

# An Arousal Regulation Explanation of Mood Effects on Consumer Choice

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This article examines how consumers' preferences are affected by the interplay between their level of arousal and the valence of their current affective state. Building on prior research examining the regulation of mood valence, the authors propose that consumers are also motivated to manage their level of arousal. It is predicted that this motivation systematically affects consumers' product preferences such that consumers in a pleasant mood will tend to choose products that are congruent with their current level of arousal, while those in an unpleasant mood will tend to choose products that are incongruent with their current level of arousal. The results of three consequential choice studies—that use scent and music to vary consumers' moods—provide strong support for the hypotheses. The article concludes with a discussion of the theoretical implications of the results.

In this article we examine how consumers' choices are affected by the interplay between their level of arousal and the valence of their current affective state. Although the impact of mood states on evaluations have been well documented and explained over the past 40 years (Gardner 1985; Goldberg and Gorn 1987; Isen et al. 1978), the motivational effects of mood on consumer choice are less well understood. We are particularly interested in the extent to which the arousal dimension of mood influences the product and experience choices that consumers make. Our research builds on prior work, which has demonstrated that arousal is a critical component of affect (Russell 1980; Russell and Barrett 1999; Russell, Weiss, and Mendelsohn 1989; Thayer

1978; Thayer, Newman, and McClain 1994) and that the impact of arousal on consumers' evaluations can be independent of the valence of an individual's mood (Fedorikhin and Patrick 2010; Gorn, Pham, and Sin 2001). We define *arousal* as the subjective experience of energy mobilization, which can be conceptualized as an affective dimension ranging from sleepy to frantic excitement (Mehrabian and Russell 1974). This is in contrast to *objective* or *physiological arousal*, which is defined as the release of energy collected in the tissues (Cacioppo, Bernston, and Crites 1996; Duffy 1962) and has been measured using pulse rate (Pham 1996) and systolic blood pressure (Sanbonmatsu and Kardes 1988).

Our research contributes to the existing literature by demonstrating that in addition to regulating mood valence—that is, the extent to which an affective state is positive or negative—consumers will also make choices that are consistent with regulating their level of arousal. Specifically, we find that consumers in a positive mood tend to prefer products that are congruent with both the level of arousal and the valence of their current affective state. For example, people who are feeling relaxed (i.e., a pleasant low-arousal mood) tend to choose relaxing products, whereas those who are feeling excited (i.e., a pleasant high-arousal mood) tend to choose exciting products. However, when consumers are in a negative mood, we find that they prefer products that are incongruent with both the level of arousal and the valence of their current affective state. For example, people who are in an unpleasant low-arousal mood will tend to choose pleasant high-arousal products, whereas those who are in an unpleasant high-arousal mood will tend to choose pleasant low-arousal products.

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In general, we predict that people will demonstrate a strong preference for products that make them “feel better”—that is, consumers’ product choices will be consistent with pursuing pleasant moods and mitigating unpleasant moods (Andrade 2005; Kim, Park, and Schwarz 2010; Manucia, Baumann, and Cialdini 1984; Raghunathan and Pham 1999; Raghunathan, Pham, and Corfman 2006). Importantly, our results reveal a systematic link between variations in consumers’ moods—in terms of both valence and arousal—and their preferences, which can account for dramatic differences in choice shares.

We contend that a better understanding of the effect of arousal regulation on consumer choice is important because, although the vast majority of products, services, and experiences offered for sale are designed to be pleasant (i.e., to promote positive affect), there is much greater variance in the level of arousal to which these offerings are designed to appeal. For example, even if both lying on a beach and surfing are considered pleasant activities, they are associated with very different levels of arousal that are likely to vary in their attractiveness to a given consumer. Similarly, an individual may consider both tea and energy drinks to be pleasant beverages, yet see one as a more arousing product than the other.

In the sections that follow we briefly review relevant research and provide a detailed rationale for our predictions. We then test our hypotheses using two different atmospheric stimuli—that is, scent (experiment 1) and music (experiments 2a and 2b)—to independently prime the arousal and valence dimensions of consumers’ affective states. Using a consequential choice task, we examine peoples’ preferences for experiences and products that are perceived to be either low or high arousal. The article concludes with a discussion of the theoretical implications of the results, as well as limitations and directions for future research.

## LITERATURE REVIEW AND HYPOTHESES

Prior research on mood regulation has documented two motivational consequences of mood states: (1) people are motivated to maintain positive moods (Andrade 2005; Isen 1987; Isen and Patrick 1983; Kim et al. 2010; Larsen 2000; Mayer and Salovey 1995; Wegener, Petty, and Smith 1995) and (2) people are motivated to mitigate negative affective states (Andrade 2005; Manucia et al. 1984; Zillmann 1988; Zillmann, Hezel, and Medoff 1980). Research on mood maintenance has demonstrated that when people are feeling “good” they tend to make choices that maintain that positive mood (Isen 1987; Isen and Patrick 1983; Kim et al. 2010; Mayer and Salovey 1995; Zillmann 1988). For example, Wegener et al. (1995) examined the extent to which people processed persuasive messages as a function of their current mood. Their results indicated that people in a pleasant mood were more likely to scrutinize messages that were consistent with that positive affective state (i.e., happy or uplifting messages) than were people in a neutral or unpleasant mood.

In addition, the authors found that people in a pleasant mood were less likely to scrutinize a message that was incongruent with their current affective state (i.e., a depressing message). Similarly, in a consumer context, Meloy (2000) found that consumers in a pleasant mood were more likely to interpret new information as favoring their preferred brand and argued that “the desire to maintain a good mood overrides the potential costs associated with a poor choice” (355).

