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Disentangling Effects of Subjective and Objective Music Characteristics in Advertising

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Abstract

Purpose:

Drawing on information processing theory, we study how consumers' liking of background music in advertising affects their purchase intention, and explore the roles of positive brand attitudes, music mode, and music tempo within such a relationship.

Design/methodology/approach:

We created several radio advertisements that promote two fictitious products: an electric car (EcoCar) and a reusable coffee mug (EcoMug). We study the role of music in these advertisements and examine how it affects purchase intention across multiple experiments.

Findings:

We confirm the prediction that positive brand attitudes mediate the relationship between music liking and purchase intention. We also show that music moderates such an indirect relationship because major mode music strengthens the effect of positive brand attitudes on purchase intention. Additionally, we find that major mode music with a fast tempo can further strengthen the effect of positive brand attitudes on purchase intention. As a result, the indirect effect of music liking upon purchase intention via positive brand attitudes will be moderated jointly by the music mode and the music tempo.

Originality:

Limited scholarship explores how the subjective characteristics of music affect consumer buying behaviour in conjunction with the objective characteristics of music. The current research addresses this gap by investigating how music liking (a subjective characteristic of music) and music mode and tempo (objective characteristics of music) affect consumer buying behaviour.

Keywords: Information processing theory; Music liking; Music mode; Music Tempo; Brand attitudes

Introduction

Marketers have widely used music to influence consumer behaviour. A content analysis study by Allan (2008) indicated that 94% of prime-time TV commercials in the United States used music, and suggested that this figure was rising. Advertising agencies and client companies pay sizeable fees for the background music that they use in commercials. For example, Microsoft paid the Rolling Stones $3 million to use their song "Start Me Up" as the theme to launch Windows 95 (Naughton, 1999). A more recent study by Kupfer (2020) shows that an international brand spends an average of $10-20 million annually on music-related rights and licenses. In terms of the effectiveness of using background music within marketing activities, research shows that advertising campaigns that involve music are 27% more likely to report substantial business effects than those that do not involve music (Binet et al., 2013). Recent studies in the *European Journal of Marketing* also provide evidence that indirectly bears on this concern. For example, Davtyan et al. (2020) find a positive effect of brand placement repetition in music videos on consumers' memory, brand attitude, and behavioural intention. In 2019, the journal devoted a special issue to assessing the relationship between music and marketing in the digital age (Sinclair and Saren, 2019). The significance of music in marketing has clearly stimulated significant research.

The previous literature highlighted two characteristics of music – subjective (e.g., familiarity, etc.) and objective (e.g., volume, lyrics, etc.) – that can separately affect consumer buying behaviour (see Table 1). Yet, few researchers ask whether, and if so how, the two

characteristics of music can jointly influence the effectiveness of marketing communications in stimulating purchase intention. This is a surprising research gap, particularly because a piece of music (used in advertising) has both subjective and objective characteristics. We do not suggest that researchers have not considered this matter at all. Instead, we note that they have paid limited attention to examining how the specific mix of subjective and objective characteristics can affect purchase intention (e.g., Abolhasani et al., 2017; Hahn and Hwang, 1999). To address these shortcomings, we draw on information processing theory to develop a conceptual framework (See Figure 1) that explains how consumers' liking of background music in an advertisement affects their purchase intention, and explores the roles of positive brand attitudes, music mode, and music tempo within such a relationship.

"Insert Figure 1 Here"

Information processing theory explains how certain advertising stimuli affect how consumers process brand information (MacInnis and Jaworski, 1989). Music liking is one of the most widely-examined subjective characteristics of music (see Table 1). Researchers have shown that consumers' liking of the background music in an advertisement can be viewed as an important stimulus that affects their buying behaviour (e.g., Vermeulen and Beukeboom, 2016). Nevertheless, consumers do not purchase a firm's products simply because they like the music used in an advertisement. According to information processing theory, the advertising stimulus triggers a brand attitude formation process, thereby affecting consumers' responses (MacInnis and Jaworski, 1989). In line with this theoretical perspective, we assume an indirect effect whereby music liking can stimulate the development of consumers' favourable attitudes towards the firm's brand, which in turn affects their purchase intention. Prior studies partially support this assumption and highlight the association between music liking and positive brand attitudes (Bozman et al., 1994; Mittal, 2015), as well as the connection between positive brand

attitudes and consumer purchase intention (Davtyan et al., 2020; Hartmann and Apaolaza-Ibáñez, 2012). Yet, adequate empirical tests of this assumption remain lacking.

Furthermore, we also argue that the two objective characteristics of music – music mode and music tempo – can alter the influence of music liking on consumer buying behaviour by affecting the strength of the relationship between positive brand attitudes and purchase intention. This consideration also builds on information processing theory, which considers emotional stimulus to be an important factor affecting the brand attitude formation process (Ching et al., 2013; Priluck and Till, 2004). Music mode is a scale with distinct melodic characteristics, while music tempo is the speed at which the musical passage progresses (Kellaris and Kent, 1991; Oakes and North, 2006). Marketers often apply various music modes and tempos to manipulate consumers' emotions as a way to affect their responses to advertised brands (Abolhasani et al., 2017; Kellaris and Kent, 1991). This suggests that, in situations involving different types of music mode and tempo, the influence of positive brand attitudes on consumer purchase intention may vary. Collectively, the subjective characteristics (i.e., music liking) and objective characteristics (i.e., music mode and tempo) of music in advertisements can jointly affect consumer buying behaviour in a complex manner. Such insights, while critical to managers charged with leveraging the use of music in advertising to enhance consumer purchase intention, remain underexamined.

To test and validate our framework, we create several radio advertisements promoting two fictitious products: an electric car (EcoCar) and a reusable coffee mug (EcoMug). We study the role of music in these advertisements and examine how it affects purchase intention across multiple experiments. In general, our research provides empirical evidence concerning the assumption of the indirect effect of music liking upon purchase intention via positive brand attitudes. We also find that music mode can, both independently or in conjunction with music tempo, moderate this indirect effect by influencing the strength of the relationship between

positive brand attitudes and purchase intention. In doing so, we advance the literature on music and marketing communication that focuses primarily on examining how the subjective and objective characteristics of music can separately affect consumer behaviour (Table 1). We instead highlight how these two characteristics of advertising music can work in a complex way to affect purchase intention. Furthermore, we advance the applicability of information processing theory (MacInnis and Jaworski, 1989; Thompson and Hamilton, 2006) by highlighting how music in advertisements can be considered an important stimulus and boundary condition that affects the brand attitude formation process, which in turn impacts consumer buying behaviour.

Theory and Hypotheses

Music in Marketing

We can analyse the previous research on the use of music in marketing in two dimensions (Table 1). Firstly, the characteristics of music reflect the fundamental elements of music structure, which can be distinguished into objective (e.g., mode, tempo, genre, etc.) and subjective (e.g., complexity, mood, liking, etc.) properties. Secondly, we investigate the role of music in two predominant areas of marketing, which can be broadly categorised as marketing communication (e.g., advertising, sponsorship, etc.) or "in-store" background (e.g., background music in a supermarket). These two dimensions give rise to four different streams of research literature[1].

"Insert Table 1 Here"

The first stream of literature investigates how the objective characteristics of music in marketing communications affect consumers' perceptions and evaluation (e.g., Alpert et al.,

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[1] We acknowledge that these four research dimensions are not mutually exclusive, but may be interrelated in important and complex ways. In fact, our research fundamentally addresses the question of how the objective and subjective characteristics of music interact within marketing communication. Nevertheless, we use these four dimensions independently to provide a clearer review of the previous literature on this field.

2005; Kellaris and Kent, 1991; Oakes and North, 2006). For example, Kellaris and Kent (1993) study consumer responses to music tempo and texture in marketing communication. Anisimova et al. (2014) find that a close fit between the lyrics and product/brand-related message can enhance consumers' emotions and identification of the products and brand. Guido et al. (2016) show that background music that ends abruptly distracts consumers' attention and reduces their memory of both the products and the messages. The second literature stream focuses on understanding the subjective characteristics of music in marketing communication and their influence on consumer attitudes. For example, Oakes (2007) states that disliked background music may cause valence incongruity if it undermines advertising that seeks to elicit positive brand attitudes. Chou and Lien (2014) find that old songs can generate positive emotions and more effective advertising only in the case of more familiar songs and more relevant lyrics. Radio advertising research by Lavack et al. (2008) shows that consumers associate a complicated piece of music with quality and sophistication.

