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Sleep Deprivation:

The effect of sleep deprivation on imagery appeals

ASHLEY R. ARSENA
Department of Marketing
University of Texas at San Antonio

TIM M. BÖTTGER
Institute of Retail Management
University of St. Gallen

DAVID H. SILVERA
Department of Marketing
University of Texas at San Antonio

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ASHLEY R. ARSENA

TIM M. BÖTTGER

DAVID H. SILVERA

Ashley R. Arsena (corresponding author), Department of Marketing, College of Business, University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249 USA; ashley.arsena@gmail.com; Tel: 1-210-458-7310; Fax: 1-210-458-6335

Tim M. Böttger, Institute of Retail Management, University of St.Gallen, Dufourstrasse 40a, St.Gallen, 9000, Switzerland; tim.boettger@unisg.ch

David H. Silvera, Department of Marketing, College of Business, University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249 USA; david.silvera@utsa.edu

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Sleep deprivation is a widespread phenomenon that has a profound impact on behavior. Given that many consumers are exposed to advertisements when sleep deprived, it is important to understand how sleep deprivation influences consumers' reactions to marketing communications. This article addresses this under-researched area and shows that visualization appeals lead to enhanced brand evaluations for sleep deprived individuals. Specifically, study 1 finds that individuals who are sleep deprived express more positive brand attitudes after exposure to an imagery appeal relative to a non-imagery appeal. Additionally, study 1 also shows that imagery appeals cause sleep deprived individuals to express more positive brand attitudes compared to individuals who are not sleep deprived. Study 2 extends these findings and demonstrates that in addition to higher brand attitudes, sleep deprived individuals also express greater purchase intentions after exposure to a visualization than a non-visualization appeal. Brand managers and marketers can benefit from the knowledge that sleep deprived consumers react positively toward visualization appeals. Our research suggests that brand managers and marketers should create advertisements that feature imagery appeals as a way to enhance advertising effectiveness for sleep deprived consumers.

Keywords: Sleep deprivation; Imagery appeals; Visualization; Brand attitudes

JEL Classification code: M31

1. Introduction

If you fail to get enough sleep does this impact your performance? Research suggests it does. Failure to get enough sleep – even in the short term – has been shown to have an effect on a multitude of biological and psychological outcomes. For instance, sleep deprivation influences weight gain, memory formation, impulsivity, cortisol levels, blood pressure, anxiety, depression, and cognitive performance (Anderson & Platten, 2011; Cain, Silva, Chang, Ronda, & Duffy, 2011; Hagewoud, Bultsma, Bark, Koolhaas, & Meerlo, 2011; Lim & Dinges, 2010; Grandner, Patel, Gehrman, Perlis, & Pack, 2010; Schmid, Hallschmid, Jauch-Chara, Born, & Schultes, 2008; Spiegel, Leproult, & Van Cauter, 1999; Tochibuko, Ikeda, Miyajima, & Ishii, 1996). However, although several studies have demonstrated the effects of sleep deprivation across an array of outcomes, one area has been surprisingly understudied: the effect of sleep deprivation on consumer behavior.

Sleep deprivation is a worldwide phenomenon that affects more than one-fifth of adults (Steptoe, Peacey, & Wardle, 2006). Given the pervasive nature of this phenomenon, it is important to understand how sleep deprivation influences consumers. This article addresses this under-researched area and examines sleep deprivation in the context of imagery appeals. Across two studies we find that imagery and visualization appeals lead to enhanced brand evaluations (study 1) and higher purchase intentions (study 2) for sleep deprived individuals relative to individuals who are not sleep deprived. These results are among the first to show that sleep deprivation influences responses to

marketing communications. The paper discusses the practical implications of this research as well as potential underlying mechanisms responsible for these effects.