However, when people are in a bad mood, research indicates that they tend to take action to mitigate that negative affective state. For example, Manucia et al. (1984) examined helping behavior and found an increased tendency among sad subjects to assist others in an attempt to improve their own mood. In a consumer context, Zillmann et al. (1980) found that people in a negative mood demonstrated a preference for television shows that held “the greatest promise of providing prompt relief from negative affective experiences” (323).

## Beyond Valence: The Role of Arousal in Mood Regulation

One major limitation of prior work has been the predominant focus on the regulation of mood valence—that is, improving one’s mood to be more positive or less negative (Andrade 2005; Larsen 2000; Mayer and Salovey 1995; Meloy 2000; Wegener et al. 1995). However, a growing body of work has indicated that, beyond mood valence, distinct affective states have different motivational implications (Garg, Inman, and Mittal 2005; Keltner, Ellsworth, and Edwards 1993; Kim et al. 2010; Labroo and Rucker 2010; Lerner and Keltner 2000; Lerner, Small, and Loewenstein 2004; Raghunathan and Pham 1999; Tiedens and Linton 2001; Yi and Baumgartner 2004; Zeelenberg and Pieters 2004). For example, Kim et al. (2010) examined how people feeling either excited or peaceful differed in their evaluations of an adventurous versus serene vacation. Both excitement and peacefulness are positive-valence emotions; therefore, if only valence matters in judgments based on mood congruency, then these two emotions should have had the same effect on consumers’ vacation preferences. In fact, Kim et al. (2010) found that excited consumers evaluated the adventurous vacation more favorably and peaceful consumers evaluated the serene vacation more favorably.

Along the same lines, prior work has demonstrated that distinct affective states of the same negative valence can drive different judgments and decisions (Keltner et al. 1993; Lerner and Keltner 2000; Raghunathan and Pham 1999; Raghunathan et al. 2006). For example, Raghunathan et al. (2006, experiment 1) examined consumers’ preferences for video games and cars depending on whether they were placed in an anxious, sad, or neutral mood. One car and one video game were presented as the more “comforting” products, while the other car and video game were presented as the options that offered greater “control and safety.” The results of that study indicated that consumers who were feeling sad preferred the more comforting products (relative

to neutral and anxious individuals). However, consumers who were placed in an anxious mood preferred products that offered greater control and safety. Although Raghunathan et al. (2006) examined the preferences of consumers in a negative mood state, the results are conceptually related to the findings of Kim et al. (2010)—that is, consumers experiencing affective states of the same valence can have very different product preferences. The important distinction is that Raghunathan et al. (2006) found that people in an unpleasant affective state chose products that had the potential to change and, in particular, improve their moods. In contrast, Kim et al. (2010) found that the evaluations people made when in a pleasant affective state were consistent with maintaining their current mood.

Other researchers have argued that in addition to valence, arousal plays a critical role in the self-regulation of affective states. For example, Thayer et al. (1994) conducted a series of surveys, which revealed that people self-report engaging in arousal management—such as vigorous exercise and meditation—to regulate their moods. Similarly, in his model of mood management through communication choices, Zillmann (1988) suggests that to maintain a pleasant state of excitation (i.e., positive high arousal) an individual should consume more exciting media, while a person feeling bored (i.e., negative low arousal) could improve his/her mood by consuming the same exciting stimuli.

### The Impact of the Mood Regulation Motive on Consumer Choice

As described above, prior research has clearly demonstrated that consumer choice is influenced by the motivation to maintain positive moods and mitigate negative moods. However, exactly how the mood regulation motive influences preference is not as well understood. In general, theories addressing the underlying mechanism tend to agree that expectations about how different choices will make people feel, given their current affective state, is a critical driver of the decision process (Andrade 2005; Gross 1998; Isen 1987; Larson 2000; Manucia et al. 1984; Mayer and Salovey 1995; Pham 2009). In essence, positive moods lead to an expectation that mood congruent options will feel better and negative moods lead to an expectation that mood incongruent options will feel better.

Similarly, research on affect as information suggests that people rely on their current affective state as information about their preferences and assess different options based on which choice would result in a better affective outcome (Raghunathan and Pham 1999; Raghunathan et al. 2006). That is, when faced with a choice between different products, consumers ask themselves, “What would I feel better about?” (Pham 2009). Although the role of affect as information in consumer choice has been studied primarily in terms of mood valence, the results of Kim et al. (2010) and Raghunathan et al. (2006, experiment 1) suggest that the same mechanism may underlie the effects of arousal on decision making.

Building on this perspective, we expect that the answer to “What would I feel better about?” will depend on the individual’s current level of arousal and mood valence, as well as the level of arousal with which the product is associated. That is, consumers may be misattributing the affect they are currently feeling, toward products that they perceive as representative of those feelings (Pham 1998). For example, when a consumer experiencing a positive low-arousal mood (e.g., relaxation) inspects her own feelings, she will find that a low level of arousal is pleasant and, therefore, prefer a product that offers lower arousal. In contrast, when a consumer experiencing a negative low-arousal mood (e.g., boredom) consults his own feelings, he finds a low level of arousal is unpleasant, and, therefore, he prefers a product that offers a higher level of arousal. Prior research has employed a standard test to assess whether or not an affect as information process underlies a particular pattern of preferences (Gorn, Goldberg, and Basu 1993; Pham 1998; Schwarz and Clore 1983; Sinclair, Mark, and Clore 1994)—that is, if the mechanism is based on affect as information, then making people aware of the source of their mood should eliminate the predicted effects (see study 2b below).