The third literature stream investigates the objective characteristics of in-store background music and their impact on consumer responses (e.g., Milliman, 1982; North et al., 2000). For example, Caldwell and Hibbert (2002) studied how music tempo affected consumer behaviour in a restaurant. Morrison et al. (2011) show that music played at a high volume can significantly impact shoppers' emotions and satisfaction levels. Knoferle et al. (2012) explored the effects of different music modes and tempos on sales. North and Hargreaves (1998) found that different musical styles had different effects on the perceived characteristics of a cafeteria, and that the subjects were prepared to pay the most for the food items on sale therein when classical music was playing. The fourth literature stream explores the influence of the subjective characteristics of music on consumer behaviour in terms of creating a favourable/unfavourable in-store atmosphere (e.g., Mattila and Wirtz, 2001; North and Hargreaves, 1996). To illustrate, Dubé et al. (1995) found music-induced pleasure and the

arousal of consumers' desires in the context of bank services' buyer-seller interactions, while Andersson et al. (2012) examined the effects of the presence or absence of music in a service store and found that consumers spent more time and money in the store in the presence of music compared to in its absence.

In these four research streams (Table 1), researchers tend to consider music's subjective and objective characteristics separately when examining the effects of music on consumer behaviour. However, such an approach ignores the complex nature of the consumer experience when viewing/listening to an advertisement involving music. In an actual advertisement accompanied by a piece of music, these characteristics of music are inseparable. Some researchers examine both characteristics of music together in the same study. For example, Hahn and Hwang (1999) examine the effect of music tempo (objective) and familiarity (subjective) on consumers' message processing in TV advertising. Abolhasani et al. (2017), in their netnography study, explore the effects of music liking (subjective) and genre (objective) on consumers' affective responses to advertising messages. These attempts to examine the combined influence of these subjective and objective characteristics of music are important because they jointly influence consumers' perceptions of advertisements' content. The current research attempts to extend such efforts by investigating how the subjective (i.e., music liking) and objective characteristics (i.e., music mode and tempo) of music in an advertisement can work jointly in a complex way to affect the purchase intention. We will develop hypotheses to specify their relationships in the following sections.

Brand Attitude and Music Processing within Advertising

Marketers can incorporate certain elements into an advertisement to affect consumers' information processing and, subsequently, their purchase intention. Music liking in the context of advertising is defined as the degree to which a piece of music is liked by consumers (Oakes, 2007). As the prior work on information processing theory shows, a certain stimulus can affect

consumers' processing of information within an advertisement (MacInnis and Jaworski, 1989). Music appears to be an important stimulus in an advertisement. As the previous work shows (Abolhasani et al., 2017; Bozman et al., 1994), consumers are more likely to respond positively to advertisements involving liked music. In addition, the prior research on advertising information processing often suggests that consumer purchase intention commonly represents the ultimate positive response (Frias et al., 2008). These rationales, combined, provide the underlying logic related to music's influence on purchase intention. This conclusion is unsurprising and many previous studies support it (e.g., Mittal, 2015; Vermeulen and Beukeboom, 2016).

This research conceptualises positive brand attitudes as a critical intermediate mechanism that connects music liking with purchase intention (see Figure 1). We define positive brand attitudes as favourable personal evaluation, emotional feelings, and behavioural tendencies that individuals display toward a firm's brand (Davtyan et al., 2020). This conceptualisation concerning the mediating role of positive brand attitudes in our framework also builds on information processing theory, according to which one of the central goals of advertising is to promote positive brand attitudes (MacInnis and Jaworski, 1989). In terms of empirical evidence, the prior work on music within advertising has already examined the relationship between music liking and positive brand attitudes. For example, Simpkins and Smith (1974) revealed how using a disliked musical genre (country music) in advertising resulted in significantly less positive brand attitudes compared to using a liked musical genre (rock music). The rationale behind such a relationship is that individuals may prefer certain music genres over other genres or styles, which may affect the extent to which they like or dislike various pieces of music. A liked piece of music within advertising may create associations with a consumer's past, emotion-laden experiences. The positive feelings that liked advertising music create then transfer to the advertised brand. At the same time, the link

between brand attitude and purchase intention is also well-established in the marketing literature (e.g., Davtyan et al., 2020; Hartmann and Apaolaza-Ibáñez, 2012). Consumers' brand attitude can directly affect their perceived value of the brand. Purchase intention is a motivational state among consumers, and appears to be a consequence of their evaluation of the brand (Davtyan et al., 2020). When consumers have a positive attitude towards the advertised brand, they are more likely to purchase the firm's products. Information processing theory supports these rationales. According to the theory, positive brand attitudes involve consumers' attitudinal responses to advertising that represent important outcomes of the brand attitude formation process (MacInnis and Jaworski, 1989), which can affect consumer purchase intention. Combining the theoretical perspective of information processing theory with the previous research findings, we can conclude that consumers' liking of music in advertisements can stimulate the development of positive brand attitudes, which in turn affects their purchase intention. In other words, the effect of music liking and purchase intention can be indirect in nature.

Hypothesis 1: Positive brand attitudes mediate the relationship between music liking and purchase intention.[2]

The Roles of Music Mode and Tempo

We conceptualise music mode and tempo as moderators in our framework by drawing on information processing theory. The music mode refers to a type of musical scale, coupled with a set of characteristic melodic behaviour, which is composed in major and minor modes or keys that can produce strong but very different feelings and emotional responses in the listeners (Alpert et al., 2005; Kellaris and Kent, 1991). Music tempo refers to the speed at which

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[2] Since the "music liking-positive brand attitude" and "positive brand attitude-purchase intention" relationships have been widely examined and verified, we did not consider that the test results (the mediation role of a positive brand attitude) provide a significant contribution to the relevant literature concerning music and marketing communication. The purpose of formalising this hypothesis is to facilitate the flow of the article, as it may be easier for readers to understand the relationship among music liking, positive brand attitudes and purchase intention. We thank a reviewer for pointing out this limitation.

the musical passage progresses. It is considered low when the tempo is less than 72bpm, and fast which the tempo is over 94bpm (Milliman, 1982; Oakes, 2003). According to information processing theory, analysing the brand attitude formation process in relation to advertisements requires a consideration of the emotional stimulus as the contingency factor (Ching et al., 2013; Priluck and Till, 2004). Many studies have investigated music mode and tempo due to their role in influencing consumers' emotions and responses regarding advertised content (e.g., Alpert et al., 2005; Oakes and North, 2006). We, therefore, consider these two objective characteristics of music as contingency factors in our framework. We will develop detailed arguments about their relationship, as our framework indicates (see Figure 1).

When consumers like the music used in an advertisement, according to information processing theory (MacInnis and Jaworski, 1989), they are more likely to formulate positive brand attitudes during the brand attitude formation process, and positive brand attitudes will lead to purchase intention (Davtyan et al., 2020; Hartmann and Apaolaza-Ibáñez, 2012). If the music used in such an advertisement is composed in the major mode, previous research suggests that consumers are more likely to develop positive emotions (Juslin and Sloboda, 2011; Trochidis and Bigand, 2013). We expect the music mode to serve as a critical contingency factor for this indirect relationship by amplifying or suppressing the effect of positive brand attitudes on purchase intention. Previous studies have shown that the emotions that music produces are not merely variable subjective experiences (Juslin and Laukka, 2003), but appear to be highly consistent between listeners (Juslin and Laukka, 2003), irrespective of the listeners' musical background and the experimental session. Music mode can elicit positive or negative emotions about the advertised brand as a peripheral cue. More specifically, major mode music is often associated with expressions such as happiness/joy, grace, serenity, and solemnity. In contrast, music composed in the minor mode is often associated with sadness, tension, disgust, and anger (Juslin and Sloboda, 2011). When consumers have a favourable

attitude towards a firm's brand, using major mode music in advertisements is more likely to reinforce the effects resulting from positive brand attitudes. Such reinforcement enhances the influence of positive brand attitudes on customers' willingness to purchase a firm's products. Combining the proposition concerning the indirect relationship, we suggest that the relative importance of positive brand attitudes in leveraging music liking into an enhanced purchase intention should be higher when major mode music plays in an advertisement:

> *Hypothesis 2: As music mode strengthens the relationship between positive brand attitudes and purchase intention such that the relationship is stronger for major mode music, the music mode will moderate the indirect effect of music liking upon purchase intention via positive brand attitudes.*

Our logic leads to hypothesis 2, assuming that music mode, as an emotional stimulus, can enhance the effect of positive brand attitudes and purchase intention. We now suggest that music tempo also serves as a source of contingency for the relationship between positive brand attitudes and purchase intention, so that music mode and tempo can work jointly to affect the strength of such an association. This is because mode and tempo are two musical parameters that constitute the inherent properties of musical structure, which affects listeners' emotions (Fernández-Sotos et al., 2016). Many studies assess the effects of music tempo, often combined with music mode, in evoking listeners' affective reactions and eliciting various feelings (e.g., Husain et al., 2002; Trochidis and Bigand, 2013). In this research, we argue that fast tempo music can enhance the moderating effects of the major music mode on the relationship between positive brand attitudes and purchase intention.

