participants were assigned to rumination or distraction conditions. Participants in the rumination condition were told that they would know what their partner looked like. On a 15-inch computer monitor, participants were shown a photo ID of another Iowa State University student of the same sex. The experimenter actually rolled a die to determine which of six photo IDs to

show. The names and identification numbers were removed from all IDs. The experiment then gave the participant some boxing gloves and demonstrated how to hit the 70-pound punching bag (Everlast, Model 4820). Participants were told that they should think about their partner while hitting the bag.²

Participants in the distraction condition were told that they would not know what their partner looked like. Instead of thinking about their partner while hitting the bag, they were told to think about becoming physically fit. Instead of seeing a photo ID of their partner on the computer screen, they saw a photo of someone of the same sex exercising. The photos were taken from fitness magazines and the experimenter rolled a die to determine which photo to show.

Participants in both the rumination and distraction condition were told that their partner would not see them (due to the coin toss). The participant was left alone to hit the punching bag. They were told they could hit it as long and as many times as they wanted to. Because there was an intercom system in the participant's room, the experimenter was able to time how long the participant hit the bag and count the number of times the participant hit the bag. The experimenter also rated how hard the participant hit the bag on a 10-point scale ranging from 1 (*very soft*) to 10 (*very hard*). The experimenter also asked the participant how hard he or she hit the bag (using the same 10-point scale). Participants then indicated how much they enjoyed hitting the punching bag on a 10-point scale ranging from 1 (*not at all*) to 10 (*extremely*).

Participants in the control condition did not hit the punching bag. Instead, they sat quietly for 2 minutes. The justification for the delay was that the experimenter was fixing their partner's computer. No attempt was made to reduce participant's anger during the 2-minute delay. Instead, participants in the no punching bag group did nothing at all. This allowed us to test whether angry people are better off doing nothing at all than engaging in cathartic activities.

Next, participants completed a mood form that measured anger and positive affect. The anger measure consisted of 15 adjectives (e.g., *angry*, *annoyed*, *furious*) from the hostility subscale of the revised Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1985). The positive affect measure consisted of 10 adjectives (e.g., *alert*, *determined*, *enthusiastic*) from the positive affect subscale of the Positive and Negative Affect Schedule (Watson, Clarke, & Tellegen, 1988). Watson and his colleagues define positive affect as a state of "high energy, full concentration, and pleasurable engagement" (p. 1063). All adjectives were rated along a 5-point Likert-type scale, where 1 = *very slightly or not at all*, 2 = *a little*, 3 = *moderately*, 4 = *quite a bit*, and 5 = *extremely*. Participants

were told to “indicate to what extent you feel this way right now, that is, at the present moment.” The alpha coefficients for the measures of anger and positive affect were .88 and .89, respectively.

The next part of the procedure was presented as a competitive reaction time task, based on a paradigm developed by Taylor (1967). Previous studies have established the construct validity of this paradigm (e.g., Bernstein, Richardson, & Hammock, 1987; Giancola & Zeichner, 1995). The participant was told that he or she and the partner would have to press a button as fast as possible on each trial and whoever was slower would receive a blast of noise. The participant was permitted to set in advance the intensity of the noise that the other person would receive between 60 decibels (level 1) and 105 decibels (level 10) if the other lost. A nonaggressive no-noise setting (level 0) also was offered. In addition to deciding the intensity, the winner decided the duration of the loser’s suffering because the duration of the noise depended on how long the winner held the button pressed down. In effect, each participant controlled a weapon that could be used to blast the other person if the participant won the competition to react faster.

The reaction time task consisted of 25 trials. After the initial (no provocation) trial, the remaining 24 trials were divided into three blocks with eight trials in each block. Within each block of trials, the other participant set random noise levels (ranging from 65 decibels to 100 decibels) and random noise durations (ranging from 0.25 seconds to 2.5 seconds). The participant heard noise on half of the trials within each block (randomly determined). An iMac computer controlled the events in the reaction time task and recorded the noise levels and noise durations the participant set for the other person. The white noise was delivered through a pair of Telephonics TDH-39P headphones.