2. Conceptual background and hypotheses

Sleep deprivation is a widespread phenomenon that impacts many people. Six out of ten adults say they do not get enough sleep (Marcus, 2010). One quarter of individuals report they sleep less than six hours per night (National Sleep Foundation, 2009). Among college students, the amount of insufficient sleep is even higher, with 71% of college students reporting feeling sleep deprived and receiving less than five hours of sleep most nights (American College Health Association, 2007). According to several studies, the average adult needs a minimum of eight hours of sleep in order to be fully rested; individuals who receive less than six hours per night are labeled as sleep deprived (Tochibuko et al., 1996; Spiegel et al., 1999; Van Dongen, Maislin, Mullington, & Dinges, 2003). Thus, a large percentage of individuals around the world are suffering from sleep deprivation

Sleep deprivation is the condition of not having enough sleep. This condition can be chronic (e.g., failure to get sufficient sleep over a period of time) or acute (e.g., failure to get sufficient sleep over one night). The harmful health consequences of chronic sleep deprivation are well documented (e.g., coronary heart disease; Lusardi et al., 1999). Failure to get sufficient sleep in the short-term (e.g., 6 hours or less) can also have significant negative consequences related to both biological processes such as blood pressure (Tochibuko et al., 1996; Spiegel et al., 1999), and psychological processes such as aggressiveness (Meijer, Habekothe, & Van Den Wittenboer, 2000). Thus, even acute sleep deprivation can greatly impact individuals' behavior. In this article we focus on

acute sleep deprivation and its influence on an area that has received little research attention: consumer behavior.

Although there is little research on the topic, marketers are well aware that consumers are sleep deprived. Product promotion reflects an increased recognition of sleep deprived consumers; for example, caffeinated beverages like energy drinks and coffee are commonly promoted as a way to increase alertness and energy and combat the effects of insufficient sleep (Malinauskas et al., 2007). Advertising also reflects an increased recognition of sleep deprived consumers, as some ads are designed specifically to appeal to this segment of the market. For instance, a recent commercial by Honda (2013) advertises "we know you have to rise early and work late with not enough sleep in between, which is why we developed the new Accord that features smart sensing technology to keep you safe - even when you are tired."

Throughout the day, consumers are exposed to a plethora of marketing communications. How does the fact that many consumers are sleep deprived influence reactions to these advertisements? Do certain advertisements lead to more favorable brand attitudes than others? Do sleep deprived individuals respond more positively to some types of appeals than others? This article addresses these questions and investigates how acute sleep deprivation influences responses to a specific type of advertisement appeal: imagery appeals.

Imagery appeals urge consumers to imagine their experience with the product. Imagery appeals play an important role in advertising effectiveness. Studies show that imagery generation increases brand attitudes and purchase intentions (Babin & Burns, 1997; Burns, Biswas, & Babin, 1993). According to models of persuasion such as the

elaboration likelihood model (Petty & Cacioppo, 1983) and the heuristic systemic model (Chaiken, 1987), high amounts of positive elaboration have been found to increase advertising effectiveness and attitude strength. For example, Petty and Cacioppo (1983) found that participants who elaborated with arguments supporting an advertisement message showed an increase in attitude strength relative to participants who did not engage in extensive elaboration. Thus, imagery appeals, via positive elaboration, lead to enhanced advertising effectiveness (Kisielius & Sternthal, 1984) and are an effective marketing communication technique to boost brand attitudes and purchase intentions.

However, research also suggests that consumers are distrustful of marketing communication efforts (Darke & Ritchie, 2007; Friestad & Wright, 1994; Forehand & Grier, 2003). That is, consumers have "persuasion knowledge," and are cognizant of the tactics and methods used in marketers' sales presentations and advertising. Persuasion knowledge allows consumers to identify when marketers are trying to influence them and defend against persuasion (Friestad & Wright, 1994). Consumers are aware that marketers' have ulterior motives (e.g. to make money), and thus are often resistant to marketing communication efforts (e.g., skeptical of flattery from a salesperson; Friestad & Wright, 1994).

Yet, resisting persuasion requires effort. Research has shown that participants express more positive attitudes toward an advertisement when it is presented late in a block of advertisements (Knowles & Linn, 2004). The reasoning behind this finding is that consumers are "worn down" by the process and have less ability to resist persuasive attempts after repeated exposure to persuasive messages. Research also shows that when an individual lacks self-control resources, their ability to resist persuasion diminishes.

That is, Burkley (2008) found that participants who were depleted in self-control (possessed few self-control resources) were more susceptible to persuasion.

