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A Comparative Analysis of Self-Report and Psychophysiological Measures of Emotion in the Context of Tourism Advertising

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Abstract

This study investigates the influence of emotional responses evoked by destination television advertisements on three common variables of interest when assessing tourism advertising effectiveness: attitude toward the advertisement, postexposure destination attitude and visit intention. In particular, this study used a combination of self-report and psychophysiological measures of emotion and explored the consistency between these two measurement techniques. A total of 101 participants were exposed to 18 existing destination commercials while their real-time psychophysiological responses and self-report data were collected. The results show that the influence of ad-evoked emotions on tourism advertising effectiveness varied according to the way emotion was measured. The effects of pleasure on tourism advertising effectiveness were much weaker when pleasure was measured physiologically than when self-report measures were used. Physiological arousal, however, was not found to be a significant indicator of advertising effectiveness. The results highlight the importance of valid and reliable measurement of emotion and raise concern over the possible overestimation of the relationship between self-reported emotional responses and advertising effectiveness.

Keywords

emotion measurement, tourism advertising effectiveness, facial electromyography, skin conductance, destination advertisements

Introduction

Emotion is a key component of consumers' responses to advertising (Geuens, De Pelsmacker, and Faseur 2011; Kemp, Bui, and Chapa 2012). The elicitation of emotion, particularly positive emotions such as joy and surprise, is an important strategy to engage consumers in advertisements (Teixeira and Wedel 2012). As Mehta and Purvis (2006, 49) discuss, "The process that consumers go through in deciding what brands to buy has a heavy emotion-based dimension to it." Indeed, the elicitation of positive emotions is regarded as a characteristic of effective advertisements (Kover, Goldberg, and James 1995).

Emotions are elicited quickly (Zajonc 1980) and influence subsequent processing of stimuli. Consumers' emotional responses to advertisements are important antecedents of advertising effects such as beliefs about the brand (Edell and Burke 1987), brand familiarity (Mano 1996), brand choice (Stayman and Batra 1991), brand attribute evaluations (Burke and Edell 1989), and recall (Pieters and de Klerk-Warmerdam 1996). These, in turn, are important predictors of purchasing intention (Batra and Ray 1986; Morris et al. 2002).

The aforementioned literature raises important issues regarding the role of emotional responses in understanding advertising outcomes. However, the relationship between emotional responses and other measures of advertising effectiveness is not clear in tourism advertising. Instead, tourism advertising research is dominated by the exploration of the effects of different elements of an advertisement such as presence of a presenter (Scott, Green, and Fairley 2016; Li et al. 2016), with little focus on the role of emotion in consumers' mental processing of advertising (S.-B. Kim, Kim, and Bolls 2014). This is surprising given the extensive use of emotional appeal in tourism promotional campaigns. This study examines the influence of ad-evoked emotional responses on consumers' attitudes toward the advertisement, destination attitudes, and visitation intentions.

Methodologically, the majority of previous research examining the relationship between emotions and advertising effectiveness has measured consumers' emotional responses

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via a self-report questionnaire. Self-report measurement is simple and convenient to employ. However, the use of self-report measures is subject to significant cognitive bias and socially desirable responses (e.g., the tendency to provide positive self-descriptions; see Paulhus 2002). A further problem associated with self-reported emotional reactions, and in particular those elicited in response to TV commercials, is that they are usually short-lived (Mano 1996). As a result, viewers may not be able to recall accurately their affective reactions to an advertisement. Importantly, the self-report method is incapable of capturing consumers' unconscious emotional responses.

To address these criticisms of self-report measures of emotion, this study adopts psychophysiological techniques to assess consumers' emotional responses. Psychophysiological measures do not rely on individuals' recollections of their emotions and do not involve cognitive activities on the part of the respondent (Erevelles 1998). The current study contributes to the tourism literature by empirically investigating how ad-evoked emotions influence tourism consumers' attitudes toward the advertisements, attitudes toward the destination, and visit intentions. The study measures consumers' emotional responses to tourism advertising using verbal and visual self-report measures and explores the differences in the relationship between ad-evoked emotional responses and tourism advertising effectiveness based on two measurement techniques.

Literature Review

Approach to the Study of Emotions

Two prominent theories of emotions are used within advertising research: Basic emotion theory and dimensional theory. The basic emotion approach regards emotions, such as happiness, sadness, and anger, as discrete entities (Chamberlain and Broderick 2007) that are assumed to be present from birth. The dimensional approach attempts to identify a set of common dimensions of affect that can be utilized to differentiate specific emotions from one another. Pleasure-arousal-dominance (PAD) is the most common theory within the dimensional framework (Russell and Mehrabian 1974). In the PAD model, the full spectrum of human emotions are concentrated on three independent and bipolar dimensions, namely, pleasure, arousal, and valence (Russell and Mehrabian 1974). The pleasure dimension refers to the pleasantness of an experience whereas arousal indicates the activation level related with an experience. The dominance dimension refers to the extent to which the individual is able to control the emotion. However, in Russel's later research, the dimension of dominance was deleted from the model as dominance accounts for very little variance in emotions (Russell and Pratt 1980).

In advertising research, the dimensional approach is considered an appropriate method to describe consumers' emotional responses (outcome) toward advertising (Poels and Dewitte 2006; Mauss and Robinson 2009). As suggested by Huang (2001), emotion in advertising and marketing is short-lived and rarely seen in its pure form, and basic emotion approaches (Izard 1977; Plutchik 1993) that limit consumers' affective states to a specific emotion are problematic. For measurement purposes, the dimensional approach is more parsimonious as it replaces the long lists of affective items and simply classifies emotions along two dimensions (Mauss and Robinson 2009). Therefore, this study adopts the dimensional approach to conceptualize consumers' emotional responses to tourism advertising.

The Measurement of Emotion

Selecting appropriate methods to measure individuals' emotional responses to tourism advertising is of considerable importance to the accuracy of the results. This section presents a critical review of two self-report measures frequently used in advertising studies. Following this, two psychophysiological techniques are discussed in terms of their ability to address issues associated with self-report techniques.

The verbal self-report method requires individuals to indicate their cognitive or emotional responses by rating their response using a set of words, phrases, or statements following exposure to advertising stimuli (Poels and Dewitte 2006). Verbal self-report measurement techniques are most common in the study of consumer responses to television advertisements (Micu and Plummer 2010). An example question when employing this method to measure emotion could be, How excited do you feel after watching the advertisement? After some introspection, individuals indicate how well this descriptor matches their recall of their emotions on a continuum ranging from not at all to extremely. Verbal self-report measures are simple to operationalize, however, subject to a series of criticisms, especially when used for measuring emotional responses. First, emotion is not considered as language-based, and cognitive effort is needed to describe an emotion experienced in words (Hazlett and Hazlett 1999). Second, asking respondents to recall their emotions may involve cognitive bias that may distort their original affective reactions to the advertisement. Finally, respondents may not be willing to reveal their actual emotions because of social desirability concerns (Paulhus 2002).