Half of participants completed the mood form first, followed by the competitive reaction time task. The other half of the participants completed the competitive reaction time task first, followed by the mood checklist. A full oral debriefing (with probe for suspicion) followed. Because none of the participants expressed any suspicion, all 300 were included in the data analyses.

RESULTS

Preliminary Analyses

COUNTERBALANCE ORDER

Counterbalance order did not significantly influence responses on any of the measures ($ps > .05$). Thus, data from the two counterbalance orders were combined for subsequent analyses.

PUNCHING BAG PREFERENCE

It was important to determine whether participants in the three groups differed in their desire to hit the punching bag after they had been angered. Because participants were randomly assigned to conditions, no differences were expected. We also tested for sex differences in punching bag preferences. Because aggressive activities are more socially acceptable among men than among women, punching bag preferences were expected to be higher among men.

Desire to hit the punching bag. Ratings of how much participants wanted to hit the punching bag were analyzed using a 3 (rumination, distraction, control) \times 2 (men, women) analysis of variance. Men wanted to hit the punching bag more than did women, $M = 4.33$, $SD = 2.77$ and $M = 3.10$, $SD = 2.33$, $F(1, 588) = 33.87$, $p < .0001$, $d = 0.48$. As expected, the effects involving experimental condition were nonsignificant ($ps > .05$).

Punching bag selected as top activity choice. Whether participants selected hitting a punching bag as their top choice of activities was a dichotomous variable (1 = selected hitting a punching bag as top choice, 0 = selected another activity as top choice). Thus, these data were analyzed using a 3 (rumination, distraction, control) \times 2 (men, women) log-linear analysis. Men were more likely to select hitting a punching bag as their top choice than were women, 6% and 1%, $\chi^2(1, N = 600) = 6.58$, $p < .01$, $\phi = .13$. As expected, the effects involving experimental condition were nonsignificant ($ps > .05$).

PUNCHING BAG MEASURES

It was important to test whether participants in the rumination group vented more than did participants in the distraction group.

How hard the punching bag was hit. The intraclass correlation between experimenter and participant ratings of how hard the bag was hit was .69 (Shrout & Fleiss, 1979). The same pattern of results also was found for the two ratings. Thus, the two ratings were averaged.

Overall, men hit the punching bag harder than did women, $M = 6.69$, $SD = 2.05$ and $M = 4.73$, $SD = 1.88$, $F(1, 396) = 99.14$, $p < .0001$, $d = 1.00$. No other effects were significant ($ps > .05$).

Number of times punching bag was hit. Participants who thought about becoming physically fit hit the punching bag more times than did participants who thought about the person who insulted them, $M = 127.5$, $SD = 63.5$ and $M = 112.2$, $SD = 57.5$, $F(1, 396) = 6.31$, $p < .05$, $d = 0.25$. In other words, participants in the rumination group vented less than did participants in the distraction group. No other effects were significant ($ps > .05$).

Time spent hitting punching bag. No significant effects were found for time spent hitting the punching bag ($ps > .05$).

Enjoyed hitting the punching bag. Men enjoyed hitting the punching bag more than did women, $M = 6.11$, $SD = 2.53$ and $M = 4.96$, $SD = 2.51$, $F(1, 396) = 20.85$, $p < .0001$, $d = 0.46$. No other effects were significant ($ps > .05$).

Primary Analyses

POSITIVE MOOD

There was no significant effect for experimental condition on positive mood, $F(2, 594) = 0.24$, $p > .05$ (see Table 1). Regardless of the condition they were in, men were in a more positive mood than were women, $M = 31.51$, $SD = 7.85$ and $M = 28.12$, $SD = 7.40$, $F(1, 594) = 29.31$, $p < .0001$, $d = 0.44$.

