

Grapes of Wrath: The Angry Effects of Self-Control

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Prior research has shown that exerting self-control can lead to increased aggression. In the present research, we find that exerting self-control is associated with angry behavior more broadly. In particular, using a “matched-choice paradigm,” we find that after exerting self-control people exhibit increased preference for anger-themed content, greater interest in faces exhibiting anger, greater endorsement of anger-framed appeals, and greater irritation to others’ attempts to control their behavior. We speculate on the possible mechanisms underlying these effects and discuss the theoretical, methodological, and practical implications of this research.

Self-control decisions are among the most prevalent and important decisions in consumer behavior. Research has shown that such decisions have significant implications for consumers’ well-being, stemming not only from the chosen outcome but also from the emotions produced by the decision, such as pride from exerting self-control (e.g., Khan and Dhar 2006) and guilt from failure to exert self-control (e.g., Giner-Sorolla 2001).

Interestingly, although exerting self-control is most commonly associated with positive emotions and well-being, recent research has found that exerting self-control may also create negative feelings, such as hyperopic regret (Kivetz and Keinan 2006), and lead to potentially negative behavioral tendencies due to ego depletion (Baumeister et al. 1998) and licensing (Khan and Dhar 2006) effects. Of particular intrigue, self-control has been associated with anger-related behavior. For example, medical field studies have found that people on diets tend to be irritable and aggressive (for a review, see Polivy [1996]). Further, lab studies show that people who have exerted self-control are more likely to subsequently engage in aggression against others (Denson et al. 2010; DeWall et al. 2007; Finkel et al. 2009; Stucke and Baumeister 2006). For instance, in one experiment,

DeWall et al. (2007) found that participants who were asked to refrain from consuming a tempting doughnut manifested increased aggression in response to a subsequent insult.

Nevertheless, despite the apparent connection between self-control and aggressive behavior demonstrated by prior research, the effect of self-control on angry behavior other than overt aggression has not been examined. As such, whether the effect of self-control is specific to aggression or extends to anger-related behaviors more broadly remains unknown. Thus, the goal of this article is to elucidate the scope of the connection between self-control and anger by examining whether exerting self-control leads to a more general increase in subsequent angry behavior. Before discussing the present research in detail, we first describe prior theoretical conjecture regarding the association between self-control and aggression. We also describe why the behaviors examined in this research lie outside the range of behaviors predicted by prior theorizing, thereby expanding the scope of the link between self-control and anger.

BACKGROUND

Previous conjecture regarding the nature of the self-control–aggression effect implies a relatively bounded association between self-control and angry behavior. Specifically, prior research has attributed the self-control–aggression association to one mechanism, namely, diminished ability to self-regulate due to ego depletion (Denson 2009; Denson et al. 2010; DeWall et al. 2007; Finkel et al. 2009; Stucke and Baumeister 2006). To elaborate, the ego depletion literature shows that self-regulation leads to the depletion of self-regulatory resources, which diminishes the ability to self-regulate in subsequent tasks (Baumeister et al. 1998). Drawing on this paradigm, it is argued that ag-

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gressive behavior is often considered undesirable; therefore, when a person is provoked but has the ability to self-regulate, she or he will seek to inhibit aggressive responding. However, after exerting self-control, the person's self-regulatory resources are diminished, resulting in less ability to suppress the aggressive expression of anger in response to a subsequent provocation.

This theoretical conjecture regarding the self-control and aggression association implies that there is not an inherent link between self-control and angry behavior per se. Instead, anger expression—and aggression in particular—is viewed as just another instance of an inappropriate behavior that is less well regulated due to the prior exertion of self-control. Consequently, this account predicts a self-control–anger association only for angry behaviors that are considered inappropriate and that are thus regulated down when one's regulatory resources are not depleted.

However, neither this ego depletion account nor the boundaries for the self-control–anger association implied by this account has been directly established (although see DeWall et al. [2007] for indirect evidence and the general discussion section of this article for more detailed discussion of potential mechanisms). Therefore, it is possible that self-control is associated with angry behavior more broadly than this account suggests, including instances where the angry behavior is not considered inappropriate. In sum, despite emerging evidence linking self-control to increased aggression, the scope of the self-control–anger connection remains to be further elucidated.

PRESENT RESEARCH

The main objective of the present research is to examine whether the self-control–aggression connection demonstrated in previous research can generalize to anger-related behaviors that are not inappropriate. Anger has been shown to affect individuals' behavior in a wide range of domains (for a review, see Litvak et al. [2010]). For example, anger is found to affect people's attention to and preference for information (Bower 1991), depth of processing (Bodenhausen, Sheppard, and Kramer 1994; Tiedens and Linton 2001), endorsement of anger-framed appeals (DeSteno et al. 2004), perceptions of risk (Ford et al. 2010; Hemenover and Zhang 2004; Lerner and Keltner 2000, 2001; Lerner et al. 2003), and social attributions (Keltner, Ellsworth, and Edwards 1993; Small and Lerner 2008). These anger-related behaviors are qualitatively distinct from overt aggression in that they are relatively subtle manifestations of anger that are typically not considered socially inappropriate, and thus individuals generally would not be expected to expend self-regulatory efforts to suppress them. Thus, examining the effect of exerting self-control on these sorts of behaviors might significantly expand the scope of the self-control–anger connection beyond what might be predicted from extant findings.

In four experiments, we find that exerting self-control indeed has a broad tendency to increase angry behaviors. Specifically, we demonstrate that exerting self-control increases one's preference for anger-themed information, endorsement

of anger-framed appeals, and irritation with others' attempts to control. For example, experiment 1 finds that people who have exerted (vs. not exerted) self-control are more likely to prefer anger-themed movies. Additional experiments find that exerting self-control increases interest in angry facial expressions, creates greater irritation toward controlling persuasive messages, and increases endorsement of anger-framed policy appeals. All of these behaviors are no less (nor more) appropriate than other non-anger-related responses and are thus unlikely to be inhibited (or disinhibited) regardless of whether one is depleted or not.

In sum, in this research we demonstrate several novel connections between exerting self-control and angry behavior that suggest a broader link between them than previously identified. Of note, because the emphasis of this research is on probing the boundaries of the effect of self-control on subsequent angry behavior, we do not test for the underlying mechanism(s) for the effect in the current studies. However, our findings clearly call for new theorizing regarding the nature of the connection between self-control and angry behavior. We speculate on the nature of this connection in our general discussion and offer suggestions on how future research might help illuminate the mechanism for the effect. Finally, we discuss implications of our findings for consumers, marketers, and policy makers.

