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Effects of Specific, Nonconscious Emotions on Self-Control Behavior

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Abstract

Current empirical evidence regarding nonconscious emotion is limited to positively versus negatively valenced affect. This paper demonstrates that specific, equally valenced emotions can be subliminally primed, remain inaccessible to conscious awareness, and still differentially affect behavior. In experiments 1 and 2 participants subliminally primed with a guilty emotion show higher self-control on both a guilty-pleasure and a grim-necessity self-control task than participants subliminally primed with a sad emotion. Participants in these different emotion conditions show no differences in their conscious emotion ratings. Experiments 3 and 4 added a time delay manipulation and replicated these findings, suggesting that the effects of nonconscious emotions found in this research are not purely semantic but also have a motivational component.

Keywords: emotion, nonconscious emotions, automaticity, self-control

Effects of Specific, Nonconscious Emotions on Self-Control Behavior

Emotions have been of central interest to psychologists for many decades (e.g., James, 1884). Research has focused on the nature and behavioral effects of emotions (e.g., Lazarus 1991; Lazarus, 2000; Lerner & Keltner 2000; Scherer, 1988; Zajonc, 1980) and has demonstrated that the sources of emotion need not be conscious or identifiable in order for emotion to affect behavior (Kihlstrom, 1999; Kunst-Wilson & Zajonc, 1980; Oehman, Flykt, & Lundqvist, 2000; Winkielman, Zajonc, & Schwartz, 1997). Although the idea that emotions can affect behavior even when their causes are not consciously available is now widely accepted (Ekman & Davidson, 1994), a new debate has emerged questioning whether the experience of emotion itself need be consciously available in order to affect behavior.

Some researchers argue strongly that emotion must be conscious in order to exist and affect behavior (Clore, 1994; Ellsworth, 1994; James, 1884). For example, Clore (1994) has argued that: “it is not possible to have an unconscious emotion because emotion involves an experience, and one cannot have an experience that is not experienced” (p. 290). However, even researchers who emphasize the importance of the conscious component of emotion (Lazarus, 2000; Scherer, 1999) have left room for the possibility that future research may reveal the existence and effects of nonconscious emotion (Davidson & Ekman, 1994; Ellsworth, 1994; Ellsworth, 1995). In other words, conscious emotion has been of focal interest to many researchers, but this focus may have not been the result of a definitional limitation but rather of a research orientation (Berridge & Winkielman, 2003).

Recently, this orientation has begun to shift and attention has been focused on nonconscious emotions. Researchers have demonstrated that emotion can affect behavior even when individuals are not consciously aware of that emotion (Berridge, 1999; Berridge & Winkielman, 2003; Dimberg, Thunberg, & Elmehed, 2000; Kihlstrom, Mulvaney, Tobias, & Tobis, 2000; Winkielman & Berridge, 2004; Winkielman, Berridge, & Wilbarger, 2005b; Winkielman et al., 1997). For example, Winkielman et al. (2005b) demonstrated that individuals behaved in accordance with the valence of a subliminally primed emotion, even though they were unaware of the prime and unable to report any subjective, conscious change in their emotional state.

However, there is one limitation in current demonstrations of nonconscious emotion. This stream of research has defined emotion as good or bad, that is, in terms of positive and negative valence (Berridge & Winkielman, 2003). There is no demonstration to date that specific, discrete emotional states that do not differ in valence can be primed, remain inaccessible to conscious awareness, and still differentially affect behavior.

The present research extends prior findings by providing empirical evidence that specific, equally valenced emotions can be subliminally primed, remain unavailable to conscious awareness, and still differentially affect behavior. An appropriate empirical test for demonstrating such behavioral effects of specific nonconscious emotions (beyond positive versus negative valence) should meet three criteria. First, the specific emotions examined should be similar in valence but generate predictably different behaviors. If different specific emotions of similar valence result in different behaviors, this would indicate that behaviors are driven by the specific type of emotion rather than by valence.

Second, if the specific emotions are expected to interact with individual characteristics to affect behavior, this interaction should continue to exist even when the emotions are not consciously accessible. Finally, it must be demonstrated that individuals were not consciously aware of or able to explicitly report any significant differences in their emotion (both in valence and specific emotion type) across the different emotion prime conditions (Winkielman et al., 2005b). Measures for such differences should be explicit and should be administered in close proximity to the emotion elicitation procedure and prior to the behavioral measure, so as to avoid biases caused by memory or counterfactual thinking (Winkielman et al., 2005b).

To satisfy these three requirements we chose to prime guilt and sadness and examined the resulting self-control behaviors. Sadness, guilt, and self-control were chosen because they satisfy the first two empirical criteria above. First, guilt and sadness are both negatively valenced but have been shown to generate predictably different levels of self-control (Baumeister, Stillwell, & Heatherton, 1994; Bybee, Merisca, & Velasco, 1998; Rehm & Plakosh, 1975; Tangney & Dearing 2002; Zemack-Rugar, 2005). Second, guilt is known to interact with a measurable individual characteristic, guilt-proneness, to determine self-control behaviors (Tangney 1999; Tangney 2001; Tangney & Fischer, 1995; Tangney, Wagner, & Gramzow, 1992).

To satisfy the third empirical criterion, this research utilizes an established emotion measure for evaluating positive versus negative valence (the PANAS scale; Egloff et al., 2003; Tice et al., 2001; Watson, Clark, & Tellegen, 1988; Winkielman et al., 2005a) with added measures designed to differentiate specifically between guilt and sadness (Zemack-Rugar, 2005); the measure is administered in close proximity to the

emotion prime and before the behavioral measure. Thus, all of our experiments meet the three criteria posed.

Experiments 1 and 2 demonstrate that individuals subliminally primed with guilt report emotions no different from individuals subliminally primed with sadness. Despite this lack of differential conscious emotion, individuals in the two emotion conditions exert predictably different levels of self-control on two separate tasks. Experiments 3 and 4 focus on the processes underlying these effects and examine whether these effects are driven only by a semantic link between the primed emotion (e.g., guilt) and self-control behaviors, or whether the effects are also driven by a motivational component linking emotion-regulation to self-control. Prior to presenting these experiments, we briefly review current findings regarding nonconscious affect and emotion and findings linking sadness, guilt, and self-control behavior.

Nonconscious Affect and Emotion

Over the last two decades, many emotion researchers have asserted that emotions can affect behavior without individuals' conscious awareness of the emotion itself (e.g., Davidson, Jackson, & Kalin, 2000; Ekman, 1999; Izard, 1994; Kihlstrom, 1999; Kihlstrom et al., 2000; Lang, 1993; Ledoux, 1996; Murphy & Zajonc, 1993; Panksepp, 1994; Zajonc, 1980). Recently, empirical evidence has accrued supporting this claim (Berridge & Winkielman, 2003; Strahan, Spencer, & Zanna, 2002; Winkielman et al., 2005b). For example, Winkielman et al. (2005b) demonstrated that thirsty individuals who were subliminally primed with happy faces consumed more and were willing to pay more for a drink than thirsty individuals who were primed with angry faces; these

individuals were not aware of any emotion-primers and reported no change in their subjective emotional experience following these primers.