Respondents also can be asked to rate their emotional states using a set of graphic characters (Poels and Dewitte 2006). The Self-Assessment Manikin (SAM), originally proposed by Lang (1980), is a visual version of the PAD (pleasure-arousal-dominance) model. In SAM, each dimension (i.e., pleasure, arousal, and dominance) is represented by five graphic images arranged along a nine-point scale. The respondents choose the point on the scale below the characters that best represents their emotional states. While visual self-report measures of emotion may reduce introspection and cognitive processing compared to verbal self-report measures, cognitive bias remains an issue, as viewers have to rely on their memory to recall the emotions or feelings. The

verbal instructions that accompany the SAM figures trigger higher-order processes when participants use this scale (Poels and Dewitte 2006). These criticisms call for alternative methods for eliminating the measurement bias associated with traditional emotion scales (Erevelles 1998).

It is widely accepted that emotions are accompanied by bodily or physiological responses that are beyond the individual's conscious control (Bagozzi, Gopinath, and Nyer 1999). Psychophysiological measures can overcome the criticisms of self-report measures by eliminating cognitive biases or socially desirable responses (Paulhus 2002). Psychophysiological measurement techniques can record participants' bodily reactions to stimuli, and thus do not rely on an individual's ability to verbalize their emotional responses (Larsen and Fredrickson 1999). Unlike self-report measures that can only capture a consumer's emotional response at a given moment in time, psychophysiological techniques provide moment-to-moment information on an individual's emotional reactions (Wilhelm and Grossman 2010; Ravaja 2004). Li et al. (2016) have demonstrated the superiority of physiological methods over self-report measures when examining tourism consumers' emotional responses to advertising. Consistent with the dimensional approach, the current study adopts facial electromyography (EMG) and skin conductance to provide separate measures of pleasure and arousal.

Facial EMG is able to capture an individual's pleasure level (Bolls, Lang, and Potter 2001). Facial EMG measures electrical signals involved in covert facial muscle activity (Hazlett and Hazlett 1999) and is capable of detecting facial muscle contractions in response to weakly evocative affective stimuli even though no overt facial expressions are noticed (Tassinary, Cacioppo, and Vanman 2007). Previous studies have found that activation of the zygomatic major muscle of the facial cheek is related to the experience of positive emotions, while negative emotions activate the corrugator supercilli muscles (around the eyebrow) (P.J. Lang et al. 1993; Dimberg 1990). Facial EMG has been applied in marketing studies to understand consumers' emotional responses (i.e., pleasure) to TV commercials that focus on tangible products (e.g., cars) (Hazlett and Hazlett 1999) and different price levels (Ravaja and Somervuori 2013).

Skin conductance (SC), also known as "electrodermal activity" (EDA), is an important index of respondents' arousal levels (Kroeber-Riel 1979). The body's autonomic nervous system is activated when exposed to a thrilling stimulus, increasing secretions in the eccrine sweat glands, which in turn leads to stronger skin conductivity (Grabe et al. 2000). Skin conductance reflects consumers' physiological arousal in response to threat-appeal TV advertisements (Algie 2005) and radio advertisements (Bolls, Lang, and Potter 2001).

Emotion and Tourism Advertising Effectiveness

Past tourism advertising effectiveness studies focus on investigation of the most persuasive stimuli in an advertisement (Li et al. 2016; Scott, Green, and Fairley 2016). These studies explore the most effective element or the most effective combination of elements in the advertisement based on experimental design methods, with advertisement likability or attitude as dependent variables representing tourism advertising effectiveness. Particular copy elements studied include an endorser (Van der Veen and Song 2014), images of tour leaders (Wang, Hsieh, and Chen 2002), types of advertising appeals (Lwin and Phau 2013), incentive types (Chou and Lien 2012), experiential texts (Goossens 1995), and gender of the endorser (Luoh and Lo 2012).

While existing tourism literature has provided diagnostic evaluations of tourism advertising materials, they do not explain how consumers process advertising messages (S.-B. Kim, Kim, and Bolls 2014). An emotional appeal strategy is commonly used in tourism advertising to evoke viewers' feelings (Kandampully, Mok, and Sparks 2001). Such travel-related campaigns sell "the way they make people feel" (Nawijn et al. 2013, 265). However, exploration of consumers' affective processing of the tourism advertising—the ad-evoked emotion that mediates between consumers' exposure to stimuli and their attitude, is limited. Further, research has not studied how advertisement-generated emotional responses influence tourism advertising effectiveness.

In the wider literature of advertising effectiveness, extensive research examines the effects of emotions on postexposure responses. However, studies examining the relationships between physiological emotional responses and other measures of advertising effectiveness are scarce despite the fact that psychophysiological measures have been demonstrated to be able to record more objective and unbiased emotion than self-report measures of emotion (Hazlett and Hazlett 1999). Derbaix (1995) adopted both a Facial Action Coding System (FACS) and self-report ratings to measure consumers' emotional responses to a series of advertisements. FACS requires coding of facial muscle movements in order to identify specific emotions (Poels and Dewitte 2006). This study found that emotions measured by self-report were predictive of attitude toward the advertisements and brand, whereas emotions captured by FACS were not.

Several researchers have criticized the use of FACS for capturing individuals' emotions, as FACS is only suitable for capturing intense facial expressions and cannot detect minor variances in facial muscle movement (Bolls, Lang, and Potter 2001; Ravaja 2004; Poels and Dewitte 2006). Building on Derbaix (1995), this study adopts alternative psychophysiological techniques to address the following research question:

> *Research question*: Does the way in which emotional response is measured (self-report vs. psychophysiological techniques) influence the relationship between ad-evoked emotions and tourism advertising effectiveness?

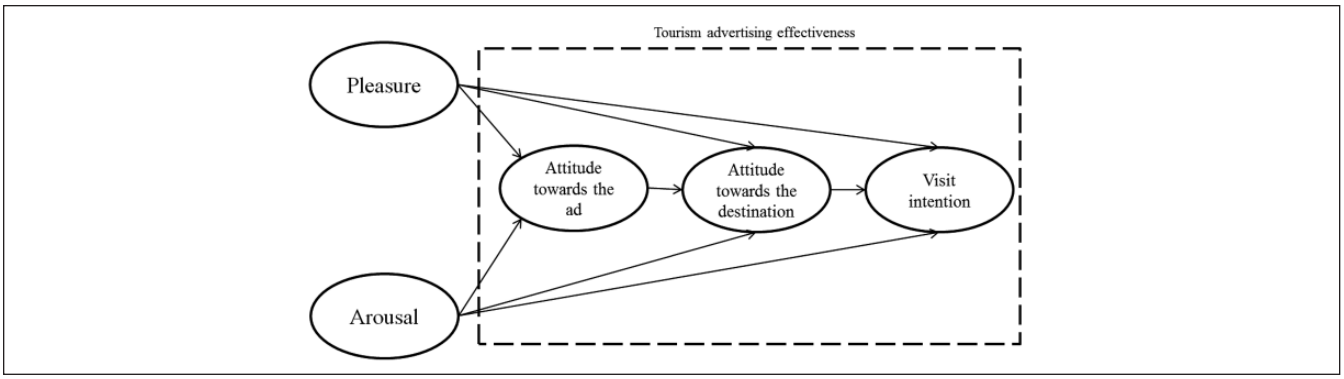

Figure 1. Proposed conceptual framework for ad-evoked emotional responses and tourism advertising effectiveness.