To summarize prior research has clearly demonstrated that people tend to maintain positive moods (Isen 1987; Isen and Patrick 1983; Larsen 2000; Mayer and Salovey 1995; Wegener et al. 1995) and mitigate negative moods (Manucia et al. 1984; Zillman 1988). In addition, studies have indicated that distinct affective states of the same valence can have different effects on judgment and decision making (Keltner et al. 1993; Kim et al. 2010; Lerner and Keltner 2000) and that arousal can play an important role in mood regulation (Thayer et al. 1994; Zillman 1988). Finally, the mood regulation and affect as information literatures both suggest that consumers will tend to make choices that are consistent with an underlying motivation to maintain their arousal level if their current affective state is pleasant and change their arousal level if their current affective state is unpleasant (Andrade 2005; Kim et al. 2010; Raghunathan and Pham 1999; Raghunathan et al. 2006; Zillman et al. 1980). Therefore,

**H1:** Consumers’ preferences for products that differ in arousal will be a joint function of the level of arousal and the valence of their current affective state.

More specifically, we predict that when consumers are in a pleasant mood they will prefer products that are congruent with their current level of arousal—that is, an *arousal maintenance* effect:

**H1a:** When experiencing a pleasant affective state, consumers will tend to prefer more-arousing products if their current arousal is high and less-arousing products if their current arousal is low.

Conversely, we predict that when consumers are in an unpleasant mood they will prefer products that are incongruent

with their current level of arousal—that is, an *arousal reversal* effect:

**H1b:** When experiencing an unpleasant affective state, consumers will tend to prefer less-arousing products if their current arousal is high and more-arousing products if their current arousal is low.

In the sections that follow we report the design, method, and results of four experiments—a pretest and three main studies—that test our predictions. Our key dependent variable is the consequential choice that consumers make between a high-arousal and a low-arousal product, which they are given to keep at the end of the experiments. First, a pretest confirms that the high-arousal product (an energy drink) is in fact perceived by consumers to be a high-arousal product and the low-arousal product (iced tea) is perceived to be a low-arousal product. In the main studies, we simultaneously manipulate consumers' mood valence and level of arousal using scent (study 1) and music (study 2a and 2b) and examine their beverage choices. The article concludes with a discussion of the theoretical implications of our findings, as well as directions for future research.

## STUDY 1

To test our hypotheses study 1 employs a 2 (level of arousal: high versus low)  $\times$  2 (mood valence: positive versus negative) between-subjects design with a control condition (no mood manipulation). The distinct mood states are induced using different intensities of a lavender or grapefruit scent (as described below). Our key dependent measure is participants' choice of either a Nestea Iced Tea drink (low arousal) or an Amp Energy Drink (high arousal). The theory presented above predicts that consumers in a positive high-arousal state are more likely to choose the high-arousal experience, while those in a positive low-arousal state tend to choose the low-arousal experience. In addition, we have predicted that those effects will be reversed among consumers in a negative mood.

### Pretest

A group of 30 participants were asked to rate both Nestea Iced Tea and Amp Energy Drink using a three-item semantic differential scale (ranging from  $-4$  to  $+4$ ) with the following anchors: (1) stimulating-relaxing, (2) exciting-calming, and (3) arousing-unarousing. The results revealed that participants felt that drinking Nestea Iced Tea would elicit lower levels of arousal than drinking the Amp Energy Drink ( $M_{\text{tea}} = -1.23$ ,  $M_{\text{energy}} = 1.62$ ;  $t(29) = 10.68$ ,  $p < .001$ ).

### Main Study

One hundred forty-eight undergraduate students from the University of Alberta participated in this study in exchange for course credit. This experiment employed a 2 (level of arousal: low vs. high)  $\times$  2 (mood valence: positive vs. negative) between-subjects design plus a control condition.

Participants in the control condition were not exposed to the mood priming procedure. Following Butcher (1998), level of arousal was manipulated by altering the type of scent that participants were exposed to (lavender for low arousal vs. grapefruit for high arousal). Following Henion (1971), valence was manipulated by varying the intensity of the scent (low concentration for positive valence vs. high concentration for negative valence). The lavender scent was 100% pure lavender oil, while the grapefruit scent was 100% pure grapefruit oil. After exposure to the mood manipulation, all participants were asked to respond to a set of questions, which included a choice between the ice tea and the energy drink. Participants were informed that they would receive their drink choice as compensation for participating in the experiment.

*Measures.* To measure mood valence and arousal, participants were asked to report their affective state using the Affect Grid (Russell et al. 1989), a graphical scale that simultaneously assesses mood valence and arousal on a scale anchored at 1 (low) and 9 (high). Feelings toward the individual products were then measured by asking each participant to indicate their agreement to the following states on a seven-item scale anchored at 1 (strongly disagree) and 9 (strongly agree): “Not drinking Nestea Iced Tea (Amp Energy Drink) would make me feel sad”; “Drinking Nestea Iced Tea (Amp Energy Drink) would elicit positive feelings”; “Drinking Nestea Iced Tea (Amp Energy Drink) would elicit feelings of joy”; “Drinking Nestea Iced Tea (Amp Energy Drink) would make me feel happy”; “Not drinking Nestea Iced Tea (Amp Energy Drink) would elicit negative feelings”; “Drinking Nestea Iced Tea (Amp Energy Drink) would leave me with a good feeling”; “Drinking Nestea Iced Tea (Amp Energy Drink) would leave me with a bad feeling.”