Such findings demonstrate that emotion need not be accessible to conscious awareness in order to affect behavior. Moreover, the effects of the nonconscious emotion interacted with individual characteristics and motivations; the effects of subliminally primed positive emotions were observed for participants who were thirsty, but not for participants who were not thirsty (Winkielman et al., 2005b).

The definition of emotion in these studies was limited to good versus bad, or positive versus negative valence (Berridge & Winkielman, 2003). There is no demonstration to date that specific, equally valenced emotions can be primed, remain inaccessible to conscious awareness, and still affect behavior in predictably different ways. Winkielman et al. (2005a) suggest that such effects likely exist: “we believe that our arguments also apply to specific emotion states, even though the empirical evidence for our position has been obtained so far primarily in the domain of affect” (in press). Other researchers support this view (Levenson, 1994; Panksepp, 1994; Zajonc, 1994), and there is evidence that brain structures are designed to support different specific emotions and responses (Winkielman et al., 2005a) rather than a generic “emotion” construct (Ledoux, 1994) or a simple negative-positive affective dichotomy (Gray, 1994; Levenson, 1994).

The experiments described next provide initial demonstrations that specific, equally valenced emotions can be primed, remain inaccessible to conscious awareness, and still affect behavior in different, predictable ways. In order to demonstrate such effects, one must identify two equally valenced emotions that are expected to

differentially affect a specific behavioral measure. To this end, we have selected guilt and sadness; we discuss below their effects on self-control behaviors.

Sadness, Guilt, Guilt-Proneness, and Self-Control

There is ample evidence suggesting that guilt and sadness, although both negative in valence, generate different levels of self-control (Baumeister et al., 1994; Bybee et al., 1998; Rehm & Plakosh, 1975; Tangney & Dearing, 2002; Zemack-Rugar, 2005). For example, sad individuals tend to approach stimuli that are tempting and positive in an immediate sense, even if these stimuli are harmful in the long term (e.g., fatty foods, indulgent purchases), showing relatively low self-control on “guilty-pleasure” self-control tasks (Baucom & Aiken, 1981; Giner-Sorolla, 2001; Heatherton, Striepe, & Wittenberg, 1998; Loewenstein, 1996; Rehm & Plakosh, 1975; Tice, Bratslavsky, & Baumeister, 2001). Moreover, sad individuals tend to avoid negative stimuli of any kind, including “grim-necessity” self-control tasks, where a current unpleasant effort (e.g., preparing for an exam) provides a potential future benefit (e.g., academic success; Giner-Sorolla, 2001). Thus, sad individuals are expected to show low levels of self-control on grim-necessity tasks (Erber & Erber, 1994; Forgas & East, 2003; Lavine, Thomsen, Zanna, & Borgida, 1998; Rehm & Plakosh 1975).

Contrarily, guilty individuals tend to exhibit high self-control on both types of tasks. Guilty individuals tend to avoid indulging in guilty-pleasures (Bybee, 1998; Tangney & Dearing, 2002) and are willing to invest time in tasks that provide a long-term benefit (especially if the benefit is social), even if the task is painful or unpleasant (Boster et al., 1999; Darlington & Macker, 1966; Estrada-Hollenbeck & Heatherton, 1998; Zemack-Rugar, 2005).

Moreover, the impact of guilt on self-control is moderated by individuals' proneness to experience guilt and their tendency to respond to it in prototypical (enhanced self-control) ways (Tangney et al., 1992). Individuals low in guilt-proneness are less inclined to link guilt-arousing situations with increased self-control behaviors than individuals high in guilt-proneness. The latter, however, repeatedly experience an emotion-behavior link between guilt and increased self-control; when they encounter guilt, they show increased self-control behaviors on both guilty-pleasure and grim-necessity tasks (Bybee, 1998; Boster et al., 1999; Darlington & Macker, 1966; Estrada-Hollenbeck & Heatherton, 1998).

Thus, over time, individuals high in guilt-proneness form a strong emotion-behavior link between guilt and increased self-control. Due to its repeated activation, this link is likely to become automated (Bargh & Chartrand, 1999) and can be activated outside of the individual's awareness (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001; Chartrand & Bargh, 1996). In other words, the behavior (increased self-control) is automatically pursued once the emotion is activated.

We argue that the activation of the emotion need not be conscious in order for the emotion-behavior link to be activated and pursued. In other words, the subliminal priming of guilt should suffice to activate this link, in particular in cases where the link is strong and automated. Such hypothesizing is consistent with the evidence for nonconscious emotions discussed above (e.g., Strahan et al., 2002; Winkielman et al., 2005b) and with a multitude of findings demonstrating that people need not be aware of the reasons driving their behavior in order to act in accordance with those reasons (Chartrand, 2005; Gilbert et al., 2002; Handley, Lassiter, Nickell, & Herchenroeder,

2003; Lieberman, Ochsner, Gilbert, & Schacter, 2001; Strahan et al., 2002; Zemack-Rugar, 2005). For example, individuals who associated snakes with fear responded to subliminal primes of snakes with an emotional fear response (Oehman & Soares, 1994). That is, the automatic link between snakes and fear was activated, even though participants could not see the snakes and were not aware of what was driving their emotions.

Similarly, we argue that the link between guilt and increased self-control will be activated even when guilt is not consciously experienced. The mere priming of guilt, whether consciously available to the individual or not, will elicit the pattern of behavior that commonly accompanies it. Thus, individuals high in guilt-proneness and primed with a guilty emotion are expected to show relatively high levels of self-control. No such effect is predicted for individuals low in guilt-proneness and primed with guilt or individuals primed with sadness.

Finally, we argue that the emotion-behavior link (e.g., guilt-self-control) is not merely semantic in nature. Rather, we argue that this link has a motivational component. This motivational component is elaborated upon and examined in experiments 3 and 4. However, first we examine whether this link does in fact exist, can be activated even when emotions are not consciously experienced, and can affect behavior in the ways predicted above.

Experiment 1

Overview

Experiment 1 examines the effects of a subliminally primed sad versus guilty emotion on self-control on a guilty-pleasure task. Consistent with the above discussion of

the emotion-behavior link, we predict that an interaction of emotion by guilt-proneness (GP henceforth) will determine self-control levels. Specifically, individuals primed with a guilty emotion and high in GP are expected to show higher self-control than individuals primed with a guilty emotion and low in GP and than individuals primed with a sad emotion (Bybee, 1998; Tangney & Dearing, 2002; Tangney et al., 1992; Zemack-Rugar, 2005).