A single night of sleep deprivation diminishes an individual's recourses (Doran, Van Dongen, & Dinges, 2001; Harrison, Horne, & Rothwell, 2000). That is, individuals who fail to achieve sufficient sleep experience a number of deficits to cognitive processes, such as decreased alertness (Doran et al., 2001) and impaired executive functions (Harrison et al., 2000). Failure to get enough sleep has been shown to have negative effects on cognitive speed and accuracy measures (Lim & Dinges, 2010), as well as leading to slower reaction times (Cain et al., 2011). These studies illustrate that sleep deprived individuals have less resources in relation to their fully rested counterparts.

The cognitive deficits experienced by sleep deprived individuals are likely to leave them in the same defenseless state as people who have been worn down by a long series of previous advertisements or people with depleted self-control resources. Given than sleep deprived individuals have fewer resources than non-sleep deprived individuals, we predict that sleep deprived individuals will fail to resist persuasion attempts and comply with advertisements' instructions. That is, if an advertisement directs the consumer to "visualize" or "imagine" additional information, we predict that sleep deprived individuals will lack the resources to resist this instruction and elaborate on the message. It is easier to comply and become persuaded than spend effort resisting (Burkley, 2008). Resisting persuasion requires resources that sleep deprived consumers lack. Thus, we predict that sleep deprived individuals will be more likely to succumb to marketing efforts. If an advertisement contains instructions to imagine additional

information, we expect sleep deprived consumers to comply with the instructions and engage in positive elaboration on the advertisement's message (e.g., imagine themselves using the product). Because positive elaboration and visualization enhance advertising effectiveness and increase persuasion (Kisielius & Sternthal, 1984; Petty & Cacioppo, 1983), we expect sleep deprived individuals to express higher brand attitudes and purchase intentions when exposed to an imagery appeal compared to a non-imagery appeal. Based on this reasoning, it is proposed:

H1: Individuals who are sleep deprived will express higher brand attitudes and purchase intentions after exposure to an imagery appeal than a non-imagery appeal.

Additionally, since non-sleep deprived individuals have the resources to resist marketing persuasion attempts, we predict that non-sleep deprived individuals will resist the persuasion attempts embedded in imagery appeals and express lower brand attitudes and purchase intentions compared to sleep deprived individuals. Thus, we hypothesize:

H2: Imagery appeals will have a more positive effect on brand attitudes and purchase intentions for individuals who are sleep deprived compared to individuals who are not sleep deprived.

2.1. Overview of Studies

Two studies provide support for the above hypotheses. Study 1 shows that individuals who are sleep deprived have more positive brand evaluations after exposure

to an imagery appeal relative to a non-imagery appeal. Additionally, imagery appeals led sleep deprived individuals to express greater brand attitudes in relation to individuals who were not sleep deprived. Likewise, study 2 finds that imagery appeals also led to greater purchase intentions for sleep deprived individuals compared to individuals who were not sleep deprived. In each study, participants were presented with an advertisement that featured a vacation destination and asked to evaluate the product. Participants also reported the number of hours they slept the night before. Amount of sleep (in hours) served as our measure of sleep deprivation.

3. Study 1

3.1. Participants and procedure

One hundred and one undergraduates (64% female; age: 19 - 28) participated at a large university for course credit.

After arriving at the lab, participants were asked to review an advertisement. The advertisement featured a vacation destination (Hawaii or Rio de Janeiro) promoting great beaches, weather, and many great places to explore. In the imagery condition, participants were asked to visualize their experience at the advertised destination ("Imagine all the fun things you can do in Hawaii..."). In the non-imagery condition, no further instructions were provided. See Appendix A.

After reviewing the advertisement, participants were asked "What is your overall evaluation of Hawaii (Rio de Janeiro) as a vacation destination?" Participants responded on 7-point Likert scales to three different semantic endpoints assessing brand attitudes:

bad/good, unfavorable/favorable, and negative/positive (α = .90; adopted from Petrova & Cialdini, 2005).