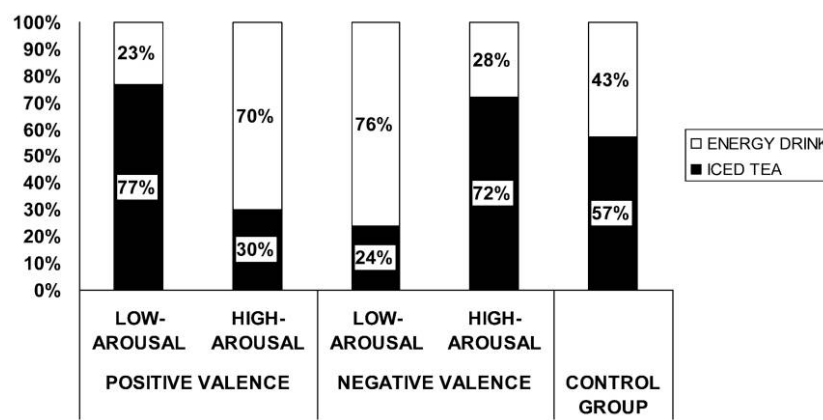
Finally, participants were asked to choose which of two different canned beverages (Nestea Iced Tea and Amp Energy Drink) they would like to receive as compensation for completing the study. When the session was complete, all participants were given the beverage they chose before leaving the lab.

## Results

*Manipulation Check.* MANOVA was used to examine the key predicted differences. Our manipulations had the predicted significant effect on both felt arousal ( $M_{\text{high}} = 6.07$ ,  $M_{\text{low}} = 3.73$ ;  $F(1, 117) = 46.98$ ,  $p < .001$ ) and mood valence ( $M_{\text{pos}} = 6.45$ ,  $M_{\text{neg}} = 3.72$ ;  $F(1, 117) = 65.60$ ,  $p < .001$ ). However, as expected, we did not find a main effect of the manipulation of level of arousal on felt valence ( $M_{\text{high}} = 5.15$ ,  $M_{\text{low}} = 5.07$ ;  $F(1, 117) = 0.06$ ,  $p = .810$ ), nor did we find a main effect of the manipulation of mood valence on felt arousal ( $M_{\text{pos}} = 4.92$ ,  $M_{\text{neg}} = 4.88$ ;  $F(1, 117) = 0.01$ ,  $p = .913$ ). The interaction between level of arousal and mood valence did not have a significant effect on either felt arousal ( $M = 4.93$ ,  $M = 4.86$ ;  $F(1, 117) = .007$ ,  $p =$

FIGURE 1

STUDY 1: PRODUCT CHOICE SHARES BY LEVEL OF AROUSAL AND MOOD VALENCE



.934) or felt valence ( $M = 5.21$ ,  $M = 5.00$ ;  $F(1, 117) = 0.42$ ,  $p = .517$ ).

Participants in the control condition reported levels of arousal and valence that were not significantly different from the midpoint of the scale ( $M_{\text{valence}} = 5.10$ ;  $t(29) = 0.27$ ,  $p = .78$ ;  $M_{\text{arousal}} = 4.90$ ;  $t(29) = -0.29$ ,  $p = .77$ ) and were in between those reported in the high and low conditions. The choice shares for the energy drink and the ice tea were not different among control condition participants (iced tea = 57%, energy drink = 43%,  $\chi^2(1) = 0.53$ ,  $p = .47$ ).

**Hypothesis Tests.** First we take a look at how our mood manipulations impact how consumers feel about the two consumptions experiences that they are being asked to choose between. An ANOVA with arousal, mood valence, and the interaction as the independent variables and feelings toward the consumption experience as the dependent variable revealed that neither of the main effects was significant (level of arousal:  $F(1, 117) = 0.02$ ,  $p = .75$ ; mood valence:  $F(1, 117) = 0.11$ ,  $p = .88$ ). However, the effect of the interaction on feelings toward the consumption experience was significant ( $F(1, 118) = 37.76$ ,  $p < .001$ ).

Follow-up tests revealed that in the positive mood conditions, high-arousal participants had more positive feelings toward the energy drink (high-arousal product) than toward the iced tea (low-arousal product;  $M_{\text{tea}} = 5.02$ ,  $M_{\text{energy}} = 6.24$ ;  $t = -2.71$ ,  $p = .011$ ), whereas low-arousal participants had more positive feelings toward the iced tea (low-arousal product) than toward the energy drink (high-arousal product;  $M_{\text{tea}} = 6.38$ ,  $M_{\text{energy}} = 4.98$ ;  $t = 2.80$ ,  $p = .009$ ). In contrast, in the negative-mood conditions, high-arousal participants had more positive feelings toward the iced tea (low-arousal product) than the energy drink (high-arousal product;  $M_{\text{tea}} = 6.42$ ,  $M_{\text{energy}} = 4.80$ ;  $t = 3.19$ ,  $p = .003$ ), whereas low-arousal participants had more positive feelings toward the energy drink (high-arousal product) than toward the iced tea (low-arousal product;  $M_{\text{tea}} = 4.99$ ,  $M_{\text{energy}} =$

6.28;  $t = -4.14$ ,  $p < .001$ ). These results are consistent with the choice share results discussed below.

Next we examine the choice share results, illustrated in figure 1. Hypothesis 1 was tested using a logistic regression model with arousal (coded as  $-1 = \text{low arousal}$  and  $1 = \text{high arousal}$ ), valence (coded as  $-1 = \text{negative valence}$  and  $1 = \text{positive valence}$ ), and the interaction as the independent variables and product choice as the dependent variable (coded as  $-1 = \text{chose Nestea Iced Tea}$  and  $1 = \text{chose Amp Energy Drink}$ ). The main effects for level of arousal ( $\beta = -0.02$ , Wald = 0.01,  $p = .93$ ) and mood valence ( $\beta = -0.13$ , Wald = 0.39,  $p = .53$ ) are not significant. However, the effect of the arousal by mood interaction on product choice is significant ( $\beta = 1.04$ , Wald = 24.36,  $p < .001$ ).