In the past, researchers have linked fast tempo music with a positive hedonic value (Holbrook and Anand, 1990; Hunter et al., 2010). We argue that the use of fast tempo can intensify the effect of major mode music in stimulating consumers' positive perceptions of the advertised brand. To illustrate, a study by Trochidis and Bigand (2013) investigates the effects of mode and tempo on emotional ratings and EEG responses (using an electroencephalogram to record brain activity) and reports that, beyond the effect of music mode, music tempo

modulated the emotional ratings, with a faster tempo evoking the emotions of anger and happiness as opposed to slow tempo, which induced a stronger feeling of sadness and serenity. This means that major mode music with a fast tempo can further evoke various positive emotions (e.g., inspiration). According to information processing theory (MacInnis and Jaworski, 1989; Thompson and Hamilton, 2006), background music in the major mode with a fast tempo in an advertisement can affect the brand attitude formation process and help to boost the positive emotional appeal, thereby reinforcing the effect of positive brand attitudes. Consumers' immediate positive emotions arising from viewing/listening to music in an advertisement may determine their response to the advertised brand, which in turn affects their willingness to purchase the firm's products. Combining the above discussions, in the indirect effect starting from music liking through to positive brand attitudes to purchase intention, the presence of major mode music with a fast tempo in an advertisement can further strengthen the relationship between positive brand attitudes and purchase intention. In this sense, fast tempo major mode music in an advert often seems arousing and pleasant (Juslin and Sloboda, 2011). Consumers' positive emotions arising from music complement the effect of their positive brand attitudes by encouraging their purchase intention:

> *Hypothesis 3: As music mode and tempo jointly strengthen the relationship between positive brand attitudes and purchase intention such that the relationship is stronger at major mode music with fast tempo, the indirect effect of music liking upon purchase intention via positive brand attitudes will be moderated jointly by music mode and music tempo.*

Overview of the Studies

Research Context

We select a "green product advertisement" as the dominant theme to develop these experiments for the following reasons. First, the context of an advertisement promoting green products often places great emphasis on educating the consumer about the product's value to promote environmental sustainability and the firm's efforts to support this objective (Hartmann

and Apaolaza-Ibáñez, 2009; Rivera-Camino, 2007). Thus, the central focus of such an advertisement is an attempt to enhance consumers' favourable responses to the advertised brand. Second, green advertising often focuses on triggering the respondents' positive feelings or attitudes towards the firm's brand (Fowler III and Close, 2012). Music, as part of an advertisement's surface features and heuristic cues, plays a critical role in subconsciously stimulating the respondents' emotions during brand communication (Müllensiefen, 2020).[3] Together, the use of music can have a strong influence on the effectiveness of green advertising. The present research explores the influence of music on purchase intention, and green product advertisement offers a rich context in which to investigate the effectiveness of the music played during advertisements.

Stimuli Development

We created two radio advertisements to promote two fictitious green products for the present research: an electric car (EcoCar) and a reusable coffee mug (EcoMug). These two advertisements were recorded in a studio, using professional recording facilities and a professional male voiceover artist. The advertisements for both products had the same structure and length, stating specific reasons for the need to purchase the product, and also presented an environmentally-driven selling argument based on rational grounds, followed by a slogan at the end (see Appendix 2). We hired composers from a professional advertising music company, who have created advertising music for many well-known brands (e.g., Aldi, Mango, Zara, Samsung, and Amazon, to name but a few), to compose various pieces of music for our

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[3] Although one might argue that green product advertisement triggers both affective (emotional) and cognitive (rational) processing, the prevalent view in the current psychological and advertising research literature (Heath, 2012) is that affective processing dominates both in terms of frequency and effectiveness (Müllensiefen, 2020). In fact, there is a school of thought that advertising generally should be less concerned with attracting attention, making arguments, and conveying messages, and more concerned with making an implicit, unconscious impact. Heath (2012) points out that, while processing consciously, consumers can build up a cognitive defence against persuasive communication messages.

research. The composers were briefed on the requirements of the musical compositions. They were also able to compose the required musical pieces by manipulating the two objective characteristics of music (tempo and mode) only and creating different music pieces that reflected the intended emotions – "Inspiring", "Sad", and "Afraid" (see Appendix 3). The "Inspiring" piece was in the major mode, while the "Sad" and "Afraid" pieces were in the minor mode. The company created a 70bpm and 100 bmp version of each of these three pieces of music to represent slow and fast tempo music, respectively (Milliman, 1982; Oakes, 2003). These pieces of music were superimposed onto the two advertisements (EcoCar and EcoMug), which were tested to establish an appropriate volume level to facilitate a comfortable listening experience and ensure that the background music did not impede the voiceover under the different conditions.

We conducted six studies to examine our theoretical framework: one pilot study and five main studies. Following Berinsky et al. (2012) and Buhrmester et al. (2016), we recruited participants from Amazon Mechanical Turk (MTurk), an online crowdsourcing service for advertising and consumer behaviour research, because recruiting participants online is cheaper and quicker than using the paper-and-pencil method. At the start of each survey, we sound-checked the online participants. In the sound-check phase, we asked the participants to click on a button to open a page and specify the sound they heard by making a selection from a list of various sounds (e.g., a train whistle, a crow cawing, etc.). Those who failed the sound-check test could not continue with the survey and left the study. We invited the online participants to listen to a 50-second version of the radio advertisement, then answer a set of questions about it. The online survey process did not allow the participants to fast forward or skip the advertisement, to ensure that they had listened to the entire radio advertisement before starting the survey.

Pilot Study

Sample, Experimental Design and Stimuli

For the pilot study, we used the advertisement for the EcoCar. This study has two advertising conditions: one without any background music, and one with slow tempo major mode music, intended to elicit 'inspiring' emotions (slow-inspiring music). We randomly selected this music condition. There were 95 participants in the slow-inspiring music experimental condition, and 102 in the no-music condition. To assess the participants' purchase intention, we adopted a three-item, seven-point Likert-scale from MacKenzie et al. (1986). To assess music liking, we followed Caldwell and Hibbert (2002) and asked the participants to rate from 1 to 7 their agreement with the statement: "I like the music that was playing" (see Appendix 1). Moreover, the variance inflation factor analysis results ruled out concerns about multicollinearity.

Results

We compared the participants' purchase intention under the music condition versus the non-music condition. We also used the Eta Squared (η^2) value to estimate the effect size for ANOVA – with near .01 as small, near .06 as medium, and above .14 as large effect size (Warner, 2012). The analysis of variance indicated that there were significant differences between the presence of music (M = 4.45) and the absence of music (M = 3.16) conditions concerning purchasing intention - $F(1, 195) = 26.60$, $p < .01$, with an effect size above .01 – $\eta^2 = .02$. We further examined the participants' purchase intention when they liked vs disliked the music in the advertisement. The analysis of variance indicated that there were significant differences between the music liking (M = 5.00) and disliking (M = 3.07) situations – $F(1, 93) = 31.64$, $p < .01$, with an effect size above .01 – $\eta^2 = .12$. Our results support our conceptual framework's baseline assumptions: 1) background music is important when designing

advertisements, as it promotes purchase intention, and 2) the effect of music is stronger when consumers like the background music in advertisements.