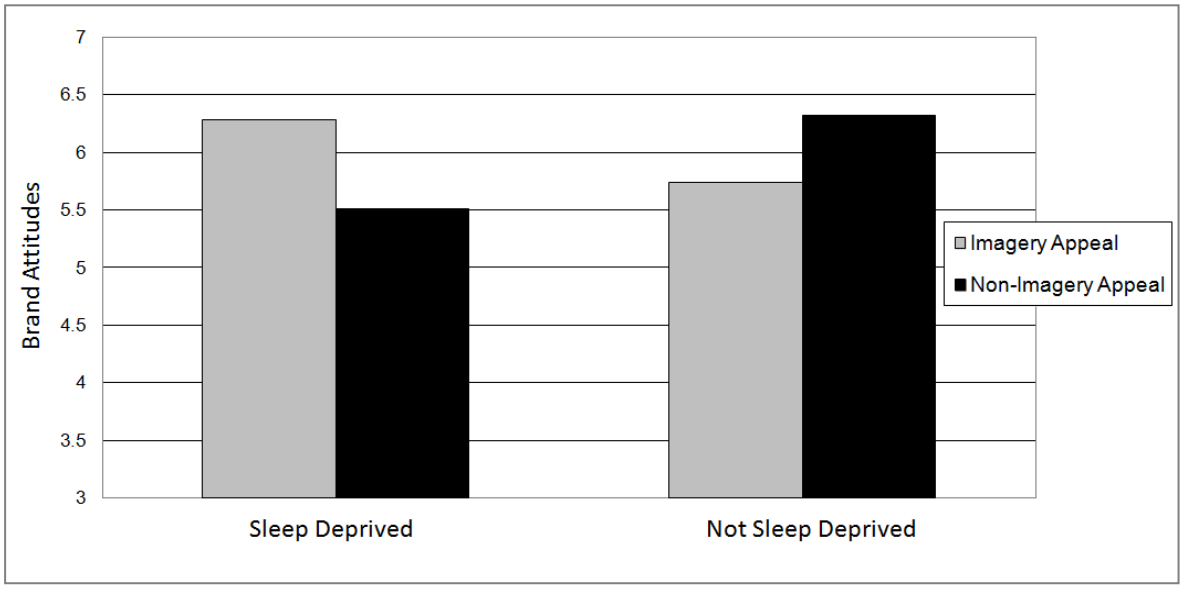
Participants then reported how many hours of sleep they received the night before. Hours of sleep served as our measure of sleep deprivation (M = 7.07; SD = 1.61). It is well documented that the average adult needs a minimum of eight hours of sleep in order to be fully rested and that individuals who receive less than six hours per night are sleep deprived (Tochibuko et al., 1996; Spiegel et al., 1999; Van Dongen et al., 2003). Thus, individuals who were one standard deviation below the mean (received less than 5.5 hours of sleep) qualified as sleep deprived.

3.2. Results and discussion

Preliminary analysis showed that the vacation destinations (Hawaii and Rio de Janeiro) had no significant main effects or interactions, and thus the two vacation destinations were collapsed in the final analyses. Linear regression was used to test whether imagery appeals (compared to non-imagery appeals) have a positive effect on brand attitudes for sleep deprived individuals (hypothesis 1). Imagery appeal condition, sleep deprivation, and the interaction between imagery appeals and sleep deprivation were included as independent predictors in a regression analysis with brand attitudes as the dependent variable. The appeal condition was coded as a dummy variable with 0 if participants were in the non-imagery condition and 1 if participants were in the imagery condition, and sleep deprivation was used as a continuous variable. This analysis yielded a main effect of amount of sleep (β = .25, t(97)= 2.30, p < .03) and appeal condition (β = 3.07, t(97)= 2.86, p < .01). More importantly, the main effects were qualified by a

significant interaction between sleep deprivation and appeal condition (β = -.42, $t(97) = -2.85$, $p = .005$). To explore the nature of the interaction, a spotlight analysis at plus and minus one standard deviation from the mean amount of sleep was performed (Fitzsimmons, 2008). Results showed that individuals who were sleep deprived (one standard deviation below the mean; received less than 5.5 hours of sleep) had more positive brand attitudes in the imagery appeal condition ($M = 6.28$) relative to the non-imagery condition ($M = 5.50$; β = .77, $t(97) = 2.30$, $p < .03$). Additionally, imagery appeals led sleep deprived individuals to express more positive brand attitudes ($M = 6.28$) compared to individuals who were not sleep deprived ($M = 5.73$; β = -.16, $t(47) = -1.75$, $p = .08$), although this effect was only marginally significant. Also, non-sleep deprived individuals responded more positively to non-imagery appeals than individuals who were sleep deprived ($M = 6.32$ vs. $M = 5.50$; β = .25, $t(50) = 2.24$, $p = .03$). See figure 1.