EXPERIMENT 1: SNACK CHOICE AND MOVIE PREFERENCES

Experiment 1 aims to examine whether exerting self-control may increase preference for anger-related information and stimuli. In particular, previous research shows that when they are angry, people tend to prefer anger-themed information, such as anger-themed movies (Bower 1991). Thus, we examine whether after exerting self-control people may exhibit greater preference for anger-themed movies over other types of movies.

Method

The experiment contained two ostensibly unrelated tasks: a self-control task involving a choice between an apple (virtue) and a chocolate candy bar (temptation; adapted from Shiv and Fedorikhin [1999]) as a "thank you gift" for the experimental session and a movie choice task in which participants chose between pairs of movies where one was anger-themed and the other was non-anger-themed. We examine whether exerting self-control (choosing the apple) would lead to an increased preference for anger-themed movies compared to a control group that simply made the movie choices. None of the snacks were consumed during the session so as to control for physiological differences.

The Matched-Choice Paradigm. A selection problem arises in comparing individuals who choose the apple in the self-control task to individuals in a control condition; namely, for some reason there may be a taste pattern such that individuals who prefer apples to chocolates also tend

to prefer anger-themed movies, thereby creating a spurious correlation between exerting self-control and a greater preference for anger-themed content. To control for this possibility, we devised a “matched-choice paradigm.” Specifically, we had subjects in the control condition also make the self-control decision but do so after making the movie choices, thereby also obtaining their preferences in the self-control decision. We are then able to compare those who exerted self-control (chose the apple) before movie selections to those who are similarly inclined to exert self-control (chose the apple) but whose movie selections were not affected by this self-control decision because the movie choices came first. We test whether when snack preferences are equated, those first choosing the apple over the chocolate will be more likely to choose anger-themed movies compared to those who simply made the movie choices (but later also chose the apple).

Procedure. Two hundred and thirty-nine participants, undergraduate students (72% female) at a large U.S. university, were randomly assigned to perform the self-control task either before or after having selected movies. The movie task consisted of a series of movie choices between one movie that had an anger theme and one movie that did not. Each movie title was accompanied by a brief description of the movie’s basic theme (see the appendix for an example of the stimuli). We constructed the movie choice pairs such that they were perceived to be similar overall to each other (e.g., same genre, writer, or starring actors; similar in valence; high vs. low-brow; and perceived appropriateness; see table 1 for full pretest results based on 41 participants from the same population as the main experiment) but differed in whether they were perceived to have an anger theme (*Anger Management* vs. *Billy Madison*; *Falling Down* vs. *The Game*; *Hamlet* vs. *Romeo and Juliet*; *The Count of Monte Cristo* vs. *The Three Musketeers*). Our dependent

variable was the share of participants’ movie choices that were anger-themed.

Results

First, we examined participants’ choices in the self-control task. In “self-control first” and “self-control last” conditions, 41% and 37% of participants chose the apple over the chocolate, respectively. There was no difference between conditions ($\chi^2 < 1$). Thus we matched the “apple choosers” across the task-order conditions for comparison. We also compared the “chocolate choosers” across task orders for completeness.

Next, we examined participants’ preference for content (see table 2 for all choice shares). Across all movies, among those who chose the apple, individuals who first chose the apple were significantly more likely to prefer the anger-themed movies ($M = 64%$), compared to those who made movie choices before they chose the apple ($M = 55%$; $t(91) = 2.08, p < .05$). Thus, the act of choosing the apple significantly increased preferences for anger-themed movies. In contrast, choosing the chocolate bar before (vs. after) the movie choices did not change people’s movie preferences (choice of anger-themed movies $M = 64%$ vs. $M = 66%$; $t < 1$). The different effect of task order on those who resisted versus yielded to temptation was reflected by a significant two-way interaction ($F(1, 235) = 3.78, p = .05$).

Discussion

Experiment 1 demonstrated that exerting self-control can lead to increased preference for anger-themed content. Further, preference for anger-themed content was increased only when self-control was exerted, not when giving in to im-

TABLE 1

EXPERIMENT 1 PRETEST RESULTS

Movie choice set	Perceived anger theme ^{a,**}	Perceived as “wrong” to watch ^{b,**}	Perceived as inappropriate for self ^{c,**}
Pair 1:			
Anger Management	5.12	1.27	1.32
<i>Billy Madison</i>	2.43	1.32	1.35
Pair 2:			
Falling Down	5.80	1.39	1.56
<i>The Game</i>	3.68	1.37	1.46
Pair 3:			
Hamlet	5.24	1.17	1.37
<i>Romeo and Juliet</i>	3.12	1.22	1.44
Pair 4:			
Count of Monte Cristo	5.85	1.37	1.37
<i>The Three Musketeers</i>	2.44	1.24	1.29

NOTE.—Anger-themed movies are shown in bold.

^a“To what extent does this movie have an ‘anger’ theme?”; from 1 (none at all) to 7 (very strong).

^b“How ‘wrong’ is it for someone to watch this movie?”; from 1 (not at all) to 5 (extremely).

^c“How inappropriate would it be for you to watch this movie?”; from 1 (not at all) to 5 (extremely).

*Difference between all pairs are significant at $p < .001$.

**Difference between all pairs are not significant, F 's < 1 .

TABLE 2
CHOICE SHARES OF ANGER-THEMED MOVIES: EXPERIMENT 1

Movie choice set	Choosing the apple (%)		Choosing the chocolate (%)	
	Self-control first	Self-control last (matched control)	Self-control first	Self-control last (matched control)
Pair 1: Anger Management <i>Billy Madison</i>	60	50	55	62
Pair 2: Falling Down <i>The Game</i>	36	33	45	43
Pair 3: Hamlet <i>Romeo and Juliet</i>	78	73	82	84
Pair 4: Count of Monte Cristo <i>The Three Musketeers</i>	82	65	76	76

NOTE.—Anger-themed movies are shown in bold.

mediate gratification. Experiment 2 seeks to provide convergent evidence to this finding in another context.

EXPERIMENT 2: SPENDING DECISION AND PREFERENCE FOR ANGRY FACES

In the next experiment, we study the effect of exerting self-control on preference for another type of anger-related stimulus, namely, angry facial expressions. We chose facial expressions as our dependent variable of interest because they are distinct carriers of emotional information (Ekman 1993; Ekman, Friesen, and Ellsworth 1972). Further, they are prevalent in everyday life, and people, including preverbal infants, are highly sensitive to and observant of other's facial expressions (de Haan and Nelson 1998). Finally, stimuli of facial expressions of emotions have been carefully constructed and validated in prior research (Ekman and Friesen 2003), providing us with clean manipulations of emotions. Previous research shows that angry people tend to show increased visual attention to angry facial expressions (van Honk et al. 2001). Given that visual attention is assumed to reflect interest and is correlated to measures of interest (Buswell 1935; Qvarfordt and Zhai 2005; Yarbus 1967), we examine whether exerting self-control leads to greater interest in angry faces.