Prior research has measured advertising effectiveness using attitude toward the advertisement (A_{ad}), postexposure brand attitude, and purchasing intention (e.g., Luoh and Lo 2012; Haiyan and van der Veen 2014; Chang, Wall, and Tsai 2005). In tourism, postexposure brand attitude is replaced by postexposure destination attitude (A_{dp}), and purchase intention is replaced by visitation intention (VI) (Haiyan and van der Veen 2014).

A_{ad} was introduced by Shimp (1981) who argued that consumers' evaluation of an advertisement determines their subsequent perceptions of the brand and behavioral intentions. Most advertising research argued that emotional responses have a direct influence on A_{ad}. Olney, Holbrook, and Batra (1991) demonstrated that emotions have an effect on different components of A_{ad}. Similarly, Chang (2001) found that ad-evoked emotions directly influenced A_{ad} and subsequently viewer's attitude. Pieters and de Klerk-Warmerdam (1996) found emotional responses were positively related with A_{ad}, and pleasure was more predictive of A_{ad} than intensity (arousal). Therefore, we propose the following hypotheses:

Hypothesis 1a: Pleasure evoked by tourism advertisements has a positive effect on A_{ad}.
Hypothesis 1b: Arousal evoked by tourism advertisements has a positive effect on A_{ad}.
Hypothesis 2: Pleasure is more predictive of A_{ad} than arousal.

Attitude toward the brand, also known as brand attitude or brand interest, is defined as "an individual's internal evaluation of the brand" (Mitchell and Olson 1981, 318). In advertising research, A_{ad} is regarded as mediating the relationship between emotional responses and attitude toward the brand. Holbrook and Batra (1987) found that ad-evoked emotions and A_{ad} mediate the influence of advertisement content on attitude toward the brand. Similarly, Edell and Burke (1987) found that the impact of emotions on attitude toward the brand is mediated by A_{ad} and beliefs. Nevertheless, modest direct effects of emotions on brand attitude can also occur (Stayman and Aaker 1988) as some advertisements associate specific feelings with a brand (Wells 1989). Therefore, we include the following hypotheses:

Hypothesis 3a: Pleasure evoked by tourism advertisements will have a direct impact on A_{dp}.
Hypothesis 3b: Arousal evoked by tourism advertisements will have a direct impact on A_{dp}.
Hypothesis 4a: A_{ad} will partially mediate the effects of pleasure level evoked by tourism advertisements on A_{dp}.
Hypothesis 4a: A_{ad} will partially mediate the effects of arousal level evoked by tourism advertisements on A_{dp}.

Purchase intention is a common measure of advertising effectiveness and used to evaluate a consumer's likelihood of buying a product (Poels and Dewitte 2006). Studies demonstrate a direct effect of ad-evoked emotional responses on purchasing intentions (Morris et al. 2002; Shahin Sharifi 2014). An indirect influence of ad-evoked emotional response on purchase intention, mediated by A_{ad} and attitude toward the brand, also is found in some studies (Batra and Ray 1986; Geuens and Pelsmacker 1998). Further, A_{ad} indirectly exerts an effect on purchase intention via attitude toward the brand (Batra and Ray 1986). Hence, we use visit intention (VI) as a proxy for purchase intention, and propose the following hypotheses:

Hypothesis 5: A_{dp} will fully mediate the effects of A_{ad} on VI.
Hypothesis 6a: Pleasure evoked by tourism advertisements will have a direct impact on VI.
Hypothesis 6b: Arousal evoked by tourism advertisements will have a direct impact on VI.
Hypothesis 7a: A_{ad} and A_{dp} will partially mediate the effects of pleasure evoked by tourism advertisements on VI.
Hypothesis 7b: A_{ad} and A_{dp} will partially mediate the effects of arousal evoked by tourism advertisement on VI.

Figure 1 shows the proposed conceptual framework for the relationships between ad-evoked emotions and other measures of tourism advertising effectiveness.

Methods

Participants. A total of 101 university students and staff from an Australian University participated in this study. Only those who had lived in Australia for all or most of their lives were included to reduce cultural effects. Physiological measurement procedures are time consuming and so such sample numbers are common (Bolls, Lang, and Potter 2001; Guo et al. 2014; Ohme et al. 2009).

Stimuli selection. Advertisements found on the websites of domestic and international destination marketing organizations (DMOs) were used as the stimuli in this study. The use of DMO advertisements served as a control for professional quality and realism. To be representative, the advertisements selected covered six advertising appeals: humor, romance, adventure, youth, family and rationality. These appeals are commonly used in tourism advertising and expected to appeal to respondents. A preliminary set of 60 online destination advertisements was selected using the criteria proposed by Li et al. (2016).

Ten Australian university students and staff evaluated the extent to which each of the six appeal categories featured in the 60 tourism advertisements. The definition of each type of appeal and corresponding examples were provided for the judges before they started evaluating the advertisements (Pollay 1983). The advertisements were presented in a random order and participants rated their level of adventure, family, romance, youth, humor, and rational appeal of each using a 10-point scale from strongly disagree to strongly agree. The top three advertisements in each of the six appeal categories were selected as the stimuli in this study (18 in total). To reduce participant fatigue and control the duration of the entire data collection process, these 18 advertisements were divided into three sets, with each set comprising six different appeal types across six different destinations.

Each participant was assigned randomly to one of the three sets (i.e., each participant was exposed to six advertisements), and the order of the advertisements within each set was randomized to avoid order effects. To control for the influences of the individuals' existing destination attitudes on advertising effectiveness, participants' preexposure destination attitudes were measured and used as a covariate in this study (see details in "covariate" section below).

Procedure. Upon entering the research lab, the participants were introduced to the research study and relevant apparatus and informed consent obtained. Participants were tested one at a time. Each participant was asked to indicate his or her preexposure destination attitude and current mood by filling out a questionnaire. After viewing each advertisement, participants were instructed to complete a self-report questionnaire including the verbal self-report emotion scales, visual self-report emotion scale (i.e., SAM), A_{ad}, A_{dp} and VI, for each advertisement. This procedure was repeated until all six destination advertisements were seen and responses collected. As the final task, participants were asked to complete another questionnaire comprising gender, age, education level, prior experience with the advertisement and destination.