Follow-up tests indicate that in the positive-mood conditions, high-arousal participants are more likely to select an energy drink (high-arousal product) over an iced tea (low-arousal product;  $\chi^2(1) = 4.80$ ,  $p = .028$ ), whereas low-arousal participants were more likely to choose iced tea (low-arousal product) over an energy drink (high-arousal product;  $\chi^2(1) = 8.53$ ,  $p = .003$ ). In the negative-mood conditions, high-arousal participants were more likely to choose iced tea (low-arousal product) over an energy drink (high-arousal product;  $\chi^2(1) = 5.83$ ,  $p = .016$ ), whereas low-arousal participants were more likely to select an energy drink (arousal-incongruent product) over iced tea (arousal-congruent product;  $\chi^2(1) = 7.76$ ,  $p = .005$ ).

## Discussion

Study 1 provides strong support for the prediction that consumers' preferences for products that differ in arousal are a joint function of their current level of arousal and the valence of their current affective state (hypothesis 1). We find that when consumers are in a positive mood they tend

to choose products that are congruent with their current level of arousal (hypothesis 1a); however, when they are in a negative mood they make arousal-incongruent product choices (hypothesis 1b). In study 2a, we further demonstrate the robustness of the effect using a different atmospheric variable (music) to manipulate the arousal level and valence of consumers' moods.

## STUDY 2A

Study 2a was designed to replicate the results of study 1 using a different atmospheric prime. In this study, the different mood states are induced using music. Following the procedure developed by Husain, Thompson, and Schellenberg (2002), participants' level of arousal was manipulated by varying the tempo of the music (i.e., fast tempo = high arousal; slow tempo = low arousal) and their mood valence was manipulated through the key in which the music was played (major key = positive valence; minor key = negative valence). Study 3a uses a 2 (level of arousal: low vs. high)  $\times$  2 (mood valence: positive vs. negative) between-subjects design plus a control condition. Once again, our key dependent measure is participants' choice of either a Nestea Iced Tea (low arousal) or an Amp Energy Drink (high arousal).

### Main Study

*Experimental Design and Procedure.* One hundred fifty-two undergraduate students from the University of Alberta participated in this study in exchange for course credit. This experiment employed a 2 (level of arousal: low vs. high)  $\times$  2 (mood valence: positive vs. negative) between-subjects design plus a control condition. Participants in the control condition were not exposed to the mood priming procedure. Participants in the other four experimental cells were asked to listen to music for approximately 10 minutes. After they had completed the music listening task, all participants were asked to respond to the same set of questions as in study 1, which included a choice between the ice tea and the energy drink. Participants were informed that they would receive their drink choice as compensation for participating in the experiment.

*Stimuli.* In this study, music was used to manipulate both valence and arousal. Prior research has indicated that music can influence both elements independently (Husain et al. 2002; Thompson, Schellenberg, and Husain 2001). Specifically, following the procedure developed by Husain et al. (2002), participants' level of arousal was manipulated by varying the tempo of the music (i.e., fast tempo = high arousal; slow tempo = low arousal) and their mood valence was manipulated through the key in which the music was played (major key = positive valence; minor key = negative valence). A skilled pianist performed both parts of the first movement of Mozart's Piano Sonata in D Major, K. 448, on a musical instrument digital interface (MIDI) keyboard (which made it easier to later alter the tempo and the key

in which the music was played). Sequencing software (Performer) was used to manipulate the tempo and mode of the performance to create four distinct versions: fast-major, fast-minor, slow-major, and slow-minor. Tempi for the fast and slow versions were 165 and 60 beats/minute, respectively. Furthermore, the movement, written and performed in D major, was converted to D minor with a built-in function of the sequencer. A few accidentals were inserted (i.e., slightly raising or lowering a note from its normal pitch) to correct for notes that sounded like errors in the minor versions. In each condition, participants were asked to listen to the music for 10 minutes. In the fast tempo conditions, the entire first movement was presented and then repeated from the beginning. In the slow tempo conditions, the sonata ended during the second half of the first movement. Instead of ending the piece abruptly after exactly 10 minutes, all renditions ended at the next phrase boundary.

### Results

*Manipulation Check.* MANOVA was used to examine the key predicted differences. Our manipulation of mood had a significant effect on both felt arousal ( $M_{\text{high}} = 6.05$ ,  $M_{\text{low}} = 3.76$ ;  $F(1, 122) = 33.21$ ,  $p < .001$ ) and mood valence ( $M_{\text{pos}} = 6.79$ ,  $M_{\text{neg}} = 3.95$ ;  $F(1, 122) = 48.70$ ,  $p < .001$ ). As expected, we did not find a main effect of the manipulation of level of arousal on felt valence ( $M_{\text{high}} = 5.39$ ,  $M_{\text{low}} = 5.37$ ;  $F(1, 122) < .001$ ,  $p = .996$ ), nor did we find a main effect of the manipulation of mood valence on felt arousal ( $M_{\text{pos}} = 4.97$ ,  $M_{\text{neg}} = 4.82$ ;  $F(1, 122) = 0.11$ ,  $p = .745$ ). A significant interaction between level of arousal and mood valence was not found for either felt arousal ( $F(1, 122) = .007$ ,  $p = .934$ ) or felt valence ( $F(1, 122) = 0.16$ ,  $p = .689$ ).