Additionally, in this experiment we contrast angry facial expressions to fearful facial expressions to assess whether the increase in preference is specific to anger-related stimuli or extends to stimuli related to other negative emotions as well. Another reason we chose fear as the control emotion is because like anger, fear is also high in arousal among negative emotions (Ax 1953; Tellegen, Watson, and Clark 1999). Thus, comparing anger to fear will help us gauge whether after exerting self-control people are attracted to any high-arousal content in general or if they are attracted to anger-themed content specifically.

Finally, in this experiment we wish to examine whether the anger effect of self-control is specific to a dietary de-

cision setting or whether it exists for other types of self-control contexts as well. To this end, we examine self-control in a financial decision involving a conflict between indulgent spending and responsible spending. Previous research (e.g., Kivetz and Simonson 2002a, 2002b) shows that consumers tend to consider pleasurable but unnecessary products (such as a spa treatment) immediately gratifying but not responsible purchases for the long run. By contrast, spending on necessities (e.g., groceries) is considered appropriate for one's long-term financial health. Thus, when faced with a choice between spending on a luxury versus a necessity, the person often needs to exert self-control to steer away from the more tempting option of luxury in favor of the more responsible option of necessity.

Method

Experiment 2 had a 2 (self-control task: spa vs. groceries choice) \times 2 (facial expression evaluation task: anger vs. fear) \times 2 (task order: self-control task first vs. last) design, where task order was manipulated between subjects, facial expression evaluation was manipulated within subject, and self-control choice was based on respondents' choices. Participants, 139 female (selected due to the spa product category) undergraduates at a large U.S. university, were randomly assigned to one of the two task-order conditions, following the same matched-choice paradigm as in experiment 1.

Self-Control Task. At the start of the experiment, participants were informed that as part of their compensation for participating, they would be entered into a raffle for a reward of their choice. Participants were informed that for their reward they could choose between a \$50 gift certificate to a local spa or \$50 in groceries at a local grocery (we would reimburse them based on a receipt). They were shown a picture of the splash page from the spa's Web site highlighting the spa's services, as well as a picture of a basket full of groceries (containing bread, olive oil, milk, water, and vegetables). They were then asked to indicate which option they would choose.

In order to preserve their anonymity, they were also asked to indicate their choice along with their e-mail address on a separate sheet of paper.

In pretesting, 21 participants from the same population as the experimental participants confirmed that the spa category was considered an indulgence whereas groceries were considered more responsible. Pretest participants were asked which option they judged to be the more indulgent, the more enjoyable, and the more responsible choice. All participants judged the groceries to be the more responsible option and the spa gift certificate to be the more indulgent option. Ninety-five percent of participants (20/21) also judged the spa gift certificate to be the more enjoyable option.

Facial Expression Evaluation Task. For the facial expression task, participants evaluated a series of six pictures (presented in random order), three of which depicted angry expressions and three of which depicted fearful expressions. Pictures of facial expressions were obtained from Ekman and Friesen (2003).

In a pretest, 66 participants from the same population as the main experiment rated how arousing the pictures were to them on 7-point scales, ranging from 1 (not at all arousing) to 7 (extremely arousing). We defined arousing for participants as “the extent they felt activated and energized by the picture, either in a positive or negative manner” (Tellegen et al. 1999). The three pictures of faces expressing anger were rated 2.62, 3.26, and 3.55 in arousal, and the three corresponding pictures of faces expressing fear were rated 3.52, 3.50, and 3.59. Thus, on average, the fearful faces were rated as more arousing to participants than angry faces in the pretest ($M = 3.53$ vs. $M = 3.14$; $t(65) = 2.30$, $p < .05$).

Additionally, in another pretest, 70 individuals from the same population as the participants in the main experiment were asked to rate “how inappropriate it would be for someone to find this picture interesting to look at” for each of the pictures on a 7-point scale ranging from 1 (not at all) to 7 (extremely). The three pictures of the faces expressing anger were rated 2.90, 3.16, 3.23 ($M = 3.10$), and the three pictures expressing fear were rated 2.77, 3.26, and 3.09 ($M = 3.04$). Judged appropriateness did not significantly differ between pictures of angry versus fearful facial expressions overall or between any pair of angry versus fearful pictures (F 's < 1). In sum, there was no difference in arousal and appropriateness between the fear and anger faces.

In the main experiment, after viewing each picture, to capture the interest in anger-themed information, participants rated how interesting they found the picture to look at on a 7-point scale, ranging from 1 (not at all interesting) to 7 (extremely interesting). These measures served as our dependent variable.

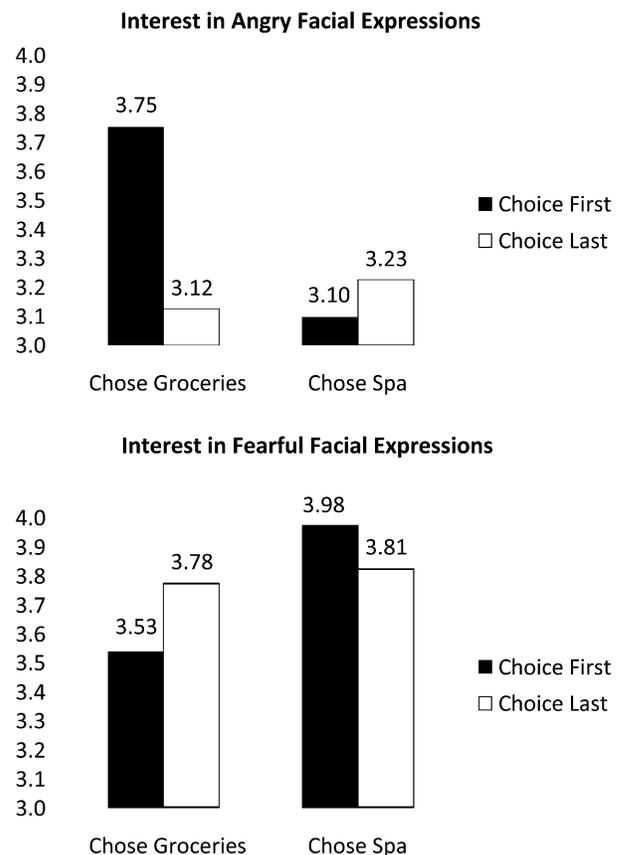
Results

After evaluating the faces, 55% and 53% of participants chose the spa option before versus after evaluating the faces, respectively. Thus, we matched spa choosers with spa choos-

ers and grocery choosers with grocery choosers across task order for analysis.