Psychophysiological measures. Facial EMG and SC data were collected by a trained researcher, proficient in the use and application of the apparatuses and analyzed using Biopac software. In line with the latest published guidelines for analysis of skin conductance data for continuous stimuli (e.g., audio or video), the frequency and amplitude of skin conductance responses (SCR) were utilized as two indicators of skin conductance (Braithwaite et al. 2013; Boucsein 2012). The criterion for skin conductance response (SCR) was greater than 0.05 μS (Braithwaite et al. 2013).

Facial EMG data were collected by recording participants' zygomatic major muscle activities. The recording sites on the participant's face were carefully located in accordance with published facial EMG guidelines (e.g., Fridlund and Cacioppo 1986). The mean facial EMG score was used as the indicator of pleasure level in this study (Boxtel 2001).

Visual self-report emotion measurements. Participants completed a questionnaire indicating their subjective "pleasure" and "arousal" levels after watching each advertisement using the Self-Assessment Manikin [SAM] (P.J. Lang 1980).

Verbal self-report emotion measurements. Emotions were measured by 12 items adopted from Russell and Mehrabian (1974), representing the pleasure and arousal dimensions. Pleasure was measured with a 7-point semantic differential scale, with the following six items: unsatisfied–satisfied; unhappy–happy; annoyed–pleased; melancholic–contented; despairing–hopeful, and bored–relaxed. Analogously, six items measured arousal: unaroused–aroused; sleepy–wide awake; calm–excited; relaxed–stimulated; sluggish–frenzied, and dull–jittery.

Advertising effectiveness measures. Attitude toward the advertisement was measured by the item "How would you describe your overall attitude toward the ad you have just watched?" using a 7-point "I don't like this ad at all - I like this ad very much" scale (Derbaix 1995; Morris et al. 2002). Attitude toward the destination was captured by the item "Based on this ad, how positive is your impression of X (the advertised destination) as a tourism destination?" (H. Kim and Stepchenkova 2015) on a 7-point not at all positive (1) to very much (7) scale. Visit intention was captured by the item "Does this ad make you want to visit the destination (advertised in the ad)?" (H. Kim and Stepchenkova 2015) using a 7-point scale anchored by not at all and very much. A single question was appropriate to measure these variables for the research purpose and additionally decreased demand on survey respondents (Dolnicar 2013; Rossiter 2011).

Covariate. To control for the possibility of participants' existing destination attitudes and mood influencing their postexposure evaluation, data on each participant's destination attitude and mood was collected prior to advertisement exposure. *Preexposure destination attitude* was captured by the item "How positive is your impression of X as a tourism destination?" (H. Kim and Stepchenkova 2015) using a 7-point not at all positive (1) to very much (7) scale. *Mood* was captured by four items: "Currently, I am in a good mood"; "As I answer these questions, I feel cheerful"; "At this moment, I feel edgy or irritable"; "For some reason, I am not very comfortable right now" (Peterson and Sauber 1983). To measure these items, a 7-point strongly disagree (1) to strongly agree (7) scale was used. The last two items were reverse scored.

Data analysis. As per EMG data analysis guidelines, the mean EMG score was standardized as a proportion of the baseline value (Boxtel 2001). For skin conductance data, SCR frequency was calculated by counting the number of SCRs during the exposure to each advertisement. To ensure consistency among different advertisements, SCR frequency was standardized as the number of SCRs per minute. SCR amplitude was calculated as the peak height of a SCR minus the value of SCR at the time when an SCR begins. All the physiological data was standardized as a z-score.

To evaluate the structural model with both self-reported and physiological data, the partial least squares (PLS) path modeling method (Hair et al. 2012) was used with SmartPLS 3.0 software (Ringle, Wende, and Becker 2015). As a component-based SEM technique, the PLS was considered more appropriate than the commonly used covariance-based SEM technique for this study for the following reasons:

1. This study is not attempting to test or confirm existing theories. The PLS path modeling method is more suitable for prediction-orientated research (Henseler, Ringle, and Sinkovics 2009).
2. This study involves physiological data, which are not normally distributed; PLS path modeling method has the advantage of not assuming normality (Hair et al. 2012).
3. Because of the use of psychophysiological measures, the sample size in this study is relatively small (i.e., 101 participants); PLS path modeling is able to validate a model with smaller sample size compared with other structural equation modeling techniques (Kline 2015).

Results

Sample Characteristics

Of the 101 participants, 58 were females and 46 were males. The largest age group was the 18–24 years old group (44.6%), followed by those aged 25–34 years (31.7%), 45–55 years (10.9 %), 35–44 years (8.9%), and the group older than 55 years (4%). Participants varied widely in terms of educational level with the majority holding a bachelor's degree (38.6%), high school (35.6%), master's degree (18.8%), doctoral degree (5.9%), and other (1.0%). Most of the participants (98%) had not seen the tourism commercials before. In most cases, respondents had not visited the destination in the advertisement (413 out of 606 cases). As the interest of the current research is in construct associations and not descriptive insights, we refrained from weighting the sample elements.

Table 1. Factor Loadings for Each Item.

Construct	Indicators	Loadings	Cronbach's Alpha (α)	Composite Reliability (ρ)	AVE
Pleasure (verbal)	Satisfied	0.861	0.89	0.916	0.687
	Happy	0.830			
	Pleased	0.849			
	Contended	0.722			
	Hopeful	0.765			
	Relax	0.790			
Arousal (verbal)	Aroused	0.762	0.877	0.906	0.616
	Wide Awake	0.817			
	Excited	0.796			
	Stimulated	0.750			
	Jittery	0.812			
	Frenzied	0.770			
Mood	Mood1	0.964	0.888	0.907	0.713
	Mood2	0.910			
	Mood3	0.770			
	Mood4	0.710			

Note: All loadings are significant at p <0.001.

Measurement Analysis

The PLS path model analysis demonstrated that all measures met the commonly suggested criteria for measurement model assessment (Henseler, Ringle, and Sinkovics 2009). To check convergent validity, the three latent variables that had multiple indicators were evaluated based on the average variance extracted (AVE). As can be seen in Table 1, all three constructs (i.e., verbal self-report pleasure, verbal self-report arousal and mood) were well above the minimum threshold of 0.50 (Henseler, Ringle, and Sinkovics 2009). Indicator reliability was evaluated by checking indicator loadings. All three constructs showed significant standardized loadings above 0.70 ($p < 0.01$). Additionally, the high Cronbach's alpha (α) and composite reliability (ρ) values (all greater than 0.80) also demonstrate good internal consistency.

Discriminant validity was assessed using the Fornell and Larcker (1981) criterion. This approach suggests that the value of the square root of AVE in each construct should be greater than other correlation values among constructs. As shown in Table 2 (the square root of AVE is indicated in bold on the diagonal of the table), all three constructs met this criterion. Based on these parameters, the reliability and validity of the latent variables is established.