Moreover, these effects are expected to occur despite the fact that participants in the different emotion prime conditions do not report different levels of positive, negative, or specific guilty emotions. These emotions are measured explicitly, in close proximity to the prime, and before the behavioral measure.

Method

Participants

Ninety-eight participants from a southeastern university completed a 2 factor between-subjects design of Emotion (Guilty vs. Sad; manipulated) by Guilt-Proneness (High vs. Low; measured), with a dependent variable of self-control on a guilty-pleasure task. The experiment took approximately 20 minutes, and participants were paid \$5.

Procedure

Participants arrived at the lab at random times (based on signs and flyers throughout the student center) and were run in batches of 1 to 10 participants. Participants were told they were going to participate in two studies: a visual acuity study and a consumer choice study. Following Chartrand & Bargh (1996), the “visual acuity” study was in fact the emotion priming procedure. Participants were seated in front of a computer screen that had three asterisks in its center. They were asked to click the space

button as quickly as possible every time a string of letters flashed on the screen. For best performance, participants were advised to focus on the three asterisks, as the stimuli would appear randomly in different places.

Stimulus words were flashed 16 times each for 60 milliseconds in one of the four quadrants of the screen (randomly). For the sad condition, stimulus words were sad, miserable, depressed and gloomy. For the guilty condition, stimulus words were guilty, blameworthy, guilt-ridden, and culpable. Following each target stimulus word a backward mask appeared (the letters “XQFBZRMQWGBX”). This mask remained on the screen until participants pressed the space button, at which point the three asterisks returned to the screen and the next trial began. Trials were separated by a randomly selected 2 to 5 second interval. Both words and mask were presented in 33 point black font (all capital letters) against a white background.

At the end of this “visual acuity” portion, participants were asked what they thought the goal of the study was. This question was designed to evaluate whether participants suspected they were flashed with anything and whether they believed the cover story for the study.

Participants then began the “consumer choice” study (presented on the same computer with no interruption) and were asked to complete the PANAS (Watson et al., 1988) emotion scale, a common, explicit, widely used measure that allows for a broad range of emotions (Egloff, Schmukle, Burns, Kohlmann, & Hock, 2003; Schmukle, Egloff, & Burns, 2002; Tice et al., 2001; Winkielman et al., 2005a). Several adjectives were added to the scale to better measure both semantic priming effects and guilt. First, to ensure there was no increased, specific semantic priming of the stimulus words, those

emotion adjectives were added to the PANAS scale. Second, the adjective “remorseful” was added to the scale to allow for the creation of a composite guilt-score (average of guilty, guilt-ridden, remorseful, and blameworthy) previously shown to differentiate between groups manipulated into sad versus guilty emotions (Zemack-Rugar, 2005)

The timing of the administration of this scale was chosen carefully; it occurred shortly after the subliminal emotion prime, but before the main dependent variable measures. This timing has two important features: (a) measuring subjective emotion shortly after the emotion prime rather than later on in the experiment reduces the potential contamination of emotions by memory bias (Schacter, 2001; Winkielman et al., 1997), and (b) explicitly measuring subjective emotion before the dependent variable allows us to examine the conscious subjective state of the participant immediately before the behavior of interest.

Following the PANAS scale, participants were asked to complete the self-control task. This task required participants to allocate a \$50 gift certificate (that they were eligible to win) between a CD/DVD purchase and a school-supply purchase. In an earlier (open ended) pretest, participants indicated they considered CDs and DVDs to be guilty-pleasures; no participant mentioned school-supplies as a guilty-pleasure. Moreover, in prior research CD/DVDs were found to be more tempting, enjoyable, and desirable than school supplies, and at the same time significantly less good for you, suggesting they are a good measure for a guilty-pleasure (Zemack-Rugar, 2005). Dollars allotted to the CD/DVD purchase served as the guilty-pleasure dependent variable. Following the coupon allocation task, participants completed several questions regarding the degree to which they found each of the options tempting, appealing, and the degree to which they

would be happy to receive them as a gift (all 7-point scales). These measures served as covariates.

Next, additional hypothesis guessing checks were administered. Participants were asked to indicate what they believed the goal of the study was (open ended), and then were asked directly if they believed they were flashed with anything other than the asterisks and the meaningless set of letters at the beginning of the “first” study (Yes/No/I don’t know). For those who responded “Yes,” a follow up question asked what they thought they had seen flashed. Then, participants completed the Test of Self-Conscious Affect (TOSCA; Tangney et al., 1992) to measure GP. Finally, participants were debriefed and paid.

Results

Three participants were unable to complete the experiment due to interruptions during the priming phase.

Hypothesis Guessing

All participants believed the “visual acuity” cover story, and none indicated suspicion that they were flashed with something other than the mask. However, following the overt emotion and coupon allocation measures, 10 participants indicated they were suspicious that the two measures were related. Although these participants were not aware that their emotion had been manipulated (none suspected the “visual acuity” task), they made a connection between the emotion measure and the subsequent coupon (self-control) measure. This connection may have biased their responses or created demand effects, and therefore they were removed from the analysis. Thus, 85 participants are included in the analysis.

Priming Stimuli

A composite score of the ratings of adjectives corresponding to the primed words was created for each condition. There was no effect of emotion condition on either the sad ($F(1,83) = .38, p > .53$, Cronbach Alpha = .85) or the guilty ($F(1,83) = .95, p > .33$, Cronbach Alpha = .81) primed word scores (see Table 1).

Emotion

Three composite emotion scores were created. Two consisted of the negative and positive valence scales from the original PANAS emotion scale, and the third of a composite guilt-score (the average of remorseful, guilty, guilt-ridden, and blameworthy; Cronbach Alpha = .81). An ANOVA revealed that there was no significant effect of emotion primed on either the negative emotion scale ($F(1,83) = 1.87, p > .15$), the positive emotion scale ($F(1,83) = 2.07, p > .15$), or the guilt-score ($F(1,83) = .62, p > .43$; see Table 1).

Self-Control (Guilty-Pleasure)

We conducted an ANCOVA using the overall valuation of the CD/DVD option as a covariate (i.e., the average of appealing, tempting, and happy to receive as gift; Cronbach Alpha = .80) and Emotion condition (sad vs. guilty), the GP score (continuous), and the Emotion X GP interaction as independent variables. The dollars allotted to the CD/DVD option served as the dependent variable. A significant Emotion X GP interaction was found ($F(1,80) = 4.15, p < .05$). Planned contrasts using a median split on the GP measure ($M = 3.7$) revealed that, as predicted, participants low in GP allotted the same amount of money to the CD/DVD option whether they were primed with a guilty emotion (LS Means: $M_{guilty} = 31.6$) or a sad emotion ($M_{sad} = 29.4, F(1,80) =$

2.72, $p > .10$). However, participants high in GP allotted less to the CD/DVD option if they were primed with a guilty emotion ($M_{guilty} = 20.2$) than if they were primed with a sad emotion ($M_{sad} = 26.4$, $F(1,80) = 4.09$, $p < .05$). Moreover, in the guilty emotion prime condition, participants high in GP exerted significantly higher self-control than participants low in GP ($F(1,80) = 5.72$, $p < .05$). No such effects were found for participants in the sad emotion prime condition ($F(1,80) = 1.53$, $p > .21$; see Figure 1).