Across all participants, there was a main effect of facial expression, such that participants tended to rate fearful facial expressions more as interesting ($M = 3.76$) than angry facial expressions ($M = 3.32$; $t(138) = 5.25$, $p < .01$). Importantly, however, there was also a significant choice \times task order \times facial expression interaction ($F(1, 135) = 14.59$, $p < .01$). Participants who chose the groceries first found the angry faces more interesting ($M = 3.75$) than participants who chose the groceries after the facial evaluation task ($M = 3.12$; $F(1, 73) = 4.50$, $p < .05$). Conversely, there was no difference in interest for angry faces among participants who yielded to temptation (chose the spa) before versus after evaluating the faces ($M = 3.10$ vs. $M = 3.23$; $F < 1$). Further, there was no difference in interest for fearful faces regardless of choice of gift certificate or order of tasks (see fig. 1 for means; F 's < 1 for all contrasts). Thus, exerting

FIGURE 1
 INTEREST IN ANGRY AND FEARFUL FACIAL EXPRESSIONS BEFORE VERSUS AFTER RESISTING TEMPTATION (CHOOSING GROCERIES) AND YIELDING TO TEMPTATION (CHOOSING SPA): EXPERIMENT 2



financial self-control increased subsequent interest in angry faces but not in fearful faces.

Discussion

Experiment 2 provided converging evidence to that of experiment 1 that making a virtuous choice may lead to greater attraction to anger-themed stimuli. Further, this interest does not extend to information of other arousing emotions, such as fear.

In experiment 3 we examine a different kind of angry behavior in order to further investigate the breadth of the association between self-control and anger. In particular, we examine whether people exhibit a greater anger response to a provocation subsequent to exerting self-control in a context where the angry response is deemed appropriate.

EXPERIMENT 3: RESPONSE TO ATTEMPT TO CONTROL

Prior research shows that people tend to become reactant and angry at others' attempts to persuade and control them (e.g., Fitzsimons 2000; Grandpre et al. 2003). This is particularly the case when the communication uses controlling language, such as "ought," "should," and "must," because such language leads individuals to view the message as imposing upon their own free will (Miller et al. 2007). We therefore examine whether exerting self-control would increase this angry response to controlling language in persuasive appeals.

Method

Participants were 209 undergraduates (64% women) at a large U.S. university. The experiment followed the same matched-choice paradigm as in experiment 1, with participants either first making a choice between an apple and a candy bar and then responding to a controlling persuasive message or in the reverse order.

For the controlling message, we used a message adopted from Miller et al. (2007, 239–40). After reading an appeal to exercise that included such terms as "should," "ought," "must," and "need to," participants were asked how irritated they felt toward the message on a 7-point scale ranging from 1 (not at all irritated) to 7 (extremely irritated). Irritation was used because previous research shows that anger is often viewed by participants as too strong a word, and consequently people tend to report anger in terms of irritation or annoyance, which are mild forms of anger (Bodenhausen et al. 1994).

We also performed a pretest involving 70 participants to examine whether expressing irritation to the message would be perceived as inappropriate. Pretest participants were asked to read the message and then to rate "how inappropriate it would be for someone to express irritation at the above message" on a 7-point bipolar scale from -3 (totally inappropriate) to 3 (totally appropriate), where the 0-point was labeled "neither inappropriate nor appropriate." The

results showed that pretest participants judged that expressing irritation to the message was significantly different from zero in the direction of appropriateness ($M = 0.69$; $t(69) = 3.16$, $p < .01$).

Results

We analyzed participants' irritation with the persuasive message employing controlling language (see fig. 2). Consistent with experiments 1 and 2, among those who chose the apple, participants expressed greater irritation with the appeal when the self-control task preceded ($M = 4.17$) versus followed the message evaluation task ($M = 3.42$; $F(1, 82) = 6.15$, $p < .05$). Conversely, among participants who chose the chocolate candy bar, participants' expressed irritation with the appeal was similar when they chose the chocolate candy bar first ($M = 3.08$) versus last ($M = 3.21$; $F < 1$). The results were reflected by a significant preference-by-task order interaction ($F(1, 205) = 5.40$, $p < .05$). Thus, it appears that first exerting self-control intensified subsequent irritation to an attempt to control.

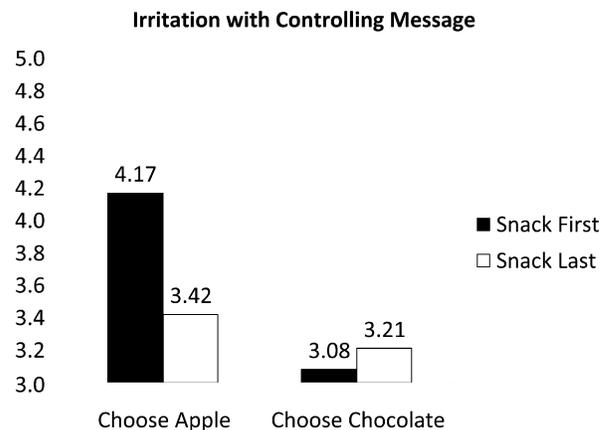
Discussion

Adding to the first two experiments, experiment 3 further expanded the scope of the association between self-control and angry behavior by finding that exerting self-control increased subsequent irritation with an attempt to control. Thus, exerting self-control not only led to greater affinity for anger-related information but also heightened subsequent angry responding when an anger response was called for.

In experiment 4, we examine the effect of exerting self-control on another anger-related behavior studied in previous literature, namely, endorsement of anger-framed messages (DeSteno et al. 2004). Further, we wish to sharpen our in-

FIGURE 2

MEAN IRRITATION WITH CONTROLLING APPEAL:
EXPERIMENT 3



sights into the observed behaviors thus far by examining a moderator of the effect.