Table 2. Correlation Matrix and Square Route of Latent Variable's Average Variance Extracted.

	A_{ad}[a]	A_{dp}[b]	Arousal (Verbal)	Pre-attitude[c]	Mood	Pleasure (Verbal)	VI[d]
A_{ad}[a]	na						
A_{dp}[b]	0.764	na					
Arousal (verbal)	0.624	0.540	**0.785**				
Pre-attitude[c]	0.269	0.285	0.403	na			
Mood	0.099	0.137	0.076	0.166	**0.845**		
Pleasure (verbal)	0.801	0.754	0.586	0.237	0.189	**0.804**	
VI[d]	0.751	0.828	0.535	0.331	0.085	0.735	na
Mean	4.791	5.020	4.211	5.260	6.042	4.958	4.470
SD	1.590	1.539	1.121	1.568	0.889	1.046	1.860

Note: The square root of three latent variable's average variance extracted appears in bold; na = not applicable (single item). a = A_{ad} (Attitude toward the advertisement); b = A_{dp} (Attitude toward the destination); c = Pre-attitude (Preexposure destination attitude); d = VI (Visit intention).

Evaluation of the Structural Model (Hypotheses Testing)

In this section, the results will be reported separately for the structural model with verbal self-report emotion measures, visual self-report emotion measures, and psychophysiological measures as independent variables. When examining the direct effects of emotional responses on A_{ad}, A_{dp}, and VI (hypotheses 1, 2, 3, and 6), as well as pleasure, arousal, and A_{ad}'s indirect effects on A_{dp} and VI (hypotheses 4, 5, and 7), the *t* values and significance levels were calculated by applying a nonparametric bootstrapping analysis (5,000 subsamples and 606 cases). This is the standard method to test the significance of PLS path modeling results (Henseler, Ringle, and Sinkovics 2009). The results of hypothesis testing with different emotion measures are displayed in Table 3.

Verbal self-report emotion measure. Figure 2 displays the outcome of the structural model test using verbal self-report emotion measures. The PLS path model estimation provided an R^2 value of 0.711 for A_{ad}, 0.639 for A_{dp}, and 0.727 for VI. In support of hypotheses 1a, 1b, and 2, we found that both pleasure and arousal have a significant positive impact on A_{ad}, with pleasure being more influential. We predicted that both pleasure and arousal would have a direct effect on A_{dp} (hypotheses 3a and 3b). The results showed that pleasure has a direct effect on A_{dp}; however, the direct effect of arousal on A_{dp} (hypothesis 3b) was not supported. Similarly, the direct effect of pleasure on VI received support (hypothesis 6a), but the direct impact of arousal on VI (hypothesis 6b) was not significant.

To test hypotheses 4, 5, and 7, we conducted a mediation analysis using a nonparametric bootstrapping procedure. In support of hypotheses 4a and 4b, we found that A_{ad} partially mediates the relationship between pleasure and $A_{dp,}$ and fully mediates the relationship between arousal and A_{dp}. Hypothesis 5, predicting that A_{dp} will mediate the effects of A_{ad} on VI, was supported. Moreover, in support of hypotheses 7a and 7b, A_{ad} and A_{dp} were found to partially mediate the effects of pleasure and fully mediate the effects of arousal on VI.

Visual self-report emotion measure. Figure 3 shows the outcome of the structural model test using visual self-report emotion measures. The PLS path model estimation provided an R^2 value of 0.640 for A_{ad}, 0.618 for A_{dp} and 0.715 for VI. Hypotheses 1a, 1b, and 2 received strong support when emotional responses were measured by visual self-report. Pleasure and arousal had a direct influence on A_{ad}, with pleasure dominating over arousal in predicting A_{ad}. In respect of hypotheses 3a and 3b, we found a direct influence of both pleasure and arousal on A_{dp}. Similarly, direct effects of both pleasure and arousal on VI were identified, which supported hypotheses 6a and 6b respectively.

In terms of indirect effects, we found that A_{ad} partially mediates the relationship between emotional responses (both pleasure and arousal) and A_{dp}, thereby supporting hypotheses hypotheses 4a and 4b. Hypothesis 5, which predicts that A_{dp} mediates the effects of A_{ad} on VI, received strong support. In support of hypotheses 7a and 7b, we found that A_{ad} and A_{dp} partially mediated the effects of pleasure and arousal on VI.

Psychophysiological emotion measure. Figure 4 illustrates the outcome of the structural model test using psychophysiological emotion measures. The PLS path model estimation provided an R^2 value of 0.121 for A_{ad}, 0.595 for A_{dp}, and 0.698 for VI when SCR frequency was used as the indicator of arousal level (Figure 4A). When SCR frequency was replaced by SCR amplitude, the R^2 values were 0.117, 0.595, and 0.697 for A_{ad}, A_{dp}, and VI, respectively (Figure 4B). We found a significant direct impact of pleasure on A_{ad} in both the SF model and the SA model[1], which supports hypothesis 1a although the effect was weaker than in the self-report models. Hypothesis 1b positing a direct effect of arousal on A_{ad} was not supported in either the SF or SA model. This result supports hypothesis 2 that pleasure has stronger power than arousal in predicting $A_{ad.}$ In respect of hypotheses 3a and 3b, we did not find significant direct effects of pleasure and arousal on A_{dp} in either the SF or the SA model. Similarly, the direct effects of pleasure and arousal on VI were not significant in either SF or SA models (hypotheses 6a and 6b).

Table 3. Results of Hypothesis Testing with Different Emotion Measures.