Figure 1. Brand attitudes as a function of sleep deprivation and imagery appeals.



These results provide initial support for hypothesis 1: among sleep deprived individuals, imagery appeals led to more positive brand attitudes than non-imagery appeals. The results also provide initial support for hypothesis 2: imagery appeals led to more positive brand attitudes among sleep deprived individuals than non-sleep deprived individuals. This demonstrates how sleep deprivation can affect perception of the same marketing message. However, one potential limitation of this study is that only brand attitudes were investigated. Although brand attitudes are a useful indicator of advertising effectiveness, we sought to directly measure purchase intentions in the next study as well as extend the generalizability of our findings by using different advertisements and imagery appeals.

4. Study 2

4.1. Participants and procedure

One hundred and thirty five undergraduates (52% female; age: 19 - 29) at a large university participated in this study for course credit.

Participants were asked to view one of two advertisements adopted from Petrova & Cialdini (2005). The advertisement featured a vacation destination (Eastern Europe). In the visualization condition, participants were shown the vacation destination with the tagline "Visualize yourself here. Take a moment and imagine yourself in a unique adventure in a land of beauty and tradition." In the non-visualization condition, participants read "Take a closer look at this place. Make your vacation a unique adventure in a land of beauty and tradition." See Appendix B.

As in study 1, after viewing the advertisement, participants were asked to rate the vacation destination on three seven-point semantic items: bad/good, unfavorable/favorable, and negative/positive (α = .94). In addition to measuring brand attitudes, we measured purchase intentions with three questions adopted from Petrova & Cialdini (2005): (1) If you were going to take a vacation, how likely would you consider a vacation here in the future?; (2) How likely would you be requesting a brochure with further product information?; and (3) How likely would you be visiting the advertised destination given you had time to plan such a vacation and had the necessary time and money? (1=Very unlikely...7=Very likely; α = .83).

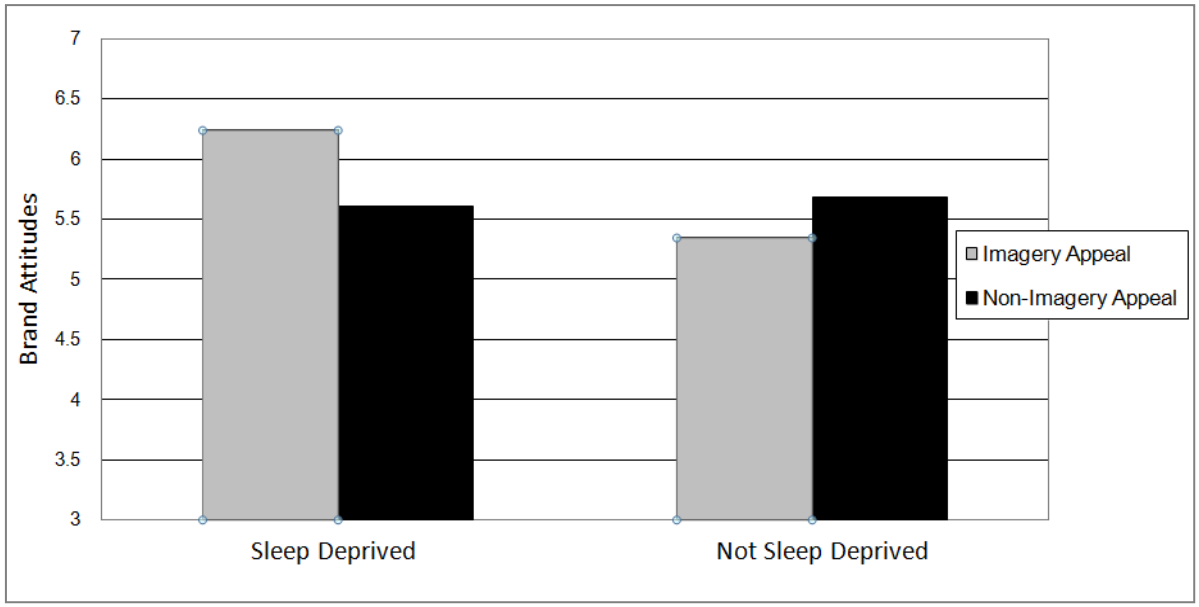
Participants then reported how many hours of sleep they received the night before (M = 6.71; SD = 2.05). As in study 1, individuals who were one standard deviation below the mean (received less than 4.6 hours of sleep) qualified as sleep deprived (Tochibuko et al., 1996; Spiegel et al., 1999; Van Dongen et al., 2003).