Discussion

Experiment 1 demonstrates that subliminal primes of different, specific, negative emotions can affect behavior in predictably different ways. Moreover, behavior was determined not by the specific emotion primed alone, but rather by its interaction with an individual characteristic, GP. Specifically, as predicted, individuals primed with guilt exhibited more self-control when they were high in GP than when they were low in GP. Additionally, participants primed with sadness exhibited the same relatively low levels of self-control regardless of their GP. As a result, participants primed with a guilty emotion and characterized by high GP showed higher self-control than all other participants.

Importantly, these effects occurred even though participants were not consciously aware of their specific emotions and reported equivalent levels of subjective emotional experience in both of the emotion prime conditions. Individuals primed with either guilt or sadness reported equal levels of negative, positive, and guilt-specific emotions. Moreover, participants' ratings on the specific emotion adjectives used in the priming process did not vary across conditions. This finding reduces the viability of an explanation relying purely on semantic priming and increases support for the claim that

emotions themselves were activated and affected behavior, albeit outside of conscious awareness.

These findings extend existing demonstrations involving nonconscious affect. To the best of our knowledge, this is the first demonstration that specific emotions can be subliminally primed, remain unavailable to conscious awareness, and still affect behavior. That is, both emotions examined in this experiment were negatively valenced; therefore, the differential behaviors observed following the subliminal priming of these emotions cannot be explained by valence alone. This experiment further shows that participants' nonconscious emotions interacted in subtle and predictable ways with their individual tendency to habitually link those emotions with self-control. This finding suggests that the activation of specific nonconscious emotions led to the activation of an automated emotion-behavior link; since the nature of this automated link varied across individuals, depending on their levels of GP, self-control levels varied accordingly. In our second experiment we examine whether these findings replicate using a different self-control task, a grim-necessity.

Experiment 2

Overview

This experiment examines the effects of a nonconscious sad versus guilty emotion on self-control on a grim-necessity task. As in experiment 1, participants are expected to report no conscious, differential emotion across the two emotion prime conditions. Moreover, as in experiment 1, individuals primed with a guilty emotion are expected to exert more self-control than individuals primed with a sad emotion, but only if they are

high in GP (Boster et al., 1999; Darlington & Macker, 1966; Estrada-Hollenbeck & Heatherton, 1998; Tangney et al., 1992).

However, these effects are expected only if participants have the time to complete the grim-necessity task. Specifically, experiment 2 involves a procedure that provides participants with an unexpected opportunity to volunteer time to a grim-necessity for a charity. For time volunteered to increase, participants must be primed with an emotion linked to volunteering (e.g., guilt), be individually inclined to link that emotion to volunteering (i.e., high in guilt-proneness), and be able to volunteer given their objective time limitations at the time of the experiment. For example, an individual who is highly guilt-prone and induced into a guilty emotion may have the inclination to volunteer more time to charity than an individual in a sad emotion. However, if the guilty individual must shortly attend a class or a meeting, whereas the sad individual has no such time limitations, the time volunteered may be determined more by the objective time limitation than by the primed emotion-state. These predictions are consistent with findings that the effects of nonconscious emotions interact with individual goals and expectations (Strahan et al., 2002; Winkielman et al., 2005b).

Method

Participants

One-hundred-ninety-seven undergraduate students from a southeastern university completed a 3 factor between-subjects design of Time Availability (Yes vs. No; measured) by Emotion (Guilty vs. Sad; manipulated), by Guilt-Proneness (High vs. Low; measured), with a dependent variable of self-control on a grim-necessity task of

volunteering time for charity. The experiment took approximately 20 minutes, and participants were paid \$5.

Procedure

The methods for experiment 2 were identical to those used in experiment 1 except for three changes: (1) a grim-necessity task was substituted for the guilty-pleasure task, (2) covariates were collected consistent with the new grim-necessity task, and (3) a time availability measure was added.

The grim-necessity task was adapted from Zemack-Rugar (2005). The mood priming procedure and mood measures were administered by computer (as in Experiment 1), and participants were told on the next computer screen that another experimenter was conducting research in an adjacent room. They were told the research involved an array of boring, repetitive tasks designed to assist a charity in formulating its research questionnaires. The other experimenter was said to be helping this charity out for free and was thus unable to pay participants for their time. Participants were asked whether they would be willing to assist the charity. They were told that they did not have to complete the entire charity packet, but could allot anywhere from 0-20 minutes to the charity. The charity task was to be completed after they finished the current study, for no additional pay. Participants were then asked to indicate how much time (0-20 minutes) they wished to allot to the charity. This served as the grim-necessity self-control dependent variable.

Following this task, participants were presented with three questions: how involved they were with charity, how important charity was to them, and how much time they spent on charity (all on 7-point scales). These questions served as covariates.

Participants were then asked to indicate what they believed the goal of the study was (hypothesis guessing check).

Since the experiment was conducted at the university's student center and participants stopped by at random without pre-scheduling, a time availability measure was needed. In particular, participants based their consent to participate in the experiment on the 20 minute duration noted on flyers and signs throughout the student center. However, the actual time availability required to participate in the experiment was 40 minutes (time needed to complete the experiment and still be able to allot up to the maximum time to the charity task). Since the "charity task" measure would be useless if mentioned before the emotion prime, it was impossible to screen out participants ahead of time based on whether they actually had 40 minutes available. Consequently, to identify those participants who were objectively limited in their ability to volunteer time to the charity, we asked participants to indicate when their next class and/or any other set (i.e., time-specific) activities they needed to attend that day were scheduled.

Results

Hypothesis Guessing

All participants believed the "visual acuity" cover story, and none indicated true suspicion that they were flashed with something other than the mask¹. However, following the overt emotion and grim-necessity for charity measures, 13 participants indicated they were suspicious that the two measures were related. These participants were removed from the analysis, leaving 184 participants..

Priming Stimuli

A composite score of the ratings of adjectives corresponding to the primed stimulus words was created for each condition. There was no effect of emotion condition on either the sad ($F(1,182) = 0.2, p > .65$, Cronbach Alpha = .76) or the guilty ($F(1,182) = 0.02, p > .89$, Cronbach Alpha = .66) primed word scores (see Table 1).