Hypothesis	Emotion Measures	Path Coefficient	*t* Value[a]	Supported
Hypothesis 1a	Verbal	0.709**	23.101	Yes
Pleasure → A_{ad}	Visual	0.611**	16.275	Yes
	Psychophysiological (SF)	0.194**	5.919	Yes
	Psychophysiological (SA)	0.200**	5.795	Yes
Hypothesis 1b	Verbal	0.200**	6.888	Yes
Arousal → A_{ad}	Visual	0.245**	6.185	Yes
	Psychophysiological (SF)	ns	1.652	No
	Psychophysiological (SA)	ns	0.366	No
Hypothesis 2	Verbal	na	na	Yes
Pleasure > Arousal → A_{ad}	Visual	na	na	Yes
	Psychophysiological (SF)	na	na	Yes
	Psychophysiological (SA)	na	na	Yes
Hypothesis 3a	Verbal	0.374**	6.069	Yes
Pleasure → A_{dp}	Visual	0.193**	3.108	Yes
	Psychophysiological (SF)	ns	1.334	No
	Psychophysiological (SA)	ns	1.172	No
Hypothesis 3b	Verbal	ns	0.938	No
Arousal → A_{dp}	Visual	0.099**	2.668	Yes
	Psychophysiological (SF)	ns	1.043	No
	Psychophysiological (SA)	ns	0.678	No
Hypothesis 4a	Verbal	0.295**	5.794	Yes
Pleasure → A_{ad} → A_{dp}	Visual	0.325**	7.092	Yes
	Psychophysiological (SF)	0.145**	5.655	Yes
	Psychophysiological (SA)	0.149**	5.527	Yes
Hypothesis 4b	Verbal	0.083**	5.018	Yes
Arousal → A_{ad} → A_{dp}	Visual	0.130**	5.517	Yes
	Psychophysiological (SF)	ns	1.655	No
	Psychophysiological (SA)	ns	0.367	No
Hypothesis 5	Verbal	0.250**	5.889	Yes
A_{ad} → A_{dp} → VI	Visual	0.358**	8.270	Yes
	Psychophysiological (SF)	0.601**	23.540	Yes
	Psychophysiological (SA)	0.599**	22.325	Yes
Hypothesis 6a	Verbal	0.255**	6.330	Yes
Pleasure → VI	Visual	0.098**	2.746	Yes
	Psychophysiological (SF)	ns	0.000	No
	Psychophysiological (SA)	ns	0.169	No
Hypothesis 6b	Verbal	ns	0.882	No
Arousal → VI	Visual	0.116**	3.590	Yes
	Psychophysiological (SF)	ns	1.386	No
	Psychophysiological (SA)	ns	0.279	No
Hypothesis 7a	Verbal	0.403**	12.260	Yes
Pleasure → A_{ad} → A_{dp} → VI	Visual	0.349**	10.342	Yes
	Psychophysiological (SF)	0.088**	3.595	Yes
	Psychophysiological (SA)	0.092**	3.338	Yes
Hypothesis 7b	Verbal	0.070**	3.234	Yes
Arousal → A_{ad} → A_{dp} → VI	Visual	0.154**	5.165	Yes
	Psychophysiological (SF)	ns	0.542	No
	Psychophysiological (SA)	ns	0.155	No

Note: A_{ad} = Attitude toward the advertisement; A_{dp} = Attitude toward the destination; VI = Visit intention. ns = not significant; na = not applicable. **p <.01 (two-sided test; number of observations = 606). To calculate the indirect effect of a variable X on attitude toward the destination, we multiply the regression coefficient for that variable in model 1 (attitude toward the advertisement) with the regression coefficient for attitude toward the advertisement in model 2 (attitude toward the destination). Same rule applies to the calculation of the indirect effect of a variable X on visit intention.
[a]We apply a nonparametric bootstrapping route to test the significance of the partial least squares path modeling results.

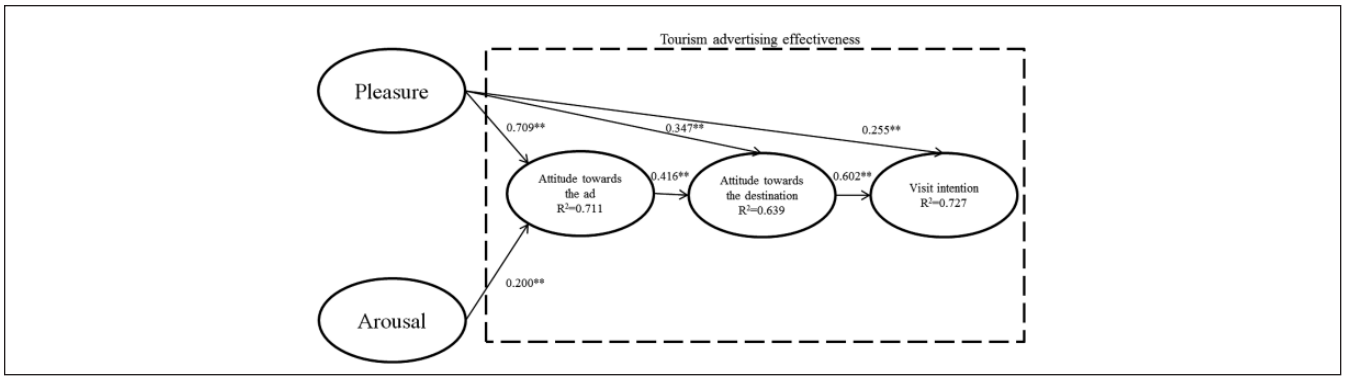

Figure 2. Partial least squares results of the structural model with verbal self-report measures.
Note: **p <.01; for simplicity, nonsignificant paths have been removed.

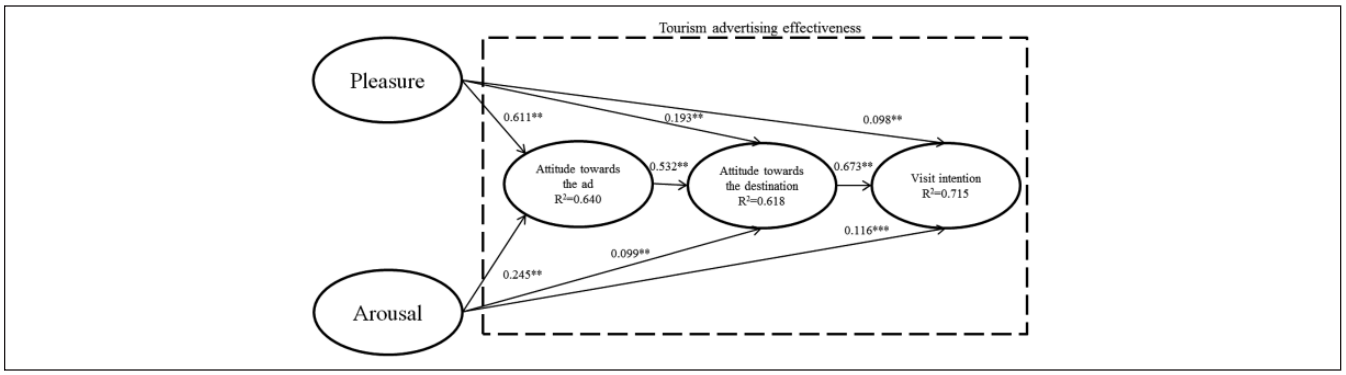

Figure 3. Partial least squares results of the structural model with visual self-report measures.
Notes: **p <.01; for simplicity, nonsignificant paths have been removed.

The mediation analysis found an indirect effect of pleasure on A_{dp} and VI in both SF and SA models, which supports hypotheses 4a and 7a. Hypotheses 4b and 7b were not supported as we did not find any effect of arousal on A_{dp} and VI in either the SF or SA model. In support of hypothesis 5, we found an indirect effect of A_{ad} on VI via A_{dp} in both the SF and SA models.