Participants in the control condition reported levels of arousal and valence that were not significantly different from the midpoint of the scale ( $M_{\text{valence}} = 5.21$ ;  $t(28) = 0.46$ ,  $p = .65$ ;  $M_{\text{arousal}} = 4.93$ ;  $t(28) = -0.15$ ,  $p = .88$ ) and were in between those reported in the high and low conditions. The choice shares for the energy drink and the ice tea were not significantly different among control condition participants (iced tea = 41%, energy drink = 59%,  $\chi^2(1) = 0.86$ ,  $p = .35$ ).

*Hypothesis Tests.* First we take a look at how our mood manipulations affect how consumers feel about the two consumption experiences that they are being asked to choose between. An ANOVA with arousal, mood valence, and the interaction as the independent variables and feelings toward the consumption experience as the dependent variable revealed that neither of the main effects were significant (level of arousal:  $F(1, 122) = 0.46$ ,  $p = .50$ ; mood valence:  $F(1, 122) = 0.003$ ,  $p = .96$ ). However, as predicted, the effect of the interaction between arousal and mood valence on feelings toward the consumption experience was significant ( $F(1, 122) = 62.45$ ,  $p < .001$ ).

Follow-up  $t$ -tests revealed that in the positive-mood conditions, high-arousal participants had more positive feelings

toward the energy drink (high-arousal product) than the iced tea (low-arousal product;  $M_{\text{tea}} = 5.45$ ,  $M_{\text{energy}} = 6.57$ ;  $t = -4.30$ ,  $p < .001$ ), whereas low-arousal participants had more positive feelings toward the iced tea (low-arousal product) than the energy drink (high-arousal product;  $M_{\text{tea}} = 6.44$ ,  $M_{\text{energy}} = 4.99$ ;  $t = 3.96$ ,  $p < .001$ ). In contrast, in the negative-mood conditions, high-arousal participants had more positive feelings toward the iced tea (low-arousal product) than toward the energy drink (high-arousal product), whereas low-arousal participants had more positive feelings toward the energy drink (arousal-incongruent product) than toward the iced tea (arousal-congruent product;  $M_{\text{tea}} = 5.33$ ,  $M_{\text{energy}} = 6.96$ ;  $t = -3.50$ ,  $p = .001$ ;  $M_{\text{tea}} = 6.49$ ,  $M_{\text{energy}} = 5.24$ ;  $t = 4.47$ ,  $p < .001$ ).

The choice share results follow the same pattern and are illustrated in figure 2. A logistic regression model with arousal (coded as  $-1 = \text{low arousal}$  and  $1 = \text{high arousal}$ ), valence (coded as  $-1 = \text{negative valence}$  and  $1 = \text{positive valence}$ ), and the interaction term as the independent variables and product choice as the dependent variable (coded as  $-1 = \text{chose Nestea Iced Tea}$  and  $1 = \text{chose Amp Energy Drink}$ ) revealed that neither main effects were significant (arousal:  $\beta = -0.15$ , Wald = 0.50,  $p = .48$ ; mood valence:  $\beta = -0.12$ , Wald = 0.35,  $p = .56$ ). However, as predicted, the interaction between level of arousal and mood valence was significant ( $\beta = 1.02$ , Wald = 24.32,  $p < .001$ ).

Planned contrasts showed that in the positive-mood conditions, high-arousal participants are more likely to select an energy drink (high-arousal product) over iced tea (low-arousal product;  $\chi^2(1) = 5.45$ ,  $p = .02$ ), whereas low-arousal participants were more likely to choose iced tea (low-arousal product) over an energy drink (high-arousal product;  $\chi^2(1) = 5.45$ ,  $p = .02$ ). In contrast, in the negative-mood conditions, high-arousal participants were more likely to choose iced tea (low-arousal product) over an energy drink (high-arousal product;  $\chi^2(1) = 4.80$ ,  $p = .028$ ), whereas low-arousal participants were more likely to select

an energy drink (high-arousal product) over iced tea (low-arousal product;  $\chi^2(1) = 11.65$ ,  $p = .001$ ). These results provide additional strong support for the stated hypotheses.

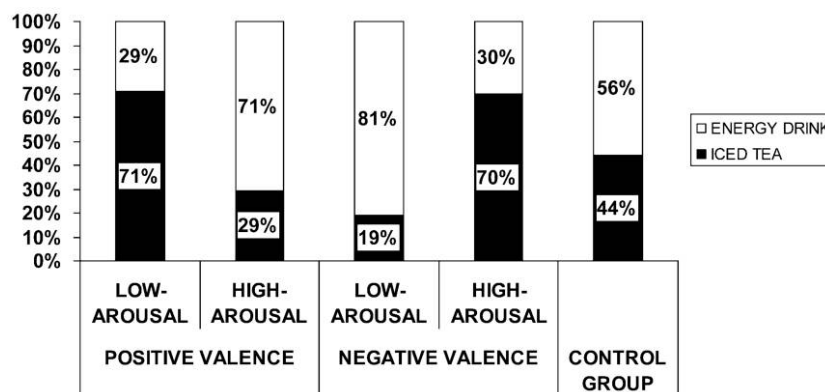
## STUDY 2B

Study 2b tests the role of affect diagnosticity—that is, the final experiment examines whether the effects demonstrated in studies 1 and 2a hold when people are aware of the source of their affect. Prior work has demonstrated that when participants are made aware of the source of their mood then the impact of their current affective state on their preferences should be eliminated (Gorn et al. 1993; Pham 1998; Schwarz and Clore 1983; Sinclair et al. 1994). For example, as discussed above, Raghunathan et al. (2006, experiment 1), found that when the source of the anxiety or sadness that consumers were experimentally induced to feel was not salient, those two negative states of affect resulted in different product preferences. However, when the researchers made the source of consumers' anxiety and sadness salient, they found no significant differences in their participants' product preferences. Similarly, Kim et al. (2010) found that when they made participants aware that the mood induction task may have affected their current feelings and asked them to make an impartial decision, the effect of feeling either excited or peaceful on product evaluations was eliminated.