Emotion

An ANOVA revealed no significant effect of emotion prime on either the negative emotion scale ($F(1,182) = .46, p > .4$), the positive emotion scale ($F(1,182) = 1.39, p > .23$) or the guilt-score ($F(1,182) = .01, p > .93$; Cronbach Alpha = .82; see Table 1).

Time

The emotion primes were expected to affect only those participants who did not have a time limitation, that is, who did not have a prior time commitment. Participants' responses to the time availability question were coded as a dummy variable, with those participants who indicated they had a set obligation within one hour coded as the time-unavailable group (35 participants), whereas the rest were coded as the time-available group.

Self-Control (Grim-Necessity)

An ANCOVA was conducted using participants' general tendency to volunteer (average of involvement, importance, and investment; Cronbach Alpha = .87) as a covariate, and Time Availability, Emotion condition, GP and their interactions as independent variables. The dependent variable was the time allotted to charity in minutes. A significant three-way interaction of Time Availability X Emotion X GP ($F(1,175) = 5.28, p < .05$) was found.

To examine the simple effects comprising this interaction, a median split was applied to the GP measure ($M = 3.8$). Planned contrasts revealed, as predicted, no significant effects of emotion in the time-unavailable condition ($p > .2$ for all). For the time-available condition, also as predicted, participants low in GP allotted the same amount of time to the charity whether they were primed with a guilty emotion (LS Means: $M_{guilty} = 3.1$) or with a sad emotion ($M_{sad} = 2.2$, $F(1,175) = .37$, $p > .54$). However, participants high in GP allotted more time to the charity if they were primed with a guilty emotion ($M_{guilty} = 8.4$) than if they were primed with a sad emotion ($M_{sad} = 3.9$, $F(1,175) = 8.2$, $p < .005$). Moreover, in the guilty emotion prime condition, participants high in GP exerted significantly more self-control than participants low in GP ($F(1,175) = 13.18$, $p < .0005$). No such effects were found for participants in the sad emotion prime condition ($F(1,175) = 1.28$, $p > .25$; see Figure 2).

Discussion

The results found in experiment 1 were replicated in experiment 2, using a different self-control measure. Once again, participants primed with different specific emotions were not aware of the emotion prime and did not report any subjective difference in their conscious experience of emotion. Despite this lack of differentiated conscious emotion across the emotion priming conditions, participants with no time restrictions behaved differently and consistently with predictions for each specific emotion primed. Moreover, behaviors were determined not by the specific emotion prime alone, but by its interaction with individual tendencies to exhibit certain self-control behaviors in response to a given emotion.

The emotion-behavior link found in experiments 1 and 2 may have exerted its effects via one of two possible mechanisms. One possibility is that the emotion-behavior link was direct or semantic in nature, that is, that certain emotions are semantically linked to certain behaviors and thus the verbal activation of those emotions leads to the enactment of linked behaviors. Another possibility is that the emotion-behavior link was motivational, that is, that the emotions examined were motivationally linked to the behaviors observed. We elaborate on each of these possible processes below and present two experiments designed to evaluate these explanations.

Semantic and Motivational Processes in Nonconscious Emotion

The results of the first two experiments can be explained by the theory of ideomotoric or semantic activation (Berkowitz, 1984; Prinz, 1990), according to which priming certain words (e.g., guilty, culpable) can activate words that are semantically linked to them (e.g., abstain, volunteer) and result in behaviors represented by those activated words. Alternatively, these results can be explained by a motivational link between specific emotions and self-control behaviors. Specifically, negative emotions (e.g., guilt and sadness) elicit emotion-regulation goals (Catanzaro & Mearns, 1990; Erber, 1996; Larsen, 2000; Morris & Reilly, 1987). With repeated activation, these negative emotions are likely to become automatically linked to such goals (Bargh & Chartrand, 1999). This automatic link can be activated by the priming of negative emotions even if the emotions themselves are not consciously available to the individual. Once these emotion-regulation goals are activated, they drive self-control behaviors. Such a process is particularly appealing, given that self-control is often used for emotion-regulation (Tice et al., 2001; Zemack-Rugar, 2005). Thus, individuals in different,

specific, nonconscious negative emotions (e.g., guilt vs. sadness) may automatically choose different levels of self-control.

In sum, we believe that the pursuit of self-control behaviors following a subliminal guilty prime is not merely the result of a semantic link. Rather, we believe that the automatic pursuit of self-control behaviors is driven by the activation of nonconscious negative emotion, which automatically activates linked emotion-regulation goals. These goals then lead to self-control behaviors that are congruent with both the specific emotion primed and the individual characteristics of the respondent. Consistent with such theorizing, prior research has shown that individuals need not be aware of either their emotions or their goals in order to act in accordance with them (e.g., Chartrand & Bargh, 2002; Strahan et al., 2002; Winkielman et al., 2005b).

To examine whether motivation plays a role in the results observed in experiments 1 and 2, an established time-delay paradigm is utilized (Bargh et al., 2001; Dunn & Kirsner, 1988). This paradigm involves adding a 5-minute time delay between the emotion prime and the actual behavior observed. If the observed behavior patterns are purely due to a direct semantic or ideomotoric activation of guilt-related behaviors, these patterns should disappear following the time delay (Anderson, 1983). The activation of semantic primes is especially likely to diminish over time if the individual is not using prime-related words, not paying attention to related concepts, or otherwise being distracted (Higgins, Bargh & Lombardi, 1985; Wyer & Srull, 1989). However, if the behaviors are the result of the activation of an actual emotion, followed by an emotion-regulation goal, this goal will continue to be active until satisfied (Bargh et al., 2001). In this case, despite the addition of the time delay, the effects should persist.

Experiment 3

Overview

This experiment examines whether the behavioral effects found in experiment 1 persist even when a 5-minute delay and distraction task is administered between the emotion prime and the behavioral measure. We predict that the emotion prime elicits a nonconscious emotional state linked to a nonconscious emotion-regulation goal; it is this goal that guides self-control behavior in a specific and predictable manner. Consequently, we predict that even with a time delay, the results found in experiment 1 will replicate.

*Method**Participants*

One-hundred-fifty-six participants from a southeastern university completed a 2 factor between-subjects design of Emotion (Guilty vs. Sad; manipulated) by Guilt-Proneness (High vs. Low; measured), with a dependent variable of self-control on a guilty-pleasure task. A five-minute time delay was added between the emotion prime and the behavioral measure. The experiment took approximately 25 minutes, and participants were paid \$5.

Procedure

Procedures were identical to those used in experiment 1. The only difference was the addition of a time delay manipulation between the “visual acuity” portion and the “consumer study”. For the time delay procedure, participants were given two randomly selected pages from a statistics book and were asked to cross out all the instances of the letter “e” on those pages. Participants were instructed to engage in this task for 5 minutes (the same time frame used in Bargh et al., 2001), after which the computer would alert

them that the time was up. Participants were told this task was merely designed to readjust their vision following the “visual acuity” task and that as a result performance on the task (e.g., number of pages completed or number of “e”s missed) was not going to be judged. The “e” crossing task was carefully chosen for the delay time interval because it included irrelevant materials (thus providing semantic distraction) and did not have performance elements that might affect emotion.