In summary, the results of this study demonstrate that the relationship between pleasure, when measured physiologically, and tourism advertising effectiveness was much weaker than when self-report measures were used. The participants' physiological arousal that occurred in response to the advertisement had no significant influence on their post-viewing evaluative responses, despite their self-report measures indicating a significant influence.

Discussion and Conclusion

Selecting an appropriate method to measure emotion is key to the understanding of how ad-evoked emotional responses are related with other advertising evaluative responses such as attitude and behavioral intentions. This study investigates if the relationship between ad-evoked emotion and tourism advertising effectiveness (i.e., A_{ad}, A_{dp}, and VI) will differ based on different emotion measurements. This study reflects an increased awareness and interest in the use of more objective techniques to measure consumers' emotional responses. This section reports the major findings of this study and the interpretations first. This is followed by conclusions, implications for tourism advertising, limitations of this study, and recommendations for future research.

The results revealed that ad-evoked emotional responses measured by the two self-report methods yielded relatively similar effects on tourism advertising outcome variables. Both verbally and visually self-reported emotional responses have significant positive impacts on A_{ad}, with pleasure being a stronger predictor than arousal. This result supports previous findings that the more positive the emotions evoked by an advertisement, the more likely a consumer will be to like the advertisement itself (Edell and Burke 1987; Pieters and de Klerk-Warmerdam 1996).

Verbally self-reported pleasure, visually self-reported pleasure, and visually self-reported arousal were found to exert significant direct effects on A_{dp} and VI; however, the direct impacts of verbally self-reported arousal on A_{dp} and VI were not supported. This result may explain some of the

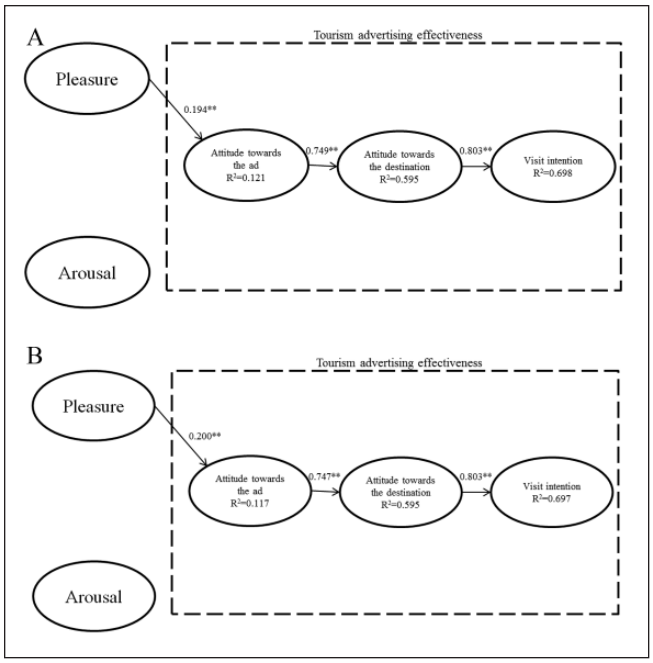

Figure 4. Partial least squares results of the structural model with psychophysiological measures. (A) SF model; (B) SA model. Note: **$p<.01$; for simplicity, nonsignificant paths have been removed. SF model refers to the model with SCR frequency as the indicator of physiological arousal; SA model refers to structural model with SCR amplitude as the indicator of physiological arousal.

inconsistent findings generated by earlier studies. For example, Morris et al. (2002) found a direct impact of emotional responses on brand attitude and intent to buy, with emotions being measured by SAM; however, the direct effects of emotions on attitude toward the brand (Ab) or purchase intentions did not exist in other studies (e.g., Batra and Ray 1986) when emotions were measured by verbal self-report scales. Instead, emotion only exerts indirect influence on attitude toward brand (via A_{ad}) and purchase intention (via A_{ad} and A_b). Poels and Dewitte (2006) noted that visual self-report may yield a stronger direct effect on other measures of advertising effectiveness such as brand attitude and purchase intentions compared to verbal self-report. One possible explanation is that "studies reporting verbal self-report of emotional reactions often include a similar verbal measure of A_{ad}, making A_{ad} a confounding variable instead of a variable that provides additional information" (Poels and Dewitte 2006, 34). Therefore, A_{ad} often mediates all the other effects of verbally self-reported emotional responses.

Li et al. (2016) has demonstrated the advantages of psychophysiological measures over self-report measures of emotions when attempting to capture tourism consumers' emotions. The current study moves beyond the methodological debate and examines how the influence of ad-evoked emotions on postviewing evaluative responses may vary based on different approaches to measuring emotions. Specifically, the results of this study reveal that physiological pleasure level has a significant positive impact on $A_{ad,}$ although the effect was much weaker compared to that of self-reported pleasure. The physiological pleasure level exerts an indirect effect on A_{dp} via A_{ad}. Similarly, the indirect effect of physiological pleasure on VI was mediated by A_{ad} and A_{dp}. This result is encouraging and different from the results generated by Derbaix (1995) who found neither direct nor indirect effects of facial expression on attitude toward the advertisement and attitude toward brand by using a Facial Action Coding System (FACS). The significant results yielded by this study may empirically confirm the superiority of facial electromyography over the manually coded FACS. As noted above (in the literature review section), facial electromyography is able to detect an individual's subtle facial muscle activities that are not perceptible using FACS.

In this study, both SCR frequency and SCR amplitude were used as the indicators of physiological arousal. However, the effects of physiological arousal on A_{ad}, A_{dp}, and VI were not found to be significant. This result is partially consistent with previous findings that emotional arousal (indexed by skin conductance level) that occurs when viewing an image of a product did not have a significant impact on purchase intention. In this study, images of seven product categories were shown to participants: detergent, chocolate, coffee, chips, orange juice, chocolate cookies, and toothpaste (Ravaja and Somervuori 2013). The current study has extended previous work and found that physiological arousal is not correlated with purchase intention in the context of tourism (Nawijn et al. 2013). Additionally, this study extended previous research by including more measures of advertising effectiveness and has demonstrated that physiological arousal did not have a significant impact on either purchase (visit) intention or tourism consumers' attitudes (i.e., A_{ad} and A_{dp}).

Recent research conducted by J. J. Kim and Fesenmaier (2015) supports the use of psychophysiological measures in natural settings. They found that two tourists' EDA (electrodermal activity or SCR) patterns were consistent with their self-reported tour experiences and concluded that measuring travelers' emotions in real time provides valuable information for researching, designing and managing tourism experiences. The current study suggests that measures of emotional valence, as well as measures of arousal, are required in order to obtain a more comprehensive understanding of tourism consumers' emotional responses.