Specifically, even though in experiments 1–3 the chocolate bar and the spa certificate were pretested to be more viscerally gratifying immediately whereas the apple and the grocery certificate were perceived to be more responsible choices for the long run, not everyone may have experienced the same level of self-control conflict when choosing the virtuous option. For example, in the food consumption domain, previous research has shown that individuals differ in their construal of food choices. Whereas some individuals are apt to detect the conflict between immediate gratification and health goals when choosing what to eat, others do not construe the situation as such and simply follow their internal feelings of satiation and desire when making food choices. These two types of dietary styles are termed “restrained eaters” and “unrestrained eaters,” respectively (Fedoroff, Polivy, and Herman 1997; Herman and Mack 1975; King, Herman, and Polivy 1987; Nisbett 1968; Ward and Mann 2000). Thus, when making a snack choice, such as between a chocolate candy and an apple, only the restrained eaters are likely to experience a self-control conflict whereby even if they crave the chocolate candy, they may view it as antithetical to their health goal and thus exert self-control to choose the apple instead. By contrast, an exertion of self-control is less likely to be involved for unrestrained eaters because, even if they had chosen the apple, it is likely because they simply happened to prefer the apple at the moment and not because they were exerting self-control. Therefore, if exerting self-control is what is causing an increase in anger-related behavior, this effect should only occur for restrained eaters who have potentially exerted self-control when they chose the apple; the effect should be absent among unrestrained eaters as they likely have exerted little self-control regardless of what they chose. Thus, in experiment 4, we examine the moderating role of dietary style to sharpen the connection between the exertion of self-control and angry behavior.

EXPERIMENT 4: RESPONSE TO ANGER-FRAMED PERSUASION AND THE MODERATING ROLE OF DIETARY STYLE

Previous research shows that when people are angry, they tend to increase their endorsement of anger-framed messages (likely because these messages resonate with their mood, i.e., “strike a cord”) but not of other appeals, such as sadness-framed messages (DeSteno et al. 2004). Thus, we examine whether, after choosing a healthy option over an indulgent option, people will be more likely to endorse anger-framed but not sadness-framed messages. Contrasting anger with sadness is also helpful in that it allows us to detect whether the effect of exerting self-control is specific to anger or can be generalized to other approach-oriented negative affect. Emo-

tions research shows that both anger and sadness are associated with approach motivation whereas fear and disgust are associated with avoidance motivation (Carver 2006). Thus, this experiment and experiment 2 (contrasting anger to fear) together serve to isolate anger from more generalized affective dimensions of valence, arousal, and approach-avoidance motivation. Additionally, in this experiment we examine whether the angry effect of self-control choice is moderated by dietary restraint style.

Method

Participants were 204 undergraduate women at a large U.S. university. Women were selected due to their greater likelihood of being restrained eaters. Participants performed two ostensibly unrelated tasks: choosing a snack (between an apple and a chocolate bar) and responding to public policy messages. In this judgment task, each participant read and responded to three anger-framed and three sadness-framed appeals adapted from DeSteno et al. (2004). The matched-choice paradigm is again used such that half of the participants were in the “self-control first” condition with the other half in the “message response first” condition.

The list of appeals began with the statement that the state where participants resided was considering raising the sales tax in order to address a number of problems in the state. This was followed by a list of six brief appeals to address different problems that required funding. The appeals were alternated and split evenly between those framed to evoke anger and those framed to evoke sadness. Pretesting confirmed the finding of prior research (DeSteno et al. 2004) that the appeals did not differ in argument strength or valence. Further, a pretest with 70 participants showed that agreement with anger-framed versus sadness-framed appeals did not differ in perceived appropriateness (“How inappropriate would it be for someone to agree with this argument?” 1 [not at all], 7 [extremely]). The three anger-framed messages were rated 2.43, 2.37, and 2.61 ($M = 2.47$), and the three sadness-framed messages were rated 2.37, 2.40, 2.43 ($M = 2.40$); pair-wise and overall difference F 's < 1).

Following each appeal, participants were asked to indicate how favorably they viewed it using a 7-point scale ranging from 1 (not at all favorably) to 7 (very favorably). Our dependent variables were the average rating of the three anger-framed appeals and the average rating of the three-sadness framed appeals.

We measured dietary restraint at the end of the experiment using the restrained eating scale (Polivy, Herman, and Warsh 1978) Afterwards, participants were thanked and debriefed.

Results

We report key results here, with full results reported in table 3 and key contrasts presented in figures 3 and 4. Of the participants, 54% and 48% chose the apple in the self-control first and last conditions, respectively ($\chi^2 < 1$), and a matched-choice paradigm was used for analysis. First, among participants who chose the apple, there was an effect

of task order that replicates findings in previous experiments: the mean favorability rating for the three anger-framed proposals was greater among individuals who chose the apple before evaluating the appeals ($M = 3.84$) than among individuals who evaluated the appeals first ($M = 3.38$; $t(102) = 2.05$, $p < .05$). Thus, first making a responsible choice led to an increase in endorsement of anger appeals.

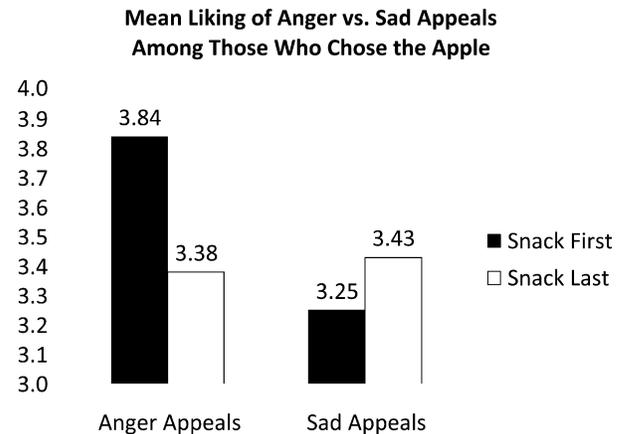
In contrast, among these apple choosers, there was no significant effect of task order on the favorability ratings of sadness-framed appeals ($M = 3.25$ vs. $M = 3.43$; $t < 1$). The different effects of choosing virtue on ratings of anger versus sadness-framed appeals was reflected by a significant task order \times message frame interaction ($F(1, 102) = 6.98$, $p < .01$). This suggests that the effect of exerting self-control is specific to anger appeals rather than more favorably responding to everything (or any approach-oriented affect) after a virtuous choice. Also consistent with previous experiments, there was no effect of task order on anger or sadness appeals among participants who chose the chocolates (F 's < 1 for all contrasts).