4.2. Results and discussion

Advertisement appeal, sleep deprivation, and the interaction between advertisement appeal and sleep deprivation were included as independent variables in a regression analysis predicting brand attitudes. Results revealed no main effect of sleep deprivation (β = .01, t(131) = .20, p = .84), but a significant main effect for advertisement appeal (β = 1.73, t(131) = 2.07, p < .04). More importantly, the expected two-way interaction between sleep deprivation and advertisement appeal was significant (β = -.237, t(131) = -1.98, p = .05). A spotlight analysis at plus and minus one standard deviation from the mean amount of sleep was performed (Fitzsimmons, 2008). Results

showed that participants who were not sleep deprived (one standard deviation above the mean, received more than 8.7 hours of sleep) showed no difference in brand attitudes across the visualization and non-visualization condition (M = 5.34 vs. M = 5.68; β = -.34, t(131) = -.99, p =.32). In contrast, individuals who were sleep deprived (one standard deviation below the mean; received less than 4.6 hours of sleep) expressed more positive brand attitudes in the visualization condition (M = 6.23) relative to the non-visualization condition (M = 5.60; β = .63, t(131) =1.83, p = .06). Additionally, sleep deprived individuals expressed more positive brand attitudes (M = 6.23) in relation to individuals who were not sleep deprived (M = 5.34) in response to imagery appeals (β = -.29, t(66) = -2.75, p < .01). See figure 2.

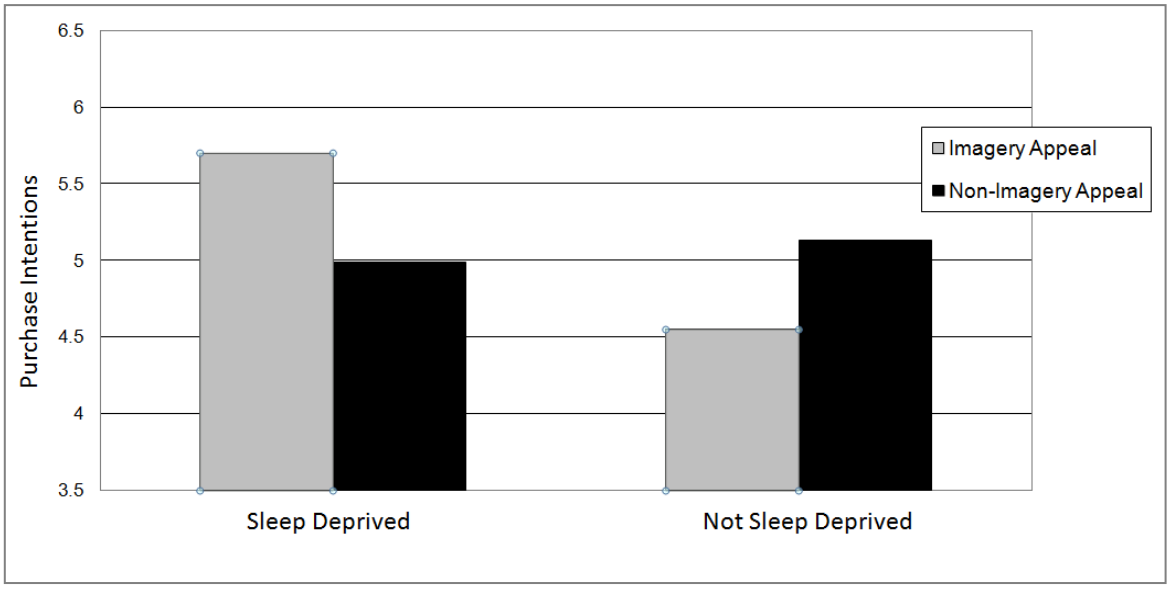
Figure 2. Brand attitudes as a function of sleep deprivation and visualization appeals.