ANGER

There was a main effect for experimental condition on anger, $F(2, 594) = 5.23$, $p < .01$ (see Table 1). Participants in the rumination group felt more angry than did participants in the distraction and control groups, $t(594) = 2.20$, $p < .05$, $d = 0.22$ and $t(594) = 3.15$, $p < .005$, $d = 0.31$. Participants in distraction and control groups did not differ in terms of how angry they felt, $t(594) = 0.95$, $p > .05$.

AGGRESSIVE BEHAVIOR

The same pattern of results was found for the two measures of aggression—noise intensity and noise duration. Thus, the two measures were standardized and summed to form a more reliable measure of aggression. The same pattern of results also was obtained on Trial 1 and on the remaining 24 trials of the competitive reaction-time task. Thus, the responses on the 25 trials were standardized and summed.

There was a main effect for experimental condition on aggression, $F(2, 594) = 5.03$, $p < .01$ (see Table 1). Participants in the rumination group were more aggressive than participants in the control group, $t(594) = 3.17$, $p < .005$, $d = 0.30$. Participants in the distraction group were more aggressive than participants in the control group and were less aggressive than participants in the rumination group, although neither difference was statistically significant, $t(594) = 1.68$ and 1.49 , $ps > .05$. Men were also more aggressive than were women, $M = 0.44$, $SD = 1.62$ and $M = -0.44$, $SD = 0.99$, $F(1, 594) = 66.52$, $p < .0001$, $d = 0.33$.

DISCUSSION

Does venting anger extinguish or feed the flame? The results from the present research show that venting to reduce anger is like using gasoline to put out a fire—it only feeds the flame. By fueling aggressive thoughts and

TABLE 1: Anger and Aggression Levels for Participants in the Control, Distraction, and Rumination Groups

| Measure | Control | Distraction | Rumination |
|---------------|----------------------------|----------------------------|----------------------------|
| Positive mood | 29.61 _a (7.34) | 29.71 _a (7.86) | 30.11 _a (8.23) |
| Anger | 26.25 _b (10.98) | 27.32 _b (10.88) | 29.78 _a (11.56) |
| Aggression | -0.21 _b (1.27) | 0.01 _{ab} (1.39) | 0.21 _a (1.54) |

NOTE: $n = 200$ in each group. Standard deviations are in parentheses. Subscripts refer to within-row comparisons. Means having the same subscript are not significantly different at the .05 significance level.

feelings, venting also increases aggressive responding. People who walloped the punching bag while thinking about the person who had provoked them were the most angry and the most aggressive in the present experiment. Venting did not lead to a more positive mood either.

People in the distraction group were less angry than were people in the rumination group, but they were not less aggressive. Thus, performing an aggressive activity such as hitting a punching bag can increase aggression even if people are distracted while performing the activity.

In the present experiment, people were best off doing nothing at all than venting their anger. No attempt was made to reduce anger or aggressive impulses in the control group. Even so, anger and aggression levels were lowest in the control group. The results might have been more dramatic if participants in the control group actively sought to reduce their angry feelings.

Overall, the present results support cognitive neoassociation theory (Berkowitz, 1993) and directly contradict catharsis theory. Venting while ruminating about the source of provocation kept aggressive thoughts and angry feelings active in memory and only made people more angry and more aggressive. These results provide one more nail in the coffin containing catharsis theory.

Magnitude of Observed Effects

Although the effects obtained in the present study were small to moderate in size (see Cohen, 1988), they are in the opposite direction predicted by catharsis theory. In the present study, the distraction activity was an aggressive one—angered people hit a punching bag. Larger effects might have been obtained if distraction activity would have been a nonaggressive one, such as working a crossword puzzle. Similarly, larger effects might have been obtained if angered people would have engaged in a behavior incompatible with anger and aggression, such as watching a funny TV program or petting a puppy (e.g., Baron, 1976, 1983).

Can These Findings Be Due to Arousal?