Next, we analyzed whether dietary restraint moderated the effect of choosing the apple on evaluations of the anger-framed appeals. We treated dietary restraint as a continuous variable, as advocated by Lowe and Thomas (2009). To illustrate the direction of effects, among participants who chose the apple, consistent with our proposition, the difference in restrained eaters' (those at 1 SD above the mean restraint score) evaluation of anger-framed proposals between the self-control first and last conditions was significant ($M = 4.31$ vs. $M = 3.31$, $\beta = 1.00$; $t = 3.47$, $p < .01$); however, this difference between task orders was not significant among unrestrained eaters (those at 1 SD below the mean restraint score; $M = 3.31$ vs. $M = 3.45$; $t < 1$). This led to a restraint style \times task order interaction ($\beta = .09$, $t = 2.66$, $p < .01$) among the apple choosers. In other words, the increased endorsement of anger appeals arising from the food choice was driven primarily by those with a restrained eating style. By contrast, for those who eat what they "want" (even if it was an apple rather than a chocolate), no change in response to anger appeals is produced.

Discussion

Experiment 4 provided convergent evidence to that of the first three experiments that choosing a healthy option over

FIGURE 3
ENDORSEMENT OF ANGER- AND SADNESS-FRAMED APPEALS BEFORE VERSUS AFTER CHOOSING THE APPLE: EXPERIMENT 4



immediate gratification can lead to an increase in angry behaviors. Further, the finding that the anger effect occurred only among restrained but not unrestrained eaters supports the exertion of self-control as the source of the effect.

GENERAL DISCUSSION

What are the consequences of exerting self-control? In this research, we expand on existing knowledge by demonstrating a novel set of anger-related behaviors after exerting self-control. Specifically, choosing responsible options over immediate gratifications tends to increase subsequent preferences for anger-related stimuli, such as anger-themed movies, and angry facial expressions. Further, exerting self-control can increase endorsement of anger-framed message appeals and intensify irritation toward controlling persuasive messages. Thus, this research extends the scope of angry behavior that ensues after exerting self-control beyond an increase in overt aggression to a more general propensity for anger-related behavior.

TABLE 3

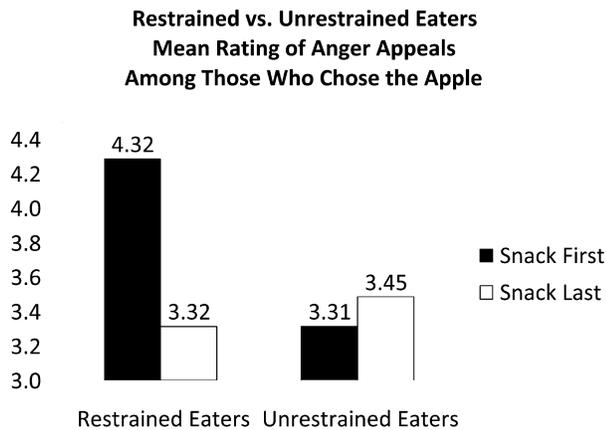
MEAN FAVORABILITY RATINGS OF ANGER- AND SADNESS-FRAMED APPEALS: EXPERIMENT 4

Eating style and frame	Choosing the apple		Choosing the chocolate	
	Self-control first	Self-control last	Self-control first	Self-control last
Restrained (at 1 SD above mean restraint):				
Anger framed	4.32 _a	3.32 _b	3.19	3.21
Sadness framed	3.25	3.40	3.69	3.24
Unrestrained (at 1 SD below mean restraint):				
Anger framed	3.31	3.45	3.26	3.31
Sadness framed	3.25	3.48	3.13	3.33

NOTE.—The pair with subscripts *a* and *b* is significantly different at $p < .01$. No other self-control first versus self-control last contrasts are significantly different.

FIGURE 4

ENDORSEMENT OF ANGER-FRAMED APPEALS AMONG RESTRAINED (AT 1 SD ABOVE MEAN RESTRAINT) AND UNRESTRAINED (AT 1 SD BELOW MEAN RESTRAINT) EATERS CHOOSING THE APPLE: EXPERIMENT 4



In addition to broadening the repertoire of downstream effects following the exertion of self-control, our findings raise important theoretical questions for future research. Most notably, because the anger-related behaviors examined in our experiments are not inappropriate, individuals are unlikely to be expending self-regulatory resources to inhibit them. Thus, an increase in these behaviors is unlikely simply an extension of diminished self-regulation due to ego depletion or licensing arising from the prior exertion of self-control. Rather, our findings suggest that there may be other mechanism(s) linking self-control to angry behaviors more broadly.

A question that naturally arises is, why and how might exerting self-control generate angry behavior? We discuss several possibilities and their implications for future research next. This is followed by a discussion of the methodological and practical contributions of this research.

Might Exerting Self-Control Elicit Anger?

Arguably, the most direct explanation for the effect of self-control on an increase in anger-related behaviors would be that there is anger created by exerting self-control. This anger then leads to an increase in a broad range of anger-related behaviors, such as aggression, attraction to anger-themed stimuli, and a greater response to other's attempts to control one's behavior. In other words, exerting self-control can make people angry. Prior research examining the link between exerting self-control and aggression has considered this possibility but has discounted it due to failure to find an increase in self-reported anger following the exertion of self-control (Dewall et al. 2007; Stucke and Baumeister 2006). Nevertheless, because affect can often be

implicit and lie below conscious identification (e.g., Chartrand 2009; Winkielman, Berridge, and Wilbarger 2005), the possibility remains that anger is in fact produced by exerting self-control but is not subjectively reported. We see several possible reasons why exerting self-control might elicit (implicit) anger.

Goal Frustration. The most essential instigator of anger is recognized to be the restriction or obstruction of desirable actions and movement toward goals. Indeed, many theorists distill the conditions for anger elicitation to "barriers to the attainment of an expected gratification" (Berkowitz and Harmon-Jones 2004) or "the irritations and frustrations that arise from events that restrict freedom of action or access to resources" (Panksepp 1998). It is believed that this affective reaction toward obstruction is quite primitive and has evolutionary roots. For example, in a classic study, newborn babies showed angry facial expressions and the autonomic response of facial flushing when a sucking biscuit was decidedly removed from the infant's mouth and held just beyond the infant's reach (Stenberg, Campos, and Emde 1983).

Implicit in these situations is also the presence of a specific barrier that had prevented the goal achievement, although the nature of this barrier and the necessity of a conscious appraisal of other fault for this barrier is a topic of great theoretical debate in anger research (a full discussion of this debate is beyond the scope of this article; for a review, see e.g., Berkowitz and Harmon-Jones [2004] and Ellsworth and Tong [2006]). The definitional debates surrounding anger notwithstanding, most researchers agree that there is a broad class of affect arising from the obstruction of an expected goal gratification and that such affect is "anger-like" even if one would not specifically label this affect as anger (Berkowitz and Harmon-Jones 2004). Further, the affect tends to be stronger, and more likely subjectively identified as anger, when there is conscious appraisal of other-fault and unfairness.