A second linear regression with advertisement appeal, sleep deprivation, and the interaction between advertisement appeal and sleep deprivation was conducted predicting

purchase intentions. Results revealed no main effect of sleep deprivation (β = .03, $t(131) = .36$, $p = .71$), but a significant main effect for advertisement appeal (β = 2.18, $t(131) = 2.38$, $p < .02$). More importantly, the expected two-way interaction between sleep deprivation and advertisement appeal was significant (β = -.31, $t(131) = -2.41$, $p < .02$). A spotlight analysis showed that participants who were not sleep deprived (one standard deviation above the mean, received more than 8.7 hours of sleep) showed no difference in purchase intentions across the visualization and non-visualization condition ($M = 4.56$ vs. $M = 5.14$; β = -.58, $t(131) = -1.54$, $p = .12$). In contrast, individuals who were sleep deprived (one standard deviation below the mean; received less than 4.6 hours of sleep) expressed stronger purchase intentions in the visualization condition ($M = 5.70$) relative to the non-visualization condition ($M = 4.99$; β = .71, $t(131) = 1.89$, $p = .06$), although this is only marginally significant. Additionally, sleep deprived individuals expressed stronger purchase intentions ($M = 5.70$) in relation to individuals who were not sleep deprived ($M = 4.56$) in response to imagery appeals (β = -.29, $t(66) = -3.41$, $p < .01$). See figure 3.

Figure 3. Purchase intentions as a function of sleep deprivation and visualization appeals.



Overall the results provide further support for hypotheses 1 and 2. Individuals who experience less sleep express more positive brand attitudes and stronger purchase intentions after exposure to an imagery appeal relative to a non-imagery appeal (hypothesis 1). Additionally, imagery appeals led sleep deprived individuals to express more positive brand attitudes compared to individuals who were not sleep deprived (hypothesis 2).

5. General Discussion

The present studies provide some of the first empirical evidence of how sleep deprivation can influence reactions to advertisements. In addition to revealing a novel effect of sleep deprivation in the marketing domain, the present research provides evidence that imagery appeals lead to enhanced brand attitudes and purchase intentions for sleep deprived consumers.

We suggest that sleep deprived consumers have depleted resources and lack the ability to resist persuasion attempts (e.g., imagery appeals). Compliance with imagery appeals leads to greater positive elaboration and, consequently, higher brand attitudes, and purchase intentions (Kisielius & Sternthal, 1984; Petty & Cacioppo, 1983; Petrova & Cialdini, 2005). However, although our studies show that sleep deprivation leads to positive responses to imagery appeals, it is unclear whether the reason behind these effects are due to a lack of resources. Thus, future studies should investigate whether lack of recourses is the driving force behind sleep deprived individuals enhanced brand attitudes and purchase intentions in response to imagery appeals.

Another possible underlying mechanism for the above results is subjective experience of ease of image generation. Literature on the effects of imagery show that individuals use the ease with which they can imagine the experience with the product as an indicator of how much they will like the product (Petrova & Cialdini, 2005). If individuals lack the dispositional ability to create vivid mental images, then imagery appeals backfire and lead to reduced brand attitudes. In contrast, if individuals posses the ability to imagine and create vivid mental images, then imagery appeals lead to enhanced persuasiveness via more favorable brand attitudes and purchase intentions (Petrova & Cialdini, 2005). In the current research, imagery appeals might have had a positive effect on brand attitudes and purchase intentions for sleep deprived individuals because sleep deprived have greater ability to imagine and engage in abstract processing compared to individuals who are not sleep deprived. Thus, future studies should examine the mediating role of experienced difficulty as a possible underlying mechanism for the above results as well as examine certain motivational and capacity variables that could override the negative effects of sleep deprivation in favor of more effortful thought.

One quarter of individuals report they sleep less than six hours per night (National Sleep Foundation, 2009), and this number is expected to grow. Marketing communications are effective when the marketing mix appeals to the target audience. If a marketer's aim is to increase brand attitudes and purchase intentions, our research suggests that imagery appeals should be used when targeting sleep deprived consumers. Late night television advertisements or early morning talk shows might be a good time to use imagery appeals since the probability of the target audience being sleep deprived is higher. Certain retail environments where consumers are more likely to be sleep deprived

(e.g., nightclubs, coffeehouses, and airports) could also use visualization appeals in product displays to increase brand attitudes and purchase intentions. Similarly, some occupations are more likely to experience sleep deprivation than others (e.g., medical doctors). Thus, visualization appeals might be more effective for this group of consumers than individuals who receive sufficient sleep. Lastly, the positive effects on brand attitudes and purchase intentions should not be restricted to only imagery and visualization appeals, but can also be applied to any type of directive advertisement. We suggest that sleep deprived individuals' ability to resist is lowered and thus any kind of directive advertisement should lead to enhanced brand attitudes and purchase intentions.