Main Study 1

Sample, Experimental Design and Stimuli

We recruited 108 participants via MTurk. To control the participants' existing knowledge and attitudes regarding existing products, we used the EcoCar advertisement. We randomly selected background music that elicits an "afraid" emotion, with 110 beats per minute (fast-afraid music). We used the same measurement items and scales to assess purchase intention and music liking. We adopted the items and seven-point Likert-scale from Belch (1981) for measuring positive brand attitudes. The variance inflation factor values are all below 3, which indicates that there are no multicollinearity problems.

Results

Hypothesis 1 proposes that music liking has an indirect effect on purchase intention via positive brand attitudes. We used regression analysis for the indirect relationship, controlling for sex, age, and education. We also used Cohen's f^2 value to estimate the effect size for the regression analysis – with near .02 as small, near .15 as medium, and above .35 as large effect size (Cohen et al., 2003). Our results replicate Pilot Study 1, showing a direct relationship between music liking and purchase intention, which is positive and significant ($\beta = .43$, p < .01; the effect size is above .02 – Cohen's $f^2 = .24$). This indicates that the purchase intention will increase by .43 units with a 1 unit increase in music liking. In terms of the indirect relationships, we use Hayes (2018)'s Process Model #4. We estimate the relationship between music liking and positive brand attitudes (Model 1: $\beta = .42$, p < .01; the effect size is above .02 – Cohen's $f^2 = .33$). We also estimate the relationship between positive brand attitudes and purchase

intention (β = .50, p < .01; the effect size is above .02 – Cohen's f^2 = .21), accounting for the effect of music liking. This indicates that purchase intention will increase by .50 units with a 1 unit increase in positive brand attitudes. Then, we calculate the indirect effect by using 10,000 bootstrap samples. We find that the indirect effect (.21)[4] is positive and significant, with a 95% confidence interval [lower-level = .09; higher-level = .36] which does not include zero. In conclusion, Pilot Study 2 provides evidence of the indirect relationship between music liking through positive brand attitudes via purchase intention. Thus, we confirm Hypothesis 1.

Main Study 2a and 2b

Sample, Experimental Design and Stimuli

Main Study 1a was a one-factor (music mode: major vs minor) between-subject design, for which we randomly assigned the participants to one of the two conditions. We recruited 202 participants from MTurk, with 99 participants in the major mode condition and 103 in the minor mode condition. We exposed the former to background music that elicited an inspired emotion. The other advertisement had minor mode music, evoking a "sad" emotion. The inspiring music was also set at 110bpm (fast-inspiring and fast-sad music) to keep the music tempo consistent. We randomly selected the background music mode with the same music tempo (See Appendix 1). To check whether our music piece produced the intended emotion (inspired and sad), we conducted another pre-test with 100 participants, recruited from MTurk. Each participant listened to our inspiring piece of music and rated their emotions using the PANAS scale (Watson et al., 1988). The manipulation check results suggested that the participants felt inspired more than other emotions. The experimental stimuli, procedures, and measures (i.e., music liking, positive brand attitudes, and purchase intention) for Main Study

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[4] The indirect effect quantifies the effect of the independent variable (i.e., music liking) on the dependent variable (i.e., purchase intention) through the mediator (i.e., a positive brand attitude). It is the product of the respective effects of the independent variable and the mediator when the former is held fixed (Hayes, 2018). The results reveal the amount of mediation by the mediator.

2a were identical to those for Pilot Study and Main Study 1 (see Appendix 1). Finally, we coded the participants who watched an advertisement with major mode music (fast-inspiring music) as "1" (the dummy variable) and those who watched an advertisement with minor mode music (fast-sad music) as "0". The results for the variance inflation factor analysis ruled out concerns about multicollinearity. Furthermore, to test the robustness of Main Study 1a's findings, Main Study 1b used the EcoMug advertisement (see Appendix 1). In addition, we randomly selected "fast-inspiring" and "fast-afraid" music as our music stimuli. Two hundred and eight participants were recruited from MTurk for Study 2b, where the participants were randomly assigned to one of the two conditions. The remaining experimental design and measures were identical to those in Main Study 2a.

<div align="center">"Insert Table 2 Here"</div>

Results

To establish a baseline assumption, we completed the following steps. First, we examined the direct and mediation effects. For the direct effect, we find a positive relationship between music liking and purchase intention ($\beta = .46$, $p < .01$; the effect size is above .02 – Cohen's $f^2 = .26$). For the indirect relationship, our results support a positive relationship between music liking and a positive brand attitude ($\beta = .57$, $p < .01$; the effect size is above .02 – Cohen's $f^2 = .68$), and also between a positive brand attitude and purchase intention when accounting for the effect of music liking ($\beta = .63$, $p < .01$; the effect size is above .02 – Cohen's $f^2 = .32$). We find that the indirect effect (.36) is positive and significant, with a 95% confidence interval [lower-level = .23; higher-level = .51] which does not include zero. We confirmed a direct and mediation relation among music liking, positive brand attitudes, and purchase intention. Such results also replicate our findings from the Pilot Studies.

Second, we examined the moderating effect of music mode on the relationship between positive brand attitudes and purchase intention. Using Hayes (2018)'s Process Model #1, our analysis (β = .50, p < .01; the effect size is above .02 – Cohen's f^2 = .10) confirmed this prediction. This indicates that purchase intention will increase by .50 units with a 1 unit increase in the joint effect of positive brand attitudes and the major mode music. We also plot our results in Figure 2. The graph shows that higher levels of positive brand attitudes have a greater influence on purchase intention when major mode music plays in advertisements. However, it also shows that lower levels of positive brand attitudes have a greater influence on purchase intention when minor mode music plays in advertisements. We reason that minor mode music helps to stimulate consumers' negative emotions (Juslin and Sloboda, 2011). When consumers have a less favourable attitude towards a firm's brand, using minor mode music in advertisements is more likely to reinforce such effects in terms of promoting purchase intention.

"Insert Figure 2 Here"

Hypothesis 2 posits that, as the music mode strengthens the relationship between positive brand attitudes and purchase intention such that the relationship is stronger in the case of major mode music, the indirect effect of music liking upon purchase intention via positive brand attitudes will be moderated by the music mode. Our proposed moderated mediation relationship (see Figure 1) is in line with the 2nd stage moderation model of Edwards and Lambert (2007), where the condition effects (moderating effects) appear on the path between the mediator and the dependent variable. According to Hayes (2018), the indirect effect of such a moderated mediation relationship is equal to the product of two coefficients: 1) the effect of the independent variable (music liking) on the mediator (a positive brand attitude) and 2) the conditional effect of the mediator – a 2-way interaction effect between the mediator (a positive brand attitude) and the moderator (major mode music) – on the dependent variable (purchase

intention). Hayes (2018) also refers to the value of this product term as the "*index of moderated mediation*".

Following Hayes (2018)'s Process Model #14, we estimate the moderated mediation effect with 10,000 bootstrap samples (see Table 2). The results show that the indirect effect (index of moderated mediation) between music liking and purchase intention (.29) is positive and significant, with a 95% confidence interval [lower-level = .13; higher-level = .45] which does not include zero. Thus, this supports Hypothesis 1b. In a different study (Main Study 1b), we again tested the moderated mediating effect using Hayes (2018)'s Process Model #14 with 10,000 bootstrap samples. We found that the indirect effect (.16) is positive and significant, with a 95% confidence interval [lower-level = .16; higher-level = .28] which does not include zero. These findings confirm the moderating role of the major mode music on the indirect relationship between music liking and purchase intention through positive brand attitudes.

Main Study 3a and 3b

Sample, Experimental Design and Stimuli

Main Study 3a's advertising messages focused on the EcoMug (a fictitious reusable mug brand). We recruited 397 participants from MTurk for Study 3a. We employed a 2 (music mode: major vs minor) x 2 (music tempo: fast vs slow) between-subject design. We randomly assigned the participants to one of the four conditions: 1) music composed in the major mode to elicit an "inspired" feeling with a "slow" tempo (slow-music), 2) music composed in the major mode to elicit an "inspired" feeling with a "fast" tempo (fast-inspiring music), 3) music composed in the minor mode to elicit a "sad" feeling with a "slow" tempo (slow-sad music) and 4) music composed in the minor mode to elicit a "sad" feeling with a "fast" tempo (fast-sad music). We used the same measurement items and scales to assess purchase intention, positive brand attitudes, and music liking (see Appendix 1). For the music mode, we coded as

"1" (dummy variable) the participants who watched an advertisement with major mode music and "0" the participants who watched an advertisement with minor mode music. For the music tempo, we coded as "1" the participants who watched an advertisement with a fast music tempo and "0" the participants who watched an advertisement with a slow music tempo. According to the collinearity diagnosis, all of the variance inflation factor values were below 3, so multicollinearity was not a severe problem for our inferences. Furthermore, Main Study 3b used the EcoCar advertisement. We randomly selected "fast-inspiring", "slow-inspiring", "fast-sad" and "slow-sad" conditions for this study, with 402 participants recruited from MTurk. The remaining experimental design and measures were identical to those in Main Study 3a.