One well-known finding in psychology is that arousal enhances whatever response is dominant (e.g., Cottrell & Wack, 1967; Criddle, 1971; Eysenck, 1975; Markovsky & Berger, 1983; Zajonc, Heingartner, & Herman, 1969; Zajonc & Sales, 1966). This finding is central to the drive theory of social facilitation (e.g., Geen & Bushman, 1987, 1989). Walloping a punching bag for a few minutes can certainly increase arousal levels. Because participants in the present study all were provoked, it seems likely that aggression would be a dominant response for them. Arousal cannot, however, explain the pattern of results obtained in the present study. If anything, people in the distraction group should have been more aggressive than people in the rumination group because they hit the punching bag a greater number of times. The results, however, were in the opposite direction.

Is Intense Physical Activity an Effective Technique for Managing Anger?

If used as a form of distraction, intense physical activity does not necessarily increase anger, even if the activity is aggressive in nature (e.g., hitting a punching bag). Physical activity should, however, increase anger if the person is provoked after engaging in the intense physical activity. According to excitation transfer theory, the arousal from the physical activity will be misattributed to the provocation and will therefore transfer to the provocation (e.g., Zillmann, 1979). Mislabeling the arousal from the physical activity as anger would therefore increase aggressive responding (e.g., Zillmann, Katcher, & Milavsky, 1972). In the present study, participants were provoked before engaging in an intense physical activity, so excitation transfer should not occur. Although it might be good for your heart, intense physical activity is probably not an effective technique for reducing anger and aggression.

Conclusion

Catharsis theory predicts that venting anger should get rid of it and should therefore reduce subsequent aggression. The present findings, as well as previous findings, directly contradict catharsis theory (e.g., Bushman et al., 1999; Geen & Quanty, 1977). For reducing anger and aggression, the worst possible advice to give people is to tell them to imagine their provocateur's face on a pillow or punching bag as they wallop it, yet this is precisely what many pop psychologists advise people to do. If followed, such advice will only make people angrier and more aggressive.

NOTES

1. According to Cohen (1988), most of the effects in the social sciences are small to moderate in size. I assumed that the effect obtained in the present study would be in this range. A power analysis (Cohen, 1988) revealed that with power = .80 and two-sided significance level = .05, 400 participants were needed in each group to detect a small effect (i.e., $d = 0.20$) and 64 participants were needed in each group to detect a moderate effect (i.e., $d = 0.50$). Thus, the present study included 200 participants in each group.

2. One man in the rumination group became so angry while hitting the punching bag that he also punched a hole in the laboratory wall.

REFERENCES

- Bandura, A. (1973). *Aggression: A social learning theory analysis*. Englewood Cliffs, NJ: Prentice Hall.
- Baron, R. A. (1976). The reduction of human aggression: A field study of the influence of incompatible reactions. *Journal of Applied Social Psychology*, 6, 260-274.
- Baron, R. A. (1983). The control of human aggression: An optimistic perspective. *Journal of Social and Clinical Psychology*, 1, 97-119.
- Berkowitz, L. (1993). *Aggression: Its causes, consequences, and control*. New York: McGraw-Hill.
- Bernstein, S., Richardson, D., & Hammock, G. (1987). Convergent and discriminant validity of the Taylor and Buss measures of physical aggression. *Aggressive Behavior*, 13, 15-24.
- Bower, G. (1981). Mood and memory. *American Psychologist*, 36, 129-148.
- Breuer, J., & Freud, S. (1893-1895). *Studies on hysteria* (Standard ed., Vol. II). London: Hogarth. (Original work published 1955)
- Bushman, B. J., & Baumeister, R. F. (1998). Threatened egotism, narcissism, self-esteem, and direct and displaced aggression: Does self-love or self-hate lead to violence? *Journal of Personality and Social Psychology*, 75, 219-229.
- Bushman, B. J., Baumeister, R. F., & Phillips, C. M. (2001). Do people aggress to improve their mood? Catharsis beliefs, affect regulation opportunity, and aggressive responding. *Journal of Personality and Social Psychology*, 81, 17-32.
- Bushman, B. J., Baumeister, R. F., & Stack, A. D. (1999). Catharsis, aggression, and persuasive influence: Self-fulfilling or self-defeating prophecies? *Journal of Personality and Social Psychology*, 76, 367-376.
- Bushman, B. J., Pedersen, W. C., Vasquez, E. A., Bonacci, A. M., & Miller, N. (2001). *Chewing on it can chew you up: Effects of rumination on displaced aggression triggered by a minor event*. Manuscript submitted for publication.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York: Academic Press.
- Cottrell, N. B., & Wack, D. L. (1967). Energizing effects of cognitive dissonance upon dominant and subordinate responses. *Journal of Personality and Social Psychology*, 6, 132-138.
- Criddle, W. D. (1971). The physical presence of other individuals as a factor in social facilitation. *Psychonomic Science*, 22, 229-230.
- Eysenck, M. W. (1975). Effects of noise, activation level, and response dominance on retrieval from semantic memory. *Journal of Experimental Psychology: Human Learning and Memory*, 1, 143-148.
- Fighting fit. (1993, July). *Vogue*, 183, 176-179.
- Geen, R. G., & Bushman, B. J. (1987). Drive theory: The effects of socially engendered arousal. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 89-109). New York: Springer-Verlag.
- Geen, R. G., & Bushman, B. J. (1989). The arousing effects of social presence. In H. Wagner & A. Manstead (Eds.), *Handbook of psychophysiology* (pp. 261-281). New York: John Wiley.
- Geen, R. G., & Quanty, M. B. (1977). The catharsis of aggression: An evaluation of a hypothesis. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 1-37). New York: Academic Press.