Consumers can also benefit from our research. By informing consumers that sleep deprivation can lead to diminished ability to resist persuasion, this information can facilitate future decision making. Specifically, consumers are advised to postpone critical financial decisions until they are better rested since sleep deprivation can lead to enhanced brand attitudes and purchase intentions in response to imagery appeals. Thus, big ticket items that often utilize imagery appeals (e.g., vacations), might be better purchased after sufficient sleep. Also, consumer advocacy groups can encourage consumers to be more mindful of their state of sleep deprivation before making important decisions.

Given that sleep deprivation is a universal phenomenon affecting more than one billion people, it is important for consumers to be understand how sleep deprivation influences reactions to marketing communications. Brand managers can also benefit from the knowledge that sleep deprived consumers react positively toward imagery appeals and are encouraged to create advertisements that feature visualization appeals in order to

enhance advertising effectiveness for this ever-increasing marketing segment: the sleep deprived consumer.

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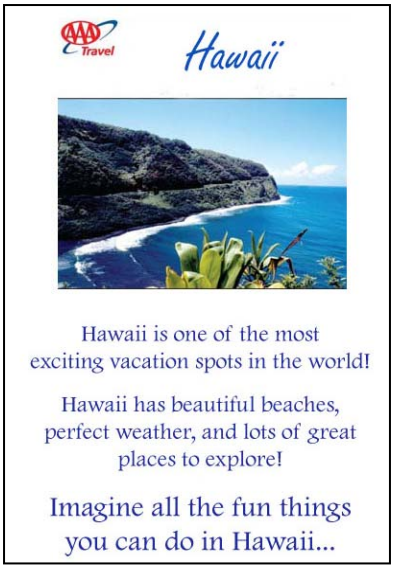
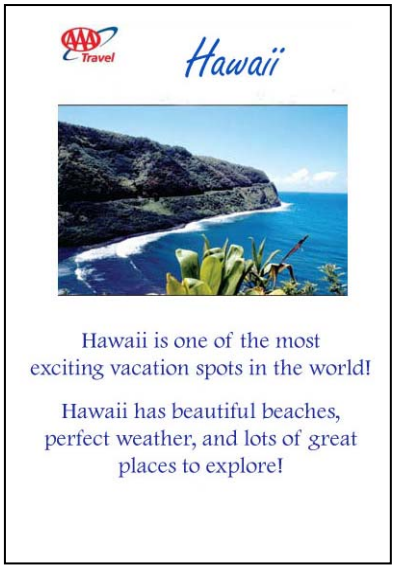
Appendix A

STUDY 1 EXPERIMENTAL MATERIALS

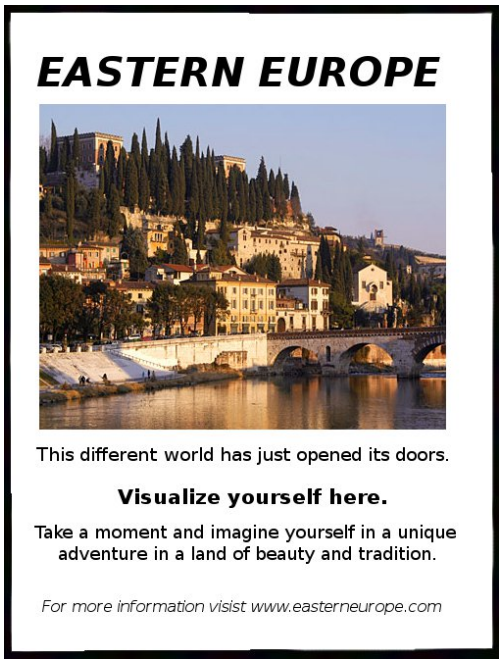




Appendix B

STUDY 2 EXPERIMENTAL MATERIALS

Visualization Appeal



Non-Visualization Appeal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