Interpretations of the Findings

Several explanations for the different effects generated by physiological emotional responses and self-report emotional responses are possible. First, while a large number of studies have demonstrated that self-report measures are less accurate than psychophysiological techniques in terms of measuring emotions (e.g., Micu and Plummer 2010; Hazlett and Hazlett

1999), self-report emotion methods could be more effective in predicting attitude or purchase intention as self-reported emotional responses undoubtedly reflect the sequential combination of feelings and judgments (Derbaix 1995; Micu and Plummer 2010). These judgments, along with postviewing responses such as attitude toward the destination, are essentially one type of cognitive interpretation of the advertisement or destination. The similar nature of self-report emotions and postviewing judgments may result in the strong correlations identified in this study.

From a measurement perspective, the dependent variables are measured by self-report items, which register the same dimensions of common underlying constructs as verbal/visual self-report emotion measures. Importantly, self-report scales, regardless of emotions or postviewing judgments, are static and reflect the "output of a conscious state of a message recipient at a given moment in time" (Potter and Bolls 2012, 166). However, the measurement of physiological responses is qualitatively different and represents a dynamic interaction between consumers' psychological states and external stimuli. A shared method variance between self-reported emotions and measures of advertising effectiveness may partially explain the stronger impact of self-report emotional responses.

A third explanation is the potential effects of postexposure attitudes on self-reported emotions. In particular, self-reported emotion data were collected after the entire advertisement when the participant's overall attitude toward the advertisement or destination may already have been shaped. Those developed attitudes may in turn affect their perceived emotional responses to the advertisement. As noted by Ciuk, Troy, and Jones (2015), self-reported emotions may be rationalized by consumers' postviewing judgments. Psychophysiological techniques, on the other hand, measure purer spontaneous emotions provoked in real time while the participant is being exposed to a TV commercial. This is less susceptible to postviewing evaluations.

Implications for Tourism Advertising

The results of the current study provide key insights into tourism advertising research and hold implications for tourism marketing communications, in particular the effective design of tourism advertisements. For scholarship, both self-report and psychophysiological measures have demonstrated the importance of emotions (i.e., pleasure) in affecting consumers' subsequent attitudes and behavioral intentions. These results have confirmed Poels and Dewitte's (2006) notion that emotions elicited by advertisements are important for subsequent cognitive and behavioral responses. This finding also has filled a gap in the tourism advertising literature that lacks inquiry on consumers' emotions and has shed light on how tourism consumers respond emotionally during media exposure.

From a practical perspective, the results of this study suggest that tourism destination advertisers should choose appropriate advertising appeals to evoke potential tourists' positive emotions. Evoking arousal, however, is less important when designing tourism advertisements based on the findings of this study.

Additionally, consistent with previous studies (Batra and Ray 1986; Geuens and Pelsmacker 1998), emotions (i.e., pleasure) evoked by tourism advertisements do not influence tourism consumers' behavioral intentions directly. Instead, attitude toward the advertisement and destination mediates the impacts of positive emotions on the outcome variable—consumers' intentions to visit. Thus, tourism advertisers should recognize the importance of attitude as one of the intermediaries of information for the subjective evaluation of behavioral intention, and tourism practitioners could enhance potential tourists' impressions of the destinations through various media channels such as printing advertising, brochures, radios, videos, and social media.

Facial EMG can also be used by tourism advertisers in the copy testing to evaluate the effectiveness of advertisements, especially continuous stimuli such as those seen in broadcast media. The adoption of facial EMG enables tourism practitioners to visualize consumers' moment-to-moment emotional responses over the course of the stimuli exposure and identify the place where emotional peaks occur. Accordingly, tourism advertisers could display the destination brand around the peak moment to enhance consumers' positive feelings associated with the destination brand, which leads to better attitude toward or memory of the brand (Hazlett and Hazlett 1999).

Limitations and Future Research

This study has certain limitations. First, the destinations advertised in the tourism TV commercials are all well-known destinations. Phelps and Thorson (1991) found that the effects of attitude toward the ad on attitude toward the brand were stronger for novel brands than for familiar brands. Future research could use tourism TV commercials that advertise both familiar destinations and unfamiliar destinations, and examine how the effect of A_{ad} on A_{dp} for novel brands (destination) may differ from that for familiar brands (destinations). Second, this study was conducted in a controlled laboratory instead of a more natural setting; therefore participants' responses to the tourism advertisements may not be the same as their responses at home. Future research could replicate this study in a more natural setting and examine the effects of emotional responses on tourism advertising effectiveness. Third, because of the difficulties in recruiting participants for research using psychophysiological measures, approximately 75% of the samples in this study are university students. The advertising literature has indicated the effects of age on advertising effectiveness, with older groups being more susceptible to persuasion than younger groups (McKay-Nesbitt et al. 2011; Goodrich 2013), due to age-related processing

differences (Goodrich 2013). Future research could balance the sample and further examine the effects of age on advertising effectiveness in the context of tourism.

Future research could further examine the influence of ad-evoked emotions in relation to other measures of tourism advertising effectiveness (e.g., recall level and brand choice) in various forms of tourism advertising (e.g., print advertising and radio advertisements). Although a significant relationship was not found between arousal (indexed by skin conductance data) and three measures of advertising effectiveness (i.e., A_{ad}, A_{dp}, and VI), it does not necessarily follow that physiological arousal is not useful in predicting consumers' postviewing evaluative responses. As "an excellent operational definition of arousal" (Ravaja 2004, 212), skin conductance level has been demonstrated to be a reliable indicator of memory (A. Lang, Dhillon, and Dong 1995). That is, the more arousing an advertising message is, the more likely this message will be remembered by the consumers. Future research could examine if the effects of physiological arousal on recall levels hold true in the context of tourism advertising.

Conclusions

While the importance of emotional response in advertising has been widely discussed in the literature, ad-evoked emotion has not received sufficient attention in the context of tourism, especially in destination advertisements. Theoretically, this study is one of the first to examine the relationship between ad-evoked emotion and postviewing attitudes and behavioral intentions in the context of tourism advertising. Methodologically, the current study has addressed limitations often associated with self-report methods by adopting psychophysiological techniques to measure emotions evoked by destination advertisements. The results of this study contribute to extending our understanding of emotional response by investigating the influence of physiological emotions on other measures of tourism advertising effectiveness. In particular, the results from this study show that the effects of physiological pleasure on tourism advertising effectiveness are weaker than that of self-reported pleasure. Physiological arousal was found not to be significantly related with postviewing advertising responses.

The results of this study do not necessarily imply that ad-evoked emotional response is not important in consumers' mental processing of a tourism advertisement. For example, this study establishes a significant relationship between physiological pleasure and postexposure judgments that expands on the earlier study of Derbaix (1995) who measured emotions by FACS but found neither direct nor indirect effects of facial expression on other advertising effects. However, our results cast doubt on the possible overestimation of the relations between ad-evoked emotion and tourism advertising effectiveness reported by most of the previous studies using self-report measures of emotion.

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Note

1. SF model refers to the model with SCR frequency as the indicator of physiological arousal; SA model refers to structural model with SCR amplitude as the indicator of physiological arousal.

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