Results

We followed the same approach as indicated above to establish a baseline assumption. First, we tested the direct and mediation effects. We confirmed a positive relationship between music liking and purchase intention (β = .45, p < .01; the effect size is above .02 – Cohen's f^2 = .23) and there is a mediating role of a positive brand attitude (indirect effect = .26 with a 95% confidence interval [lower-level = .19; higher-level = .30] which does not include zero). Second, we tested the three-way interaction effect of positive brand attitudes, major mode and fast tempo on purchase intention to highlight the joint moderation effects of music mode and tempo on the relationship between positive brand attitudes and purchase intention. Using Hayes (2018)'s Process Model #3, our analysis show that this prediction is confirmed (β = .45, p < .05; the effect size is above .02 – Cohen's f^2 = .14). This indicates that purchase intention will increase by .45 units with a 1 unit increase in the joint effect of positive brand attitudes, major mode music and fast music tempo. We also plot the three-way interaction effects in Figure 2.

The graph shows that positive brand attitudes at all levels will strongly affect purchase intention, in conjunction with major mode and fast tempo background music in advertisements.

Hypothesis 3 posits that, as music mode and tempo jointly strengthen the relationship between positive brand attitudes and purchase intention, such that the relationship is stronger for major mode music with fast tempo, the indirect effect of music liking upon purchase intention via positive brand attitudes will be moderated jointly by music mode and music tempo. Using the same approach, we calculate the indirect effect (index of moderated mediation) of the moderated mediation relationship as the product of two coefficients: 1) the effect of the independent variable (music liking) on the mediator (a positive brand attitude) and 2) the conditional effect of the mediator on the dependent variable (purchase intention). However, at this time, the conditional effect of a positive brand attitude on purchase intention is a three-way interaction among a positive brand attitude, major mode and fast tempo.

Using Hayes (2018)'s Process Model #18 with 10,000 bootstrap samples, we found that the indirect effect (.12) is positive and significant, with a 95% interval [lower-level = .04; higher-level = .25] which does not include zero. Thus, this supports Hypothesis 3. In a different study (Main Study 3b), we again tested the moderated mediating effect using Hayes (2018)'s Process Model #18 with 10,000 bootstrap samples. We find that the indirect effect (.20) is positive and significant, with a 95% confidence interval [lower-level = .01; higher-level = .40] which does not include zero. These findings confirm the combined moderating role of major mode music and fast music tempo on the indirect relationship between music liking and purchase intention through positive brand attitudes.

Discussion and Concluding Remarks

Theoretical Contribution

This work provides new insights into how the subjective (i.e., music liking) and objective (i.e., music mode and music tempo) characteristics of music in advertisements can work jointly to affect purchase intention. We reveal that brand attitude formation plays an important role in this process. Our results confirm that consumers' subjective perception of the likeability of a piece of music used in advertisements can facilitate the development of positive brand attitudes, which in turn promotes purchase intention. Our work also advances the view that the objective characteristic of music, such as the music mode, can influence the effectiveness of this process. To date, the literature concerning the influence of music mode on marketing communication (see Table 1) has focused primarily on examining its direct impact on consumer behaviour (e.g., Alpert et al., 2005; Kellaris and Kent, 1992), instead of viewing it as a critical boundary condition for translating the brand attitude formation process into marketing results (i.e., purchase intention). Our results provide strong evidence that the use of major mode music in advertisements can amplify the beneficial effect of positive brand attitudes on purchase intention. As a result, music mode moderates the mediation effect of music liking regarding purchase intention via positive brand attitudes. These findings highlight how music liking (subjective characteristics of music) and music mode (objective characteristics of music) can work together to persuade consumers to purchase a firm's products.

Furthermore, the previous research on this area focuses mainly on analysing the direct influence of music tempo on consumers' perceptions and recall of advertised content (e.g., Brooker and Wheatley, 1994; Oakes and North, 2006). We extend this literature by investigating the role of music tempo, combined with music mode, in affecting the relationship between music liking and purchase intention through positive brand attitudes by amplifying the impact of positive brand attitudes on purchase intention. We show three-way interaction effects of positive brand attitudes, major mode and fast tempo on purchase intention. Our

moderated mediation analysis demonstrates that the indirect effects of music liking, through positive brand attitudes to purchase intention, are contingent on the combination of major mode music and a fast music tempo. Thus, our work not only advances a view that recognises the influence of advertising background music tempo on marketing communication (see Table 1), but also addresses our research objective that explores how the subjective (i.e., music liking) and objective (music mode and music tempo) characteristics of music in advertisements can work jointly to affect purchase intention. Our literature review suggests that researchers have paid limited attention to understanding the influence of music on consumer behaviour from this angle (e.g., Abolhasani et al., 2017; Hahn and Hwang, 1999).

Finally, we add to the information processing theoretical perspective of advertising (e.g., Ching et al., 2013; Frias et al., 2008; MacInnis and Jaworski, 1989), which the marketing literature uses to explain how consumers process marketing information and the effectiveness of advertising (Priluck and Till, 2004; Thompson and Hamilton, 2006). Our study demonstrates that the applicability of information processing theory explains the joint influence of the subjective and objective characteristics of music in marketing communication. We suggest that music mode and tempo can be considered important boundary conditions that influence the brand attitude formation process, stimulated by music liking, leading to an enhanced purchase intention. In doing so, we develop a holistic framework that accounts for the influence of both the objective and subjective characteristics of music on information processing in advertisements.

Managerial Implications

Our findings provide marketers with a deeper understanding of how to incorporate music into advertisements that seek to promote products. In particular, music liking related to an advertisement can help to enhance purchase intention. However, marketers must understand

that simply incorporating a piece of music that consumers like when designing an advertisement may be insufficient to enhance their purchase intention. It is vital to emphasise the firm's brand value in an advertisement.

Furthermore, marketers must recognise the crucial role of music mode and music tempo when incorporating music in advertisements. More specifically, the use of the major mode music in advertisements can enhance the effect of positive brand attitudes on purchase intention, which will in turn enhance the benefits of incorporating music that consumers like when designing advertisements. Furthermore, our findings also reveal that the beneficial effects of major mode music with a fast tempo surpass those generated by using major mode music with a slow tempo. In practice, marketers seeking to sell products should use appropriate background music that reinforces positive feelings, such as inspiration, hope, and motivation, to ensure that the brand attitude formation process leads to an enhanced purchase intention.

Research Limitations

There are several limitations to the study. First, although music can elicit similar emotions in people, irrespective of the individual listeners' musical background, the context may play a differentiating role in terms of stimulating feelings. Music mode may convey different meanings in different cultural and geographical contexts, and there may be differences between the degrees to which customers like various pieces of music in varied cultures (Fang et al., 2017).

Second, we tested and validated our framework by developing radio advertisements for two fictitious products: an electric car (EcoCar) and a reusable coffee mug (EcoMug). Although this context might be useful for examining consumers' responses concerning the use of music in advertisements (Fowler III and Close, 2012; Müllensiefen, 2020), it also limits the generalisability of our findings. Furthermore, the design of green advertisements can focus not

only on stimulating respondents' "hot" emotions favourably towards a firm's sustainable brand image and products, but also on triggering their cognitive thinking about their environmental responsibility.

Third, in our arguments leading to the development of the research hypotheses, we suggest that advertisements with different pieces of music can affect consumers' emotions. Consequently, the consumer brand attitude and purchase intention will also be affected. However, our framework did not include any "emotion" construct (e.g., happiness, sadness, etc.).