Considering the theory of anger and self-control decisions, we find important similarities between exerting self-control and the antecedents for anger. Specifically, in a self-control decision, a tempting reward is close at hand and yet a person is prevented from reaching for it due to the presence of a concern for long-term well-being. Thus, an otherwise attainable reward is denied by a specific barrier, potentially creating an affective dynamic for anger. However, harkening back to the debate about the role of other-blame in anger research, in exerting self-control, the barrier to immediate gratification is one's own sense of responsibility rather than another party. Consequently, even though an anger-like affect might be generated by the frustration of immediate gratification, the affect is likely to be mild and not subjectively identified by the individual as anger due to the lack of clear other-blame in this situation.

If anger indeed arises in response to the obstruction of immediate gratification, another important question for future research is why anger is not produced (based on evidence in our experiments) when people indulge and thus

fail to realize (or make progress toward) their long-term goal. It might be that the asymmetry lies in the visceral tangibility and closeness of the immediate reward versus the abstractness and distance of the future goal (Hoch and Loewenstein 1991; Liberman, Trope, and Stephan 2007). Specifically, because the future benefit is not viscerally and immediately available, the person may reason that a future benefit is at risk when he or she indulges but does not viscerally experience the restraint from a tangible reward. Rather, the person abstractly knows that he or she did something wrong and therefore, guilt rather than anger ensues when one indulges. Thus, to more fully establish the nature of the link between anger and exerting self-control, future research might test whether reducing the visceral/abstract asymmetry between the short-term versus long-term goals might reduce the asymmetry in anger.

Diminished Sense of Autonomy. Another potential source of anger from exerting self-control is the sense that one's sense of freedom is restricted and that one is "forced" to choose the virtuous path rather than indulgence. This explanation differs from the previous goal frustration account in posing that one is not angry because of failure to obtain one's visceral goal, but rather because one feels one does not freely control the choice outcome.

At first blush this account seems implausible because the individual clearly controls the outcome of a self-control decision (i.e., it is that individual's decision). However, research in Self-Determination Theory (SDT) has argued that, in the context of self-control decisions, pursuit of immediate gratifications tends to be associated with a relatively intrinsic locus of causality and thus tends to reflect the "true" or "authentic" self. Conversely, choices made in accordance with norms, rules, and expectations may be driven by one's desire to conform to standards and are thus less intrinsically motivated. As a result, the latter sort of choices can feel as if they are coerced by demands that are relatively external to the self (Deci and Ryan 1985; Moller, Deci, and Ryan 2006; see also Laran and Janiszewski 2011; Trope and Fishbach 2005; Ward and Mann 2000). Thus, anger might be a consequence of a feeling of reduced autonomy when choosing responsibility over immediate gratification. To shed light on this possibility, future research might examine how the degree to which one attributes one's virtuous choices to relatively extrinsic demands, such as social norms and pressures, moderates the magnitude of subsequent angry behavior.

Ego Depletion Elicits Anger. Another possible account for the effect of self-control on angry behavior is simply that the state of being depleted makes people angry. For example, being depleted might be an uncomfortable or stressful state, and thus people who are depleted might feel irritable and be quick to anger. This account differs from prior accounts ascribing the self-control-aggression link to ego depletion because it does not depend on people's inability to self-regulate subsequent inappropriate behavior in order for anger to be manifest but rather poses that the depleted state itself is aggravating and anger provoking.

Detecting Anger from Exerting Self-Control. Another question to consider is this: If anger is indeed produced from exerting self-control, how might this anger affect be detected and measured? One avenue may be to rely on participants' self-reports of anger. However, given that the anger may not be consciously identified, a self-report may not accurately capture one's underlying affective state. To address the limitation of explicit self-report, one avenue is to provide more convergent evidence of anger-related behaviors after exerting self-control. In addition to the behaviors demonstrated in the current studies, one might also examine physical acts associated with anger, such as punching, hitting, and gripping inanimate objects (e.g., punching bags). One might also attempt to identify the presence of physiological measures associated with anger, such as arousal and facial expressions. Finally, one may take advantage of psychological tests designed and validated specifically for the detection of implicit emotions. For example, Krieglmeier, Wittstadt, and Strack (2009) used an implicit word detection task to demonstrate the presence of implicit anger. Such a task could be used after a self-control decision to complement (or contrast to) explicit self-reports of anger. A convergence of the above measures might then establish the production of anger through exerting self-control, as well as shed light into the mechanism(s) by which exerting self-control produces anger.

Other Potential Mechanisms Linking Self-Control to Anger

Although the production of an anger affect through the exertion of self-control is a plausible and direct account of the observed associations between self-control and angry behavior, other mechanisms are still possible. Below we discuss a few of these possibilities.

Depletion Exposes Latent Anger. Rather than the exertion of self-control eliciting anger affect as described above, an alternative account is that depletion of self-regulatory resources leads to the expression of existent, latent anger. This account presumes that people possess a certain degree of anger affect that is normally inhibited from influencing behavior by executive processes but that these inhibitory processes are attenuated following the exertion of self-control, thereby allowing latent anger to be expressed. Seemingly consistent with this view, Goltz (1892) described "sham rage" in dogs whose cortex was surgically removed. The decorticated animals responded with immediate, pronounced, and relatively undifferentiated rage in the absence of provocation, a finding that has been replicated many times subsequently (for a review, see Kaada [1967]). However, the existence of latent anger in humans and the ability for one simple self-control choice to disinhibit such latent anger are yet to be established through extensive research.

All Anger Expression Is Viewed as Inappropriate. Although we did not find an explicit need for inhibition of the anger-congruent responses in our studies (based on our pre-

tests), a possibility that cannot be ruled out is that an aversion to anger is so deeply entrenched that all anger affect—regardless of whether it is implicit or explicit and whether its manifestations are appropriate or inappropriate—is automatically suppressed when one has the regulatory resource to do so. For example, people might automatically suppress choosing anger-themed movies or interest in angry faces when they have the regulatory resources to do so even though they do not explicitly report such content as being inappropriate. The possibility of such deep, automatic suppression of anger (and perhaps the cultural variations thereof) might be an intriguing area for future research.