Results

Fifteen participants were unable to complete the experiment due to interruptions in the priming phase².

Hypothesis Guessing

All participants believed the “visual acuity” cover story, and none indicated suspicion that they were flashed with something other than the mask. However, following the overt emotion and guilty-pleasure task, 10 participants indicated they were suspicious that the two measures were related. These participants were removed from the analysis, leaving 131 participants.

Priming Stimuli

There was no effect of emotion condition on either the sad ($F(1,129) = 0.01, p > .91$; Cronbach Alpha = .82) or the guilty ($F(1,129) = .87, p > .35$; Cronbach Alpha = .84) primed word composite scores (see Table 2).

Emotion

An ANOVA revealed no significant effect of emotion on either the negative emotion scale ($F(1,129) = .44, p > .50$), the positive emotion scale ($F(1,129) = .08, p > .78$) or the guilt-score ($F(1,129) = .11, p > .74$; Cronbach Alpha = .85; see Table 2).

Self-Control (Guilty-Pleasure)

An ANCOVA was conducted using the overall valuation of the CD/DVD option as a covariate (Cronbach Alpha = .84) and the Emotion condition (sad vs. guilty), GP score, and the Emotion X GP interaction as independent variables. The dollars allotted to the CD/DVD option served as the dependent variable. A significant Emotion X GP interaction was found ($F(1,126) = 3.8, p = .05$). Planned contrasts using a median split on the GP measure ($M = 3.8$) revealed that, as predicted, participants low in GP allotted the same amount of money to the CD/DVD option whether they were primed with a guilty emotion (LS Means: $M_{guilty} = 37.1$) or primed with a sad emotion ($M_{sad} = 33.4, F(1,126) = .88, p > .34$). However, participants high in GP allotted less to the CD/DVD option if they were primed with a guilty emotion ($M_{guilty} = 26.4$) than if they were primed with a sad emotion ($M_{sad} = 33.4, F(1,126) = 3.75, p = .05$). Moreover, in the guilty emotion prime condition, participants high in GP exerted significantly more self-control than individuals low in GP ($F(1,126) = 7.77, p < .05$). No such effects were found for participants in the sad emotion prime condition ($F(1,126) = 0, p > .94$; see Figure 3).

Discussion

Even after the addition of a time delay between the emotion-prime and the self-control measure, the effects found in experiment 1 were replicated. Participants primed with a guilty emotion showed higher self-control on the guilty-pleasure task than participants primed with a sad emotion, but only when guilty participants were high in GP. Moreover, participants' ratings on the various emotion scales, including the specific emotion priming adjectives, did not vary across conditions. These findings cannot be explained by semantic activation alone. If the emotion-behavior link was direct and

semantic in nature, the behavioral effects should have disappeared. However, these effects persisted, suggesting a more goal-driven mechanism might underlie these results.

The fact that behavioral effects persist even following the addition of a time delay suggests that emotions themselves, not merely their semantic representation, are activated. As a result of the activation of negative emotions, emotion-regulation goals are automatically activated, remain active until satisfied, and result in the pursuit of specific, predictable self-control strategies. These strategies are pursued despite the addition of a time delay and despite the fact that individuals are not consciously aware of their specific emotional state. In our fourth experiment we further test the effects of time delay by adding a time delay to a replication of experiment 2.

Experiment 4

Overview

This experiment examines whether the behavioral effects found in experiment 2 persist even when a 5-minute delay and distraction task is administered between the emotion prime and the behavioral measure. We argue that as in experiment 3, the emotion prime elicits a nonconscious emotional state that in turn elicits a nonconscious emotion-regulation goal; it is this goal that guides self-control behavior in a specific and predictable manner. Consequently, we predict that even with a time delay, the results found in experiment 2 will replicate.

Method

Participants

One-hundred-seventy-three undergraduate students from a southeastern university completed a 3 factor between-subjects design of Time Availability (Yes vs. No;

measured), by Emotion (Guilty vs. Sad; manipulated), by Guilt-Proneness (High vs. Low; measured), with a dependent variable of self-control on a grim-necessity task of volunteering time to help a charity. A time-delay manipulation was added between the emotion-prime and the behavioral measure. The experiment took approximately 25 minutes, and participants were paid \$5.

Procedure

The methods for experiment 4 were identical to those of experiment 2, with the addition of the time delay procedure previously utilized in experiment 3.

Results

Hypothesis Guessing

None of the participants indicated awareness of the subliminal emotion manipulation or suspicion in the connection between the overt emotion measure and the charity questionnaire.

Priming Stimuli

There was no effect of emotion condition on either the sad ($F(1,171) = 0.72, p > .39$, Cronbach Alpha = .75) or the guilty ($F(1,171) = .53, p > .46$, Cronbach Alpha = .43) primed word scores (see Table 2).

Emotion

An ANOVA revealed no significant effect of emotion prime on either the negative emotion scale ($F(1,171) = .33, p > .56$), the positive emotion scale ($F(1,171) = .01, p > .91$) or the guilt-score ($F(1,182) = .15, p > .69$; Cronbach Alpha = .54; see Table 2).

Time

Those participants who indicated they had a set obligation within one hour were coded as the time-unavailable group (29 participants), whereas the rest were coded as the time-available group.

Self-Control (Grim-Necessity)

An ANCOVA was conducted using participants' general tendency to volunteer (Cronbach Alpha = .86) as a covariate, and Time Availability, Emotion condition, Guilt-Proneness, and their interactions as independent variables. The dependent variable was the time allotted to charity in minutes. A significant three-way interaction of Time Availability X Emotion X GP ($F(1,164) = 6.53, p < .05$) was found.

To examine the simple effects comprising this interaction, a median split was applied to the GP measure ($M = 3.7$). Planned contrasts for participants who were in the time-available condition revealed, as predicted, that participants low in GP allotted the same amount of time to the charity whether they were primed with a guilty emotion (LS Means: $M_{guilty} = 2.0$) or with a sad emotion ($M_{sad} = 2.9, F(1,164) = .39, p > .53$). However, participants high in GP allotted more time to the charity if they were primed with a guilty emotion ($M_{guilty} = 7.1$) than if they were primed with a sad emotion ($M_{sad} = 3.5, F(1,164) = 4.86, p < .05$). Moreover, in the guilty emotion prime condition, participants high in GP self-controlled significantly more than individuals low in GP ($F(1,164) = 10.11, p < .0005$). No such effects were found for participants in the sad emotion prime condition ($F(1,134) = .14, p > .70$; see Figure 4).