Fourth, although the present research adopted a robust methodological approach by creating various pieces of music (see Appendix 3) merely through manipulating the music mode and tempo, we used an identically structured voiceover (the narration) for all conditions (see Appendix 2). It may be argued that, for example, for minor mode music that seeks to elicit sad emotions to be effective in an advertisement, the voiceover of the advertisement copy should also be congruent with the feelings that the music seeks to elicit and contain a sad narration, and vice versa. Furthermore, the pieces of music used in the current research project were all instrumental in nature, without any lyrics.

Future Research Opportunities

These research limitations lay the ground for future research directions. First, although music can elicit similar emotions in people, the context may play a differentiating role in stimulating feelings irrespective of the listeners' musical background. As Hargreaves et al. (2002, p. 13) point out, "listeners are not passive consumers, but active partners in a cultural process who use music to fulfil different functions according to different social contexts". National music styles may evoke concepts and images congruent with cultural stereotypes of that country. For example, while German music might make consumers think of beer and

bratwurst, French music might evoke images of wine and the Eiffel Tower (North et al., 1997; Tekman and Hortaçsu, 2002). Researchers could explore the effects of music mode and tempo in advertising in different cultures to enhance the generalizability of the findings.

Second, researchers on a similar topic should consider including emotion constructs in the framework to explain precisely how different advertisements affect purchase intention. To further improve the nomological value of the study, researchers may also investigate different emotional concepts and advertising contexts that may affect the formation of consumer brand attitudes when music plays in advertisements.

Third, researchers could examine whether the overarching positive effects of major mode music in eliciting a positive response towards advertising overshadow the potential benefits of eliciting negative emotions in consumers in order to generate favourable attitudinal and purchase intention outcomes if the pieces of music and voiceover themes are congruent. Researchers can also explore how using music with lyrics affects the elicitation of positive and negative emotions and, consequently, consumers' attitude towards the advertised brand and buying behaviour, as well as investigating the interaction between lyrics, mode, and tempo, on the one hand, and the elicitation of feelings by advertisements, on the other.

Fourth, consumers may respond differently to product advertising than service advertising, and service represents most of our economic activities (Abernethy and Butler, 1992). Researchers might explore the effects of music on service brand and purchase intention. Fifth, in this research, the genre of music and instruments used to play the various pieces of music were the same, in an attempt to control their effects. Researchers might manipulate these in order to explore in greater depth the influence of music on marketing communication.

Lastly, other subjective and objective characteristics of music (see Table 1) might affect the influence of music in advertising (e.g., volume, strings vs brass, modern vs classical, etc.). In this research, we attempt to control all of these factors in our experiments by ensuring that

all of the "conditions" are kept identical. The only difference between the pieces of music that play in advertisements was their mode and tempo. Researchers might explore the influence of other subjective and objective characteristics of music in our framework to offer a more complete picture of the role of music in the brand attitude formation process.

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Figure 1: Framework
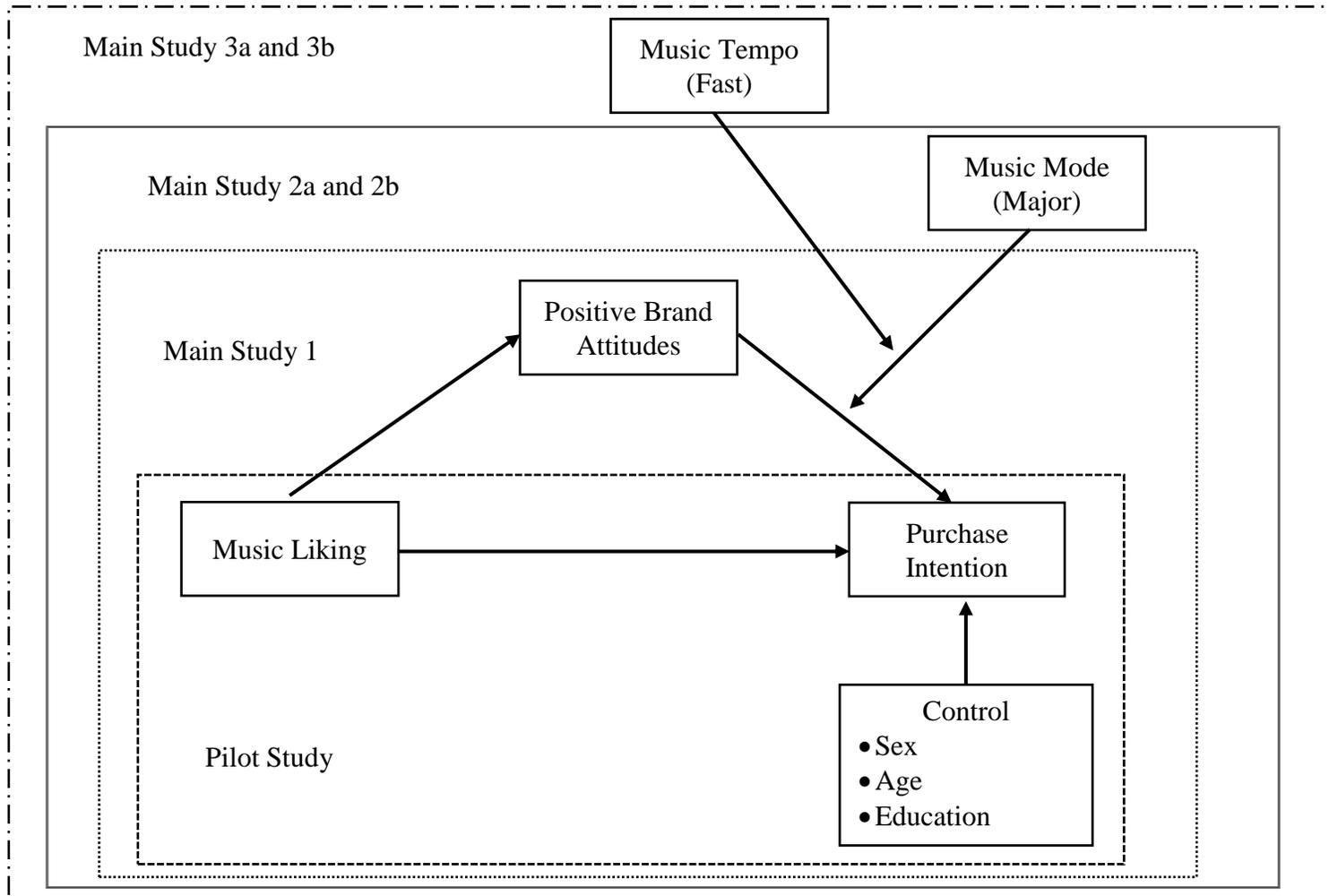
Table 1: Overview of Existing Research about Music in Marketing

		Characteristics of Music	
		Objective	**Subjective**
Practices	**Marketing Communication**	• Tempo (Hahn and Hwang 1999; Kellaris and Kent 1993; Oakes and North 2006) • Texture (Kellaris and Kent 1993) • Volume (Kellaris and Rice 1993) • Lyrics (Anisimova et al. 2014; Chou and Lien 2014) • Key (Kellaris and Kent 1992, 1993) • Ending (Guido et al. 2016) • Mode (Alpert et al. 2005; Kellaris and Kent 1991)	• Liking (Abolhasani and Oakes 2017; Alpert and Alpert 1989; Craton et al. 2008; Gorn 1982; Mittal 2015; Oakes 2007; Simpkins and Smith 1974; Vermeulen and Beukeboom 2016) • Familiarity (Chou and Lien 2014; Hahn and Hwang 1999) Nostalgia (Apaolaza-Ibantilde et al. 2010; Chou and Lien 2014) • Mood (Alpert et al. 2005) • Arousal (MacInnis and Park 1991) • Complexity (Lavack et al. 2008)
	"In-Store" Background	• Tempo (Caldwell and Hibbert 2002; Knoferle et al., 2012; Milliman 1982, 1986; Oakes 2003) • Volume (Morrison et al. 2011; North et al. 2000) • Style (North and Hargreaves 1998; North et al. 2000) • Mode (Knoferle et al., 2012)	Liking (Andersson et al. 2012; Dubé et al. 1995; Hui et al. 1997; Morin et al. 2007; North and Hargreaves 1996; Vaccaro et al. 2012; Vida et al. 2007) Arousal (Dubé et al. 1995; Mattila and Wirtz 2001)