In sum, while leaving the question of mechanisms open for future investigation, the current research contributes to the understanding of self-control decisions by demonstrating a broad range of anger-congruent effects as a result of exerting self-control. Importantly, these findings cannot be explained by prior conjectures regarding the association between self-control and angry behavior, and they therefore call for new theorizing. Finally, from a broad perspective, our research suggests that the potential negative affective consequences of the exertion of self-control is an underexplored area that warrants greater research.

Methodological Contributions

In addition to its theoretical implications for understanding self-control decisions, this research also makes a methodological contribution to the study of the consequences of self-control decisions. A potential selection problem inherently arises when one seeks to compare the subsequent behavior of people who chose one way or another in a decision. Previous research tends to circumvent the selection problem by using either a hypothetical scenario or a “rigged” choice (e.g., “stacking” the options so that most will choose in the more efficient direction for the researcher). However, in general, researchers may be interested in situations in which the first choice involves a real conflict (rather than a relatively trivial choice). As another alternative, a popular ego depletion paradigm involves “forced” self-control (e.g., Baumeister et al. 1998). Finally, some research, including a number of classic studies in cognitive dissonance, fail to address this problem entirely (for a discussion of this issue, see Chen and Risen [2010]).

In this research, we introduced the “matched-choice paradigm” as a relatively straightforward way to control for the selection problem. The matched-choice paradigm can be used not just in studying self-control decisions but in studying the consequences of choice in general. The logic is to separate the psychological effect of the act of choice from any effects correlated with one’s chronic preferences in that choice. This goal is achieved by measuring the chronic preference in the potent choice after the target dependent variables have been measured. This way a measure of chronic preferences is obtained in the control condition as well, which is readily used to be “matched” with the treatment group preferences.

However, research using the matched-choice paradigm should also be mindful of the potential limitations to this

method. In particular, the possibility exists that the target behavior might also significantly influence the self-control decision in the “self-control last” (control) condition, making the “preference match” imperfect between the two task orders. This concern may be abated by having a certain amount of theoretical confidence that the target behavior should not significantly affect the self-control choice and by checking that the self-control choice outcome indeed did not differ between the task orders. Finally, one may also add a filler task (time lag) between the target behavior and the self-control choice to further limit this possibility.

Practical Implications

Given that most individuals are frequently engaged in self-regulation throughout any given day—whether it be resisting the urge to mock one’s boss, to yell at a screaming baby, to eat an extra slice of chocolate cake, to save instead of spend, or to play instead of work—our findings suggest that anger-related behavior might be more prevalent than previously assumed or reported. This might have important implications for marketers, policy makers, and, more generally, for consumer well-being.

For marketers, findings from our research offer some intriguing possibilities. For example, companies might do well in advertising anger-themed movies and video games (e.g., “Angry Birds”) next to “healthy food” aisles. More generally, if anger arising from self-control decisions is as ubiquitous as our findings indicate, anger-themed advertising might be particularly effective by catering to such emotions. Interestingly, recent press articles have documented the increasing prevalence of anger-themed advertising, including by well-known companies such as Miller Brewing, Kodak, Harley Davidson, and JetBlue (Elliott 2009). Our research provides insight into the popularity of anger appeals by demonstrating the perhaps underestimated prevalence of anger-evoking situations.

For consumers, our findings suggest that one should be aware of the potential angry behavior produced while self-regulating. Although sometimes these angry behaviors, such as preferring to watch an anger-themed movie, are relatively benign, at other times they may in fact be harmful, such as when behaving aggressively or being overly attracted to anger-related stimuli. Consumers might seek to reduce the anger effects from self-control by adopting self-regulatory strategies that reduce the need for the exertion of self-control (see Myrseth and Fishbach 2009; Trope and Fishbach 2000, 2005), such as by avoiding self-control dilemmas in the first place (i.e., situational control) or cognitively reappraising the situation so that the virtuous choice does not involve a denial of satisfaction.

Finally, this research suggests that public policy messages regarding healthy eating or other forms of self-regulation such as saving for retirement might need to be mindful of the emotional consequences such messages might have on consumers. For example, in the case of food, an increasing prevalence of public health messages and laws mandating calorie and ingredient labeling of food tend to categorize

foods in terms of those that are good versus bad (Barbaro 2009). Such categorization is assumed to help consumers regulate their diets. However, with such explicit juxtaposition, individuals may increasingly view food in terms of health versus pleasure conflicts. Consequently, individuals might increasingly experience guilt when eating restricted foods and irritation/anger when denying themselves these foods. Thus, policy makers might want to be mindful of these emotional consequences of food education and perhaps rely on a wider set of mechanisms (e.g., situational control, positive inducement) as means to increase responsible behavior.

APPENDIX

PAIRED ANGER-THEMED AND NON-ANGER-THEMED MOVIE CHOICES (EXPERIMENT 1)

CHOICE 1:

- A. *Anger Management* (anger-themed): In this comedy, Adam Sandler plays a man ordered by a judge to attend anger management classes, but interactions with his obviously psychotic anger management counselor appear to only make him angrier.
- B. *Billy Madison* (non-anger-themed): In this comedy, Adam Sandler plays a man who must successfully repeat grades 1–12 all over again in order to inherit his father's fortune.

CHOICE 2:

- A. *The Game* (non-anger-themed): In this thriller, Michael Douglas plays a wealthy man who is thrust into a panic-inducing real-life "game," seemingly without rules, in which his identity is stolen and in which he does not know whom he can trust.
- B. *Falling Down* (anger-themed): In this dark comedy, Michael Douglas plays an unemployed defense worker who is frustrated with the various flaws he sees in society, and who begins to psychotically and violently lash out against them.

CHOICE 3:

- A. *Romeo and Juliet* (non-anger-themed): A film adaptation of the William Shakespeare tragedy about two young "star-cross'd lovers" whose untimely deaths ultimately unite their feuding families.
- B. *Hamlet* (anger-themed): A film adaptation of the William Shakespeare tragedy. Recounts how Prince Hamlet exacts revenge on his uncle Claudius, who has murdered Hamlet's father and married Hamlet's mother. Vividly charts the course of real and feigned madness—from overwhelming grief to seething rage—and explores themes of treachery, revenge, incest, and moral corruption.

CHOICE 4:

- A. *Count of Monte Cristo* (anger-themed): In this adaptation of the Alexander Dumas literary classic, a man is consumed with exacting revenge against the individuals that wrongly had him imprisoned.
- B. *The Three Musketeers* (non-anger-themed): This adaptation of the Alexander Dumas literary classic follows a group of swashbucklers as they engage in a series of adventures and romantic liaisons.

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