The design of study 2b replicates that of 2a without a control condition and with one critical difference in instructions: immediately after the mood manipulation (i.e., listening to 10 minutes of the Mozart piano sonata), we included the phrase "it is important to note that the music that you have listened to may have affected your current feelings. Please give impartial answers to the questions that follow" (Kim et al. 2010). This instruction was intended to make the source of consumers' moods salient, which allows us to examine the extent to which this type of affect regulation is a deliberate conscious process.

FIGURE 2

STUDY 2A: PRODUCT CHOICE SHARES BY LEVEL OF AROUSAL AND MOOD VALENCE



## Results

**Manipulation Check.** MANOVA was used to examine the key predicted differences. Our manipulation of mood had a significant effect on both felt arousal ( $M_{\text{high}} = 6.32$ ,  $M_{\text{low}} = 4.17$ ;  $F(1, 134) = 40.47$ ,  $p < .001$ ) and mood valence ( $M_{\text{pos}} = 6.79$ ,  $M_{\text{neg}} = 4.62$ ;  $F(1, 134) = 38.67$ ,  $p < .001$ ). As expected, we did not find a main effect of the manipulation of level of arousal on felt valence ( $M_{\text{high}} = 5.80$ ,  $M_{\text{low}} = 5.64$ ;  $F(1, 134) = 0.12$ ,  $p = .73$ ), nor did we find a main effect of the manipulation of mood valence on felt arousal ( $M_{\text{pos}} = 5.17$ ,  $M_{\text{neg}} = 5.29$ ;  $F(1, 134) = 0.24$ ,  $p = .63$ ). A significant interaction between level of arousal and mood valence was not found for either felt arousal ( $F(1, 134) = 2.07$ ,  $p = .15$ ) or felt valence ( $F(1, 134) = 0.45$ ,  $p = .51$ ).

**Hypothesis Tests.** Hypotheses 1 and 2 were tested using a logistic regression model with arousal (coded as  $-1 = \text{low arousal}$  and  $1 = \text{high arousal}$ ), valence (coded as  $-1 = \text{negative valence}$  and  $1 = \text{positive valence}$ ), and the interaction term as the independent variables and product choice as the dependent variable (coded as  $-1 = \text{chose iced tea}$  and  $1 = \text{chose energy drink}$ ). The main effects of arousal ( $\beta = -0.12$ , Wald = 0.48,  $p = .49$ ), mood valence ( $\beta = 0.002$ , Wald < .001,  $p = .99$ ), and the interaction between level of arousal and mood valence ( $\beta = 0.06$ , Wald = 0.12,  $p = .73$ ) are not significant.

The choice share results are illustrated in figure 3. Planned contrasts did not reveal any significant differences. In the positive-mood conditions, high-arousal participants were not more likely to select an energy drink (high-arousal product) over iced tea (low-arousal product; iced tea = 50%, energy drink = 50%,  $\chi^2(1) = 0$ ,  $p = 1$ ); similarly low-arousal participants were not more likely to choose iced tea (low-arousal product) over an energy drink (high-arousal product; iced tea = 47%, energy drink = 53%,  $\chi^2(1) = 0.12$ ,  $p = .73$ ).

In the negative-mood conditions, high-arousal participants were not more likely to choose iced tea (low-arousal product) over an energy drink (high-arousal product; iced tea = 53%, energy drink = 47%,  $\chi^2(1) = 0.13$ ,  $p = .72$ ); similarly low-arousal participants were also not more likely to select an energy drink (high-arousal product) over iced tea (low-arousal product; iced tea = 44%, energy drink = 56%,  $\chi^2(1) = 0.47$ ,  $p = .49$ ).

## Discussion

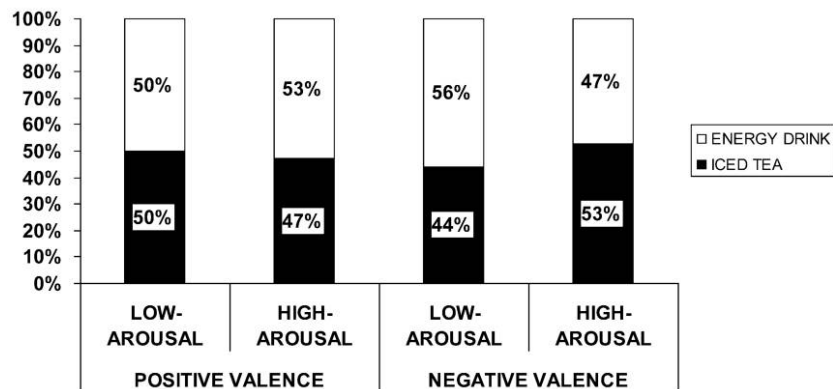
Study 2a replicates the pattern of results from study 1 and provides additional strong support for the prediction that consumers' preferences for products that differ in arousal are a joint function of their current level of arousal and the valence of their current affective state (hypothesis 1). In addition, study 2b demonstrates that these effects disappear when the source of their mood is made salient to consumers. Null effects must be interpreted with caution; however, the design and procedure of study 2b replicates that of 2a and the results do indicate that the manipulations worked as effectively as in study 2a.