Table 2: Main Studies

	Main Study 1		Main Study 2a		Main Study 2b		Main Study 3a		Main Study 3b	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Outcome	PBA	PI	PBA	PI	PBA	PI	PBA	PI	PBA	PI
Controls										
Sex	.37(1.41)	-0.14(-.48)	.26(1.61)	-.38(-2.15)**	-.61(-3.97)***	-.07(-.36)	-.25(-2.24)**	.04(.27)	.03(.26)	-.20(-1.52)
Age	-.04(-.28)	-.25(-1.75)*	.03(.42)	-.46(-5.33)***	-.01(-.13)	-.07(-1.03)	.04(.93)	-.12(-2.58)**	.03(.54)	-.42(-6.50)***
Edu	.02(.23)	.01(.13)	.02(.47)	.10(1.71)*	.01(.13)	.17(2.35)**	.01(.30)	.08(1.66)*	.01(.24)	.093(2.072)**
Predictors										
Music Liking	.42(5.85)***	.22(2.413)**	.57(11.46)***	.10(1.44)	.34(7.98)***	.17(2.59)*	.30(8.94)***	.20(4.60)***	.53(15.16)***	.13(2.58)**
Positive Brand Attitudes [PBA]		.50(4.612)***		.66(8.33)***		.61(5.47)***		.88(15.18)***		.64(6.63)***
Music Mode (Major)				.05(.19)		-2.63(-2.81)**		-.07(-.59)		-.83(-1.14)
Music Tempo (Fast)								-.14(-1.10)		.88(1.48)
Interaction										
PBA x Music Mode (Major)				.50(3.85)***		.46(2.91)**		.20(1.88)*		.12(.87)
PBA x Music Tempo (Fast)								-.01(-.10)		-.25(-2.03)**
Major x Music Tempo (Fast)								.11 (.44)		-1.51(-1.49)
PBA x Music Mode (Major) x Music Tempo (Fast)								.41(1.95)**		.38(1.98)**
Intercept			1.97(4.13)***	4.38(7.82)***	4.29(8.40)***	-.53(-.63)	4.13(12.17)***	3.52(8.91)***	2.43(7.24)***	1.25(2.37)**
Model Summary										
F-Value	9.30***	10.91***	38.33***	39.88***	2.42***	22.80***	21.68***	35.74***	61.83***	40.21***
R-Square	.27	.35	.44	.60	.29	.44	.18	.51	.38	.53

Notes:
Study 1: N=108; Study 2a: N = 202; Study 2b: N = 208; Study 3a: N = 397; Study 3b: N = 402
*** $p < .01$; ** $p < .05$; * $p < .10$
PI = Purchase Intention
Unstandardized Coefficients are reported with (t-value) in parentheses
Bootstrap sample = 10000 with 95% confidence intervals
Indirect effect (Model 1 and Model 2) = .21 LLCI (.09) ~ ULCL (.36)
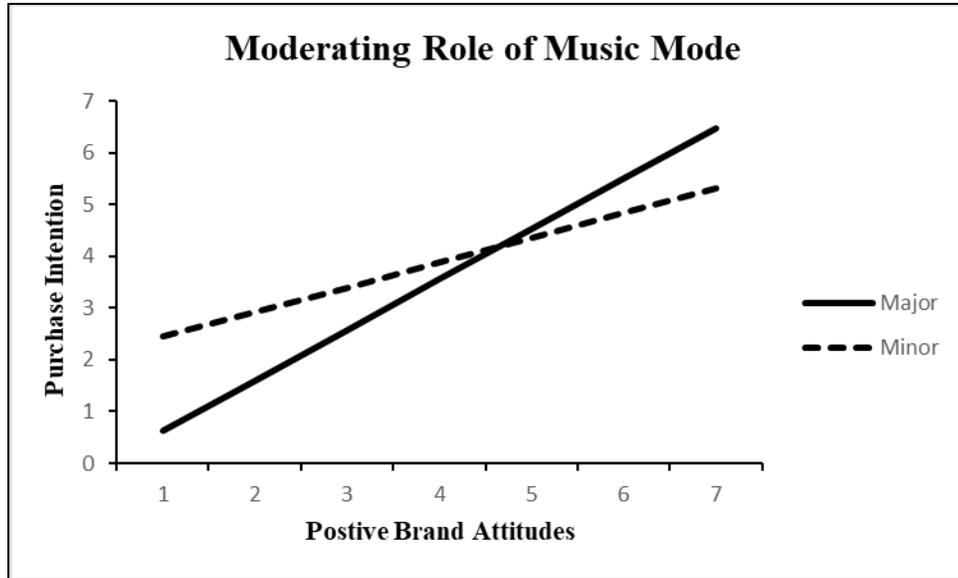Indirect effect (Model 3 and Model 4) = .29 LLCI (.13) ~ ULCL (.45)
Indirect effect (Model 5 and Model 6) = .16 LLCI (.59) ~ ULCL (.28)
Indirect effect (Model 7 and Model 8) = .12 LLCI (.04) ~ ULCL (.25)
Indirect effect (Model 9 and Model 10) = .20 LLCI (.01) ~ ULCL (.40)

Figure 2: Graphical Representation

a) Moderating Role of Music Mode – Study 2a

Note:
Two-way interaction effect of positive brand attitudes and music mode. The graph shows that higher levels of positive brand attitudes have a greater influence on purchase intention when using major mode music in advertisements. However, it also shows that lower levels of positive brand attitudes have a greater influence on purchase intention when using minor mode music in advertisements.

b) Moderating Roles of Music Mode and Tempo – Study 3a
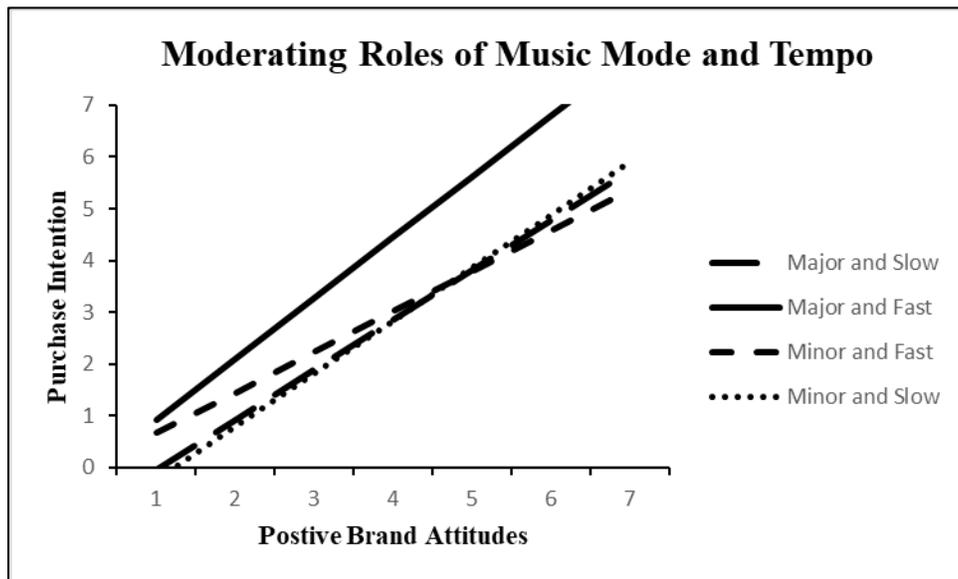
Note:
Three-way interaction effect of positive brand attitudes, music mode and music tempo. The graph shows that positive brand attitudes at all levels will strongly affect purchase intention, accompanying major model and fast tempo background music in advertisements.