Discussion

As in experiment 3, even after the addition of a time delay differences between the subliminally primed sad and guilty emotion conditions persisted. Participants primed

with a guilty emotion showed higher self-control on the grim-necessity task than participants primed with a sad emotion, but only when guilty participants were high in GP. Moreover, participants' emotion ratings on the positive/negative valence scales, the guilt-score, and the specific emotion priming adjectives did not vary across conditions. These findings lend further support to the argument that the effects of nonconscious emotion on behavior in this research were motivationally driven.

According to this motivational account, the subliminal emotion primes did not merely prime the semantic representations of emotions, but rather activated the specific emotions themselves. As a result of the activation of negative emotions, emotion-regulation goals were activated, and participants pursued different emotion-regulation strategies by adjusting their self-control levels. These self-control strategies were contingent upon both the specific, subliminally primed emotion and the individual's coping characteristics. Moreover, these self-control strategies were pursued despite the addition of a time delay, and even though participants were not consciously aware of their specific emotion state.

General Discussion

This research demonstrates in a series of experiments that specific, equally valenced emotions can be subliminally primed, remain unavailable to conscious awareness, and still affect behavior in unique and predictable ways. Although there have been prior demonstrations of the effects of nonconscious valenced affect on behavior, to the best of our knowledge, this is the first demonstration of the effects of specific nonconscious emotions on behavior.

The first two experiments demonstrated that individuals subliminally primed with a sad versus guilty emotion did not report any conscious difference in their emotional state, yet exerted different levels of self-control. Self-control was determined not by the specific nonconscious emotion alone, but by its interaction with individuals' tendency to repeatedly link that emotion with a given behavior. As a result, individuals high in GP who were primed with guilt showed higher self-control than both individuals low in GP primed with guilt and individuals primed with sadness. These results replicated across two separate self-control tasks and four different experiments.

The last two experiments examined the possible processes underlying these effects. By adding a time delay manipulation, we examined whether a purely semantic-ideomotoric priming mechanism can fully account for our findings or whether a motivational component is indicated. Specifically, the ideomotoric model suggests that the effects of the primed emotions should fade over time, whereas the motivational model suggests that the effects should remain intact.

The results of experiments 3 and 4 replicated those of experiments 1 and 2 even after the addition of the time delay, supporting a motivational model. According to this model, emotions and linked emotion-regulation goals are nonconsciously activated and lead to specific self-control behaviors. For example, individuals high in GP, who tend to use self-control as a way to assuage their guilt, showed increased self-control when primed with guilt as compared to all other conditions.

All four experiments were conducted according to the empirical criteria set forth in this and prior research efforts. First, the emotion measure utilized was a widely accepted scale capable of capturing valenced emotion, enhanced (using findings from

prior research) to specifically capture the difference between guilt and sadness.

Moreover, this measure was taken in close proximity to the emotion prime and before the behavioral measure. Such measurement timing avoids post-behavioral and memory biases in the reported emotions.

Second, this research identified two equally valenced emotions that were expected to generate different behaviors on the same behavioral measure, self-control. Individuals primed with each of the equally valenced emotions (i.e., guilt and sadness) behaved consistently with predictions based on existing emotion literature. Third, consistent with the final criterion, individuals' behavior was determined not only by the specific emotion primed but also its interaction with GP, an established individual difference factor known to influence the connection between guilt and self-control.

These findings are of particular interest and importance given the current debate in emotion research. Decades of research have focused on conscious emotions, and consequently many researchers believe that emotion is an experience limited to the conscious realm (e.g., Clore, 1994; Ellsworth, 1994). However, a growing group of researchers have argued and demonstrated that emotions can also exert their effects when they are not consciously experienced (Berridge & Winkielman, 2003; Kihlstrom, 1999; Murphy & Zajonc, 1993; Oehman et al., 2000; Winkielman & Berridge, 2004; Winkielman et al., 2005b; Zajonc, 1980; Zajonc, 1994). This new stream of research may change the way we view and define emotion. It is worthwhile considering whether, like many other important human activities (e.g., cognitions, goals), some functions of emotion may also be relegated to the nonconscious or automated self (Bargh &

Chartrand, 1999; Bargh & Ferguson, 2000; Bargh et al., 2001; Chartrand & Bargh, 2002; Chartrand, Van Baaren, & Bargh, 2005).

The latter two experiments in this research further examine the processes underlying nonconscious emotions. The fact that the results of experiments 1 and 2 replicated in experiments 3 and 4, even after the addition of a time delay, rules out a purely semantic, ideomotoric explanation. Instead, these findings suggest that real, actual emotions were nonconsciously activated, and that these emotions activated emotion-regulation goals. These nonconscious goals then strategically directed self-control behaviors.

The idea that nonconscious goals (e.g., emotion-regulation) can drive behavior is arguably less controversial than the idea that specific nonconscious emotions can do so (Bargh et al., 2001; Chartrand, 2005; Chartrand & Bargh, 1996; Handley et al., 2003; Strahan et al., 2002). However, this research provides only indirect evidence that emotion-regulation goals were activated. Moreover, other specific nonconscious emotions may work via alternate paths and processes. These issues certainly warrant further research.

Another avenue for further research is the question of what procedures or processes elicit conscious versus nonconscious emotions. Although we argue and present evidence supporting the view that our subliminal adjective primes elicit nonconscious emotions, we do not claim that subliminal primes will never result in conscious emotions. In fact, different methods of subliminal priming have led to different levels of conscious and nonconscious emotion. For example, although our adjective primes and the priming of negative versus positive affective facial expressions (Winkielman et al., 2005) have led

to nonconscious emotion, priming of positive versus negative words (e.g., music, friends, war, cancer) has resulted in consciously experienced emotion (Chartrand et al., 2005).

One may question what is driving the differential effects of word primes (as used in Chartrand et al., 2005) compared to our adjective primes.

One possible explanation is provided in the work of Stapel and colleagues (e.g., Stapel, Koomen, & Ruys, 2002). The authors distinguish between early-diffuse emotion and late-distinct emotion. They argue that exemplars or words (e.g., war, Hitler) are often more vivid and memorable than general trait information (e.g., aggressive, guilty). Consequently, subliminal presentation of affect-laden stimuli that are of different levels of distinctiveness (i.e., diffuse vs. distinct) may exert different effects. In particular, we suspect that since our experiments used diffuse emotion adjectives as the priming stimuli, more diffuse, less vivid emotions were activated; as a result, these emotions were not consciously experienced by individuals. Certainly, the Stapel et al. (2002) framework is only one possible explanation why certain subliminal stimuli lead to nonconsciously available emotions whereas others lead to the conscious experience of emotions; further research on this question is likely to yield interesting and important insights into the conscious versus nonconscious aspects of emotion.