## GENERAL DISCUSSION

In combination, the three studies reported in this article provide strong support for the stated hypotheses and suggest that the extent to which consumers are aware of the source of their mood plays an important role in the effect of arousal and valence on consumer choice. In study 1 we used the scents of lavender and grapefruit to simultaneously manipulate consumers' mood valence and level of arousal. We found that when experiencing a pleasant affective state, consumers tend to prefer more-arousing products when their current arousal is high and less-arousing products when their current arousal is low. Conversely, when experiencing an unpleasant affective state, consumers tend to prefer less-

FIGURE 3

STUDY 2B: PRODUCT CHOICE SHARES BY LEVEL OF AROUSAL AND MOOD VALENCE





arousing products if their current arousal is high and more-arousing products if their current arousal is low. These results were replicated in study 2a, wherein valence and arousal were simultaneously manipulated by playing a piano sonata in different keys and at different tempi.

The first two studies clearly demonstrate that consumers make choices that are consistent with a desire to manage their level of arousal, as well as the valence of their current mood. However, although study 2b used the same musical stimuli, experimental procedures and manipulations as study 2a, we find that the effect of mood on consumer choice is no longer significant when consumers are made aware of the source of their mood. This is consistent with prior research that has used similar findings to argue for an underlying affect as information mechanism (Gorn et al. 1993; Pham 1998; Schwarz and Clore 1983; Sinclair et al. 1994). Nevertheless, the results of study 2b do not definitively rule out the possibility that the underlying mechanism is a more traditional mood regulation process. Previous research has shown that affect regulation can also be an intuitive and automatic process (Gross 1998; Gyurak, Gross, and Etkin 2011; Isen 1987) that may be disrupted when the affect source is made salient. Therefore, the details of the underlying mechanism remain an open question and an important area for future research.

Investigations along these lines should dig deeper into the subtle differences between the alternative potential explanations. Building on the results of study 2b, one potentially fruitful avenue for further exploration would aim to better understand the differences between incidental affect, which has been the focus of affect as information theory, versus integral and longer-lasting moods that consumers may also regulate. It may be particularly useful to induce both types of affective states in the same experimental design to test the impact on consumer choice. Ultimately, the research presented in this article is only a first step toward a deeper understanding of how arousal regulation impacts consumer choice and the underlying mechanism remains an interesting question for future research.

In addition, although we have focused on the two major dimensions of mood—arousal and valence—prior research has documented the important impact that other aspects of affect can have on judgment and decision making. For example, both motivation (Martin et al. 1993; Raghunathan and Pham 1999) and cognitive appraisals (Lerner, Han, and Keltner 2007; Roseman and Evdokas 2004) can impact consumer choice. We have used scent and music to manipulate consumers' moods; however, different mood triggers might give rise to specific cognitive and motivational processes that then influence the decisions that consumers ultimately make. For example, would an unpleasant mood triggered by a negative customer service interaction result in the same choices as a negative mood created incidentally by minor key music or highly concentrated scents? Consumers might also manage affective states generated by different sources or triggers in a different manner, including more deliberate and strategic approaches to mood regulation (Gross 1998;

Isen 1987; Larsen 2000; Manucia et al. 1984; Mayer and Salovey 1995). Similarly, it would be worthwhile to further our understanding of the impact of the interplay between arousal and valence on consumer choice by examining distinct emotions such as fear, anger, and serenity, among others (Kim et al. 2010; Raghunathan et al. 2006; Russell 1980; Thayer 1978).

Our theory and results suggest that people make consumption choices that are consistent with maintaining positive moods and mitigating negative affective states. An interesting avenue for future research would be to explore those times when consumers want to maintain, or even activate, a negative mood. For example, consumers may choose to watch sad, scary, or even depressing movies, listen to music that generates unpleasant feelings, or choose to play a game that is frustrating (Cohen and Andrade 2004; Tamir and Robinson 2004). Would different current levels of arousal have an impact on consumers' preferences for different products associated with negative affective states (e.g., a sad versus a scary movie)? Similarly, the current research does not speak to the potential effects of arousal on preferences for other product attributes. For example, evidence suggests that decreases in negative affect can increase consumers' willingness to pay for a variety of products (Murray et al. 2010). Arousal may also influence willingness to pay and/or price sensitivity.

Although we have also focused on the basic effect of arousal regulation on consumer choice, prior work suggests a number of interesting boundary conditions. For example, representativeness, relevance, processing intensity, and other moderating factors that have been identified in the literature (see Greifeneder, Bless, and Pham 2011 for a review) may also play an important role in determining how arousal affects consumer choice. Moreover, it is likely that the results reported in this article will be bounded by situational factors such as satiation or tedium (Berlyne 1960). Specifically, as a consumer's mood evolves over time what was once a positive state of arousal may eventually become negative. For example, lying on a beach may be relaxing for a while but is likely to eventually become boring. Likewise, consuming one energy drink might result in a higher level of positive arousal, but multiple energy drinks are likely to lead to a negative state of high arousal. Along the same lines, even if a shopping context is initially pleasant because it creates a sense of excitement (or relaxation), that high (or low) level of arousal is likely to become less pleasant as the time of exposure increases. In other words, although our studies have examined the impact of arousal on consumer choice by looking at a single decision, the influence of any particular level of arousal on preference is likely to evolve over time.

Finally, it has been argued that we live in an "experience economy" (Pine and Gilmore 1999), and there is growing interest in better understanding how consumers evaluate and choose between different types of hedonic consumption experiences (Ariely and Zauberman 2000; Murray and Bellman 2011; Noseworthy, Cotte, and Lee 2011; Noseworthy

and Trudel 2011). Arousal is a critical attribute of many hedonic products, services, and experiences. Yet, little is known about how the arousal associated with hedonic products affects consumer decisions. This article takes an important step toward addressing this issue and provides strong evidence that the level of arousal associated with a product or experience can have a dramatic effect on market share.

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