Appendix 1: Experiments and Measurements

Experiments	Pilot Study	Main Study 1	Main Study 2a	Main Study 2b	Main Study 3a	Study 3b
Advertising Copy	EcoCar	EcoCar	EcoCar	EcoMug	EcoMug	EcoCar
Music Conditions	Slow-Inspiring No Music	Fast-Afraid	Fast-Inspiring Fast-Sad	Fast-Inspiring Fast-Afraid	Fast-Inspiring Slow-Inspiring Fast-Sad Slow-Sad	Fast-Inspiring Slow-Inspiring Fast-Sad Slow-Sad
Participant Sex	Male (116); Female (81)	Male (56); Female (52)	Male (105); Female (97)	Male (115); Female (93)	Male (214); Female (183)	Male (205); Female (197)
Participant Age	16 ~ 24 years (3) 25 ~ 34 years (60) 35 ~ 44 years (39) 45 ~ 54 years (31) 55 ~ 64 years (63) 65+ years (1)	16 ~ 24 years (1) 25 ~ 34 years (5) 35 ~ 44 years (31) 45 ~ 54 years (21) 55 ~ 64 years (50) 65+ years (0)	16 ~ 24 years (4) 25 ~ 34 years (59) 35 ~ 44 years (40) 45 ~ 54 years (39) 55 ~ 64 years (58) 65+ years (2)	16 ~ 24 years (12) 25 ~ 34 years (59) 35 ~ 44 years (57) 45 ~ 54 years (33) 55 ~ 64 years (26) 65+ years (21)	16 ~ 24 years (34) 25 ~ 34 years (144) 35 ~ 44 years (83) 45 ~ 54 years (67) 55 ~ 64 years (45) 65+ years (24)	16 ~ 24 years (10) 25 ~ 34 years (120) 35 ~ 44 years (80) 45 ~ 54 years (78) 55 ~ 64 years (111) 65+ years (3)
Participant Education*	Level 1 (10) Level 5 (35) Level 2 (34) Level 6 (56) Level 3 (27) Level 7 (15) Level 4 (19) Level 8 (1)	Level 1 (6) Level 5 (28) Level 2 (30) Level 6 (5) Level 3 (30) Level 7 (2) Level 4 (3) Level 8 (4)	Level 1 (5) Level 5 (36) Level 2 (27) Level 6 (51) Level 3 (43) Level 7 (20) Level 4 (17) Level 8 (3)	Level 1 (1) Level 5 (21) Level 2 (0) Level 6 (84) Level 3 (19) Level 7 (34) Level 4 (45) Level 8 (4)	Level 1 (1) Level 5 (70) Level 2 (52) Level 6 (170) Level 3 (79) Level 7 (48) Level 4 (38) Level 8 (9)	Level 1 (12) Level 5 (70) Level 2 (60) Level 6 (106) Level 3 (74) Level 7 (36) Level 4 (39) Level 8 (5)
Music Liking (Caldwell and Hibbert, 2002) 1=Strongly disagree; 7 = Strongly agree	Mean = 5.16** SD = 1.47**	Mean = 3.86 SD = 1.73	Mean = 4.41 SD = 1.64	Mean = 4.94 SD = 1.72	Mean = 4.94 SD = 1.64	Mean = 4.51 SD = 1.66
I like the music that was playing.	Loading = N/A	Loading = N/A	Loading = N/A	Loading = N/A	Loading = N/A	Loading = N/A
Positive Brand Attitudes (Belch, 1981) 1 = Not at all; 7 = Very much	Mean = N/A*** SD = N/A*** Cronbach's α = N/A***	Mean = 4.62 SD = 1.48 Cronbach's α = .93	Mean = 4.83 SD = 1.45 Cronbach's α = .95	Mean = 5.73 SD = 1.24 Cronbach's α = .97	Mean = 5.68 SD = 1.21 Cronbach's α = .96	Mean = 4.95 SD = 1.41 Cronbach's α = .94
I found the brand – good	Loading = N/A***	Loading = .79	Loading = .87	Loading = .90	Loading = .88	Loading = .86
I found the brand – likable	Loading = N/A***	Loading = .89	Loading = .89	Loading = .92	Loading = .89	Loading = .88
I found the brand – favourable	Loading = N/A***	Loading = .91	Loading = .88	Loading = .91	Loading = .89	Loading = .87
I found the brand – appealing	Loading = N/A***	Loading = .87	Loading = .88	Loading = .90	Loading = .88	Loading = .88
Purchase Intention (MacKenzie et al., 1986) 1 = Not at all; 7 = Very much	Mean = 3.79 SD = 1.86 Cronbach's α = .94	Mean = 3.17 SD = 1.71 Cronbach's α = .96	Mean = 3.61 SD = 1.80 Cronbach's α = .95	Mean = 4.60 SD = 1.82 Cronbach's α = .95	Mean = 4.64 SD = 1.74 Cronbach's α = .95	Mean = 3.76 SD = 1.80 Cronbach's α = .95
I like to purchase the product.	Loading = .86	Loading = .90	Loading = .87	Loading = .87	Loading = .86	Loading = .88
I am probably going to purchase the product.	Loading = .89	Loading = .94	Loading = .92	Loading = .92	Loading = .91	Loading = .92
I am possibly going to purchase the product.	Loading = .90	Loading = .92	Loading = .90	Loading = .91	Loading = .90	Loading = .90

Note:

Number of participants are reported in parentheses

* Level 1 = Elementary school; Level 2 = Some high school, no diploma; Level 3 = High school graduate, diploma or equivalent; Level 4 = Some college credit, no degree; Level 5 = Trade/technical/vocational trading associate degree; Level 6 = Bachelor's degree; Level 7 = Master's degree; Level 8 = Doctorate degree

**Only apply to the music condition (vs. no music condition as control group)

*** Positive Brand Attitudes is not tested in Pilot Study 1

Appendix 2: Advertising copies for two products

Reusable Coffee Mug (brand name: EcoMug)

How often do you buy a cup of coffee?
How often do you think about the environmental impacts of using disposable cups?

Despite looking like they are made of cardboard, 99 per cent of disposable coffee cups are not

recyclable and every minute over one million cups end up in landfills globally.

Using your reusable *EcoMug*, you can save 365 disposable cups if you drink one coffee every day.

This may seem a small thing, but it can have a big impact to reduce waste and pollution within our environment. If everyone made one small change, could we all change the world?

EcoMug! Choose to reuse!

Electric Car (brand name: EcoCar)

How often do you drive your car?
How often do you think about the environmental impacts of using gasoline cars?

In 2013, transportation contributed more than half of the carbon monoxide and nitrogen oxides, and almost a quarter of the hydrocarbons emitted into our air.

Driving your electric *EcoCar*, you will produce half the CO2 emissions of a gasoline car, including the manufacturing emissions.

If most things in our lives run on electricity when they could run on gasoline, why do our cars run on gasoline when they could run on electricity? Could we all change the world?

EcoCar, for the love of the air!

Appendix 3: Music composition methodology

Standard abbreviations for chords: the chord takes its name from a "root" pitch, given as a capital letter. If the chord is major, no additional symbol is needed; if minor, a small "m" is added. Thus C major is "C", and C minor is "Cm". Other symbols appear, usually numerical, which indicate additional pitches in the chord that do not generally affect its major or minor quality, but give clues as to its function in the harmonic sequence.

The pieces all make use of a standard 5-part string orchestra: 1st violins (sometimes subdivided into two groups), 2nd violins, violas, cellos, and basses. These sounds were created with sample playback on "Logic", a Mac-based digital audio workstation. The sounds all come from the "Vienna Symphonic Library" sample collection, being a mixture of the standard "orchestral strings" with some more recent patches from their "Synchron strings" library. Although the sounds themselves are realistic (they are recordings, painstakingly assembled by the Vienna Symphonic Library workforce, of actual musicians playing real instruments), a lot of work has to go into shaping them expressively to make them sound like a real ensemble. In fact, over the years, this aim has become less and less relevant: the introduction of this technology has itself begun to shape the expectations of the audience, and particularly in the genres of film music and game music, the computerised sound, and the mannerisms that it encourages (increased size of ensemble, and of the apparent space in which it is recorded, repetitive nature of material, for instance), have been accepted as the norm.

The pieces, as notated, are 16 bars long, of which the second 8 bars are effectively a repeat of the first 8, with some differences. They were conceived in 70bpm. The 70bpm recorded versions fade out before 16 bars; the 110bpm versions loop round to the beginning again, and fade out before the second round is complete. The tempo changes were effected mechanically, by changing the tempo setting on the playback of the midi information. Often a drastic change in tempo can have odd effects, but no action was taken to modify the pieces after tempo operations, and the 110bpm pieces are identical in every way with their 70bpm counterparts, except in tempo.

We decided to avoid creating a complex melody, partly because we thought that anything too busy on the top line would distract attention from the advertising copy (a common problem). In the absence of a prominent melody, the top