- Giancola, P. R., & Zeichner, A. (1995). Construct validity of a competitive reaction-time aggression paradigm. *Aggressive Behavior, 21*, 199-204.
- Hornberger, R. H. (1959). The differential reduction of aggressive responses as a function of interpolated activities. *American Psychologist, 14*, 354.
- Konecni, V. J. (1974). Self-arousal, dissipation of anger, and aggression. *Personality and Social Psychology Bulletin, 1*, 192-194.
- Lang, P. J. (1979). A bio-informational theory of emotional imagery. *Psychophysiology, 16*, 495-512.
- Lee, J. (1993). *Facing the fire: Experiencing and expressing anger appropriately*. New York: Bantam.
- Lyubomirsky, S., & Nolen-Hoeksema, S. (1995). Effects of self-focused rumination on negative thinking and interpersonal problem solving. *Journal of Personality and Social Psychology, 69*, 176-190.
- Markovsky, B., & Berger, S. M. (1983). Crowd noise and mimicry. *Personality and Social Psychology Bulletin, 9*, 90-96.
- Rusting, C. L., & Nolen-Hoeksema, S. (1998). Regulating responses to anger: Effects of rumination and distraction on angry mood. *Journal of Personality and Social Psychology, 74*, 790-803.
- Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86*, 420-428.
- Sullivan, A. (1999, September 27). What's so bad about hate? *New York Times Magazine*, pp. 50-57, 88, 104, 112-113.
- Taylor, S. P. (1967). Aggressive behavior and physiological arousal as a function of provocation and the tendency to inhibit aggression. *Journal of Personality, 35*, 297-310.
- Watson, D., Clarke, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.
- Zajonc, R. B., Heingartner, A., & Herman, E. M. (1969). Social enhancement and impairment of performance in the cockroach. *Journal of Personality and Social Psychology, 13*, 83-92.
- Zajonc, R. B., & Sales, S. M. (1966). Social facilitation of dominant and subordinate responses. *Journal of Experimental Social Psychology, 2*, 160-168.
- Zillmann, D. (1979). *Hostility and aggression*. Hillsdale, NJ: Lawrence Erlbaum.
- Zillmann, D., Katcher, A. H., & Milavsky, B. (1972). Excitation transfer from physical exercise to subsequent aggressive behavior. *Journal of Experimental Social Psychology, 8*, 247-259.
- Zuckerman, M., & Lubin, B. (1985). *Manual for the MAACL-R: The Multiple Affective Adjective Checklist Revised*. San Diego, CA: Educational and Industrial Testing Service.

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