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Footnotes

¹ Six participants answered “Yes” in response to the specific question whether something other than the mask was flashed. However, none of them provided a response to the follow-up question asking specifically what they saw that would suggest they were truly suspicious. Responses included a repetition of the mask string, a mention of a white screen, or a response of “I don’t know”. Additionally, these participants did not indicate suspicion in either of the open ended hypothesis guessing questions. Thus their data were retained.

² Interruptions include cell-phone rings, individuals loudly entering the room, etc. Three such interruptions occurred, each time disturbing 3-7 individuals whose participation had to be cancelled.

Table 1. Experiments 1 & 2 – Means of emotion measures.

Experiment	<u>Experiment 1</u>			<u>Experiment 2</u>		
	Sad Prime Condition	Guilty Prime Condition	P-value	Sad Prime Condition	Guilty Prime Condition	P-value
Primed Sad Words	1.36	1.45	.53	1.42	1.46	.65
Primed Guilty Words	1.23	1.14	.33	1.25	1.24	.89
Negative Affect	1.63	1.51	.17	1.49	1.53	.49
Positive Affect	2.11	2.38	.15	2.52	2.38	.23
Guilt Score	1.21	1.15	.43	1.25	1.25	.93

Table 2. Experiments 3 & 4 – Means of emotion measures.

Experiment	<u>E x p e r i m e n t 3</u>			<u>E x p e r i m e n t 4</u>		
	Sad Prime Condition	Guilty Prime Condition	P-value	Sad Prime Condition	Guilty Prime Condition	P-value
Primed Sad Words	1.59	1.58	.91	1.45	1.37	.39
Primed Guilty Words	1.16	1.23	.35	1.20	1.17	.46
Negative Affect	1.64	1.59	.50	1.53	1.49	.56
Positive Affect	2.13	2.09	.78	2.29	2.27	.91
Guilt Score	1.16	1.18	.74	1.20	1.18	.69

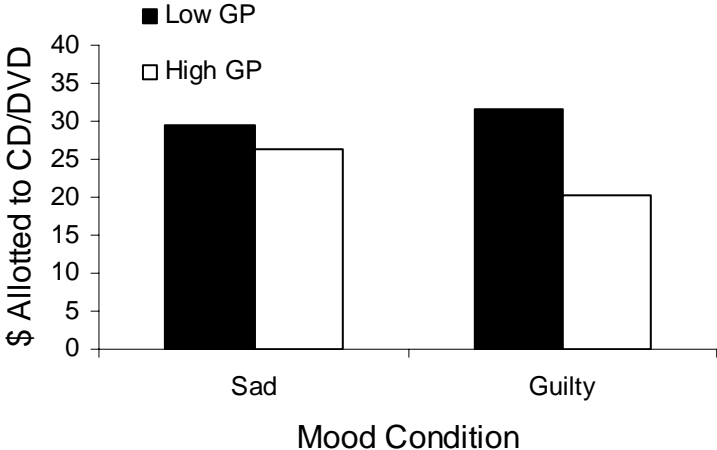
Figure Captions

Figure 1. Experiment 1 – Self-control on a guilty-pleasure: Emotion by guilt-proneness.

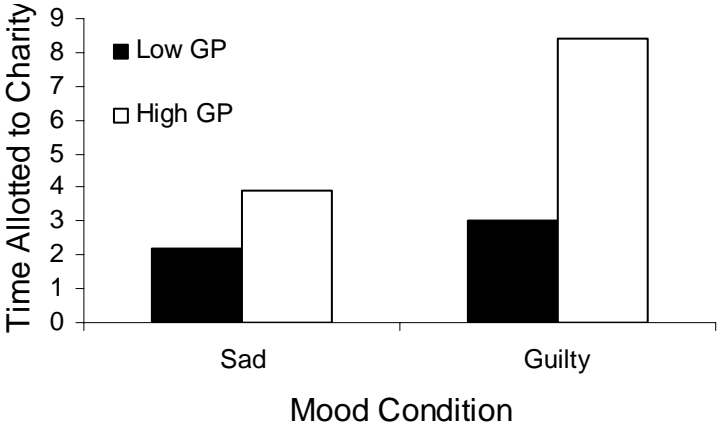
Figure 2. Experiment 2 – Self-control on a grim-necessity: Emotion by guilt-proneness.

Figure 3. Experiment 3 – Self-control on a guilty-pleasure after time-delay: Emotion by guilt-proneness.

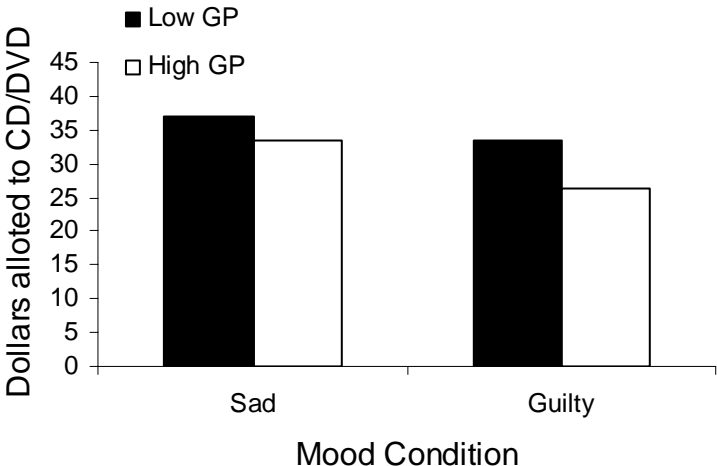
Figure 4. Experiment 4 – Self-control on a grim-necessity after time-delay: Emotion by guilt-proneness.



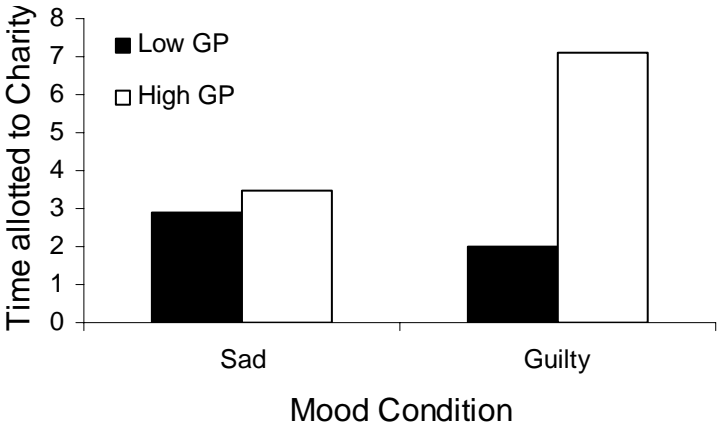
Note. Lower dollars allotted mean higher self-control levels.



Note. More time allotted means higher self-control.
Results are for the time-available condition only.



Note. Lower dollars allotted mean higher self-control levels.



Note. More time allotted means higher self-control.
Results for time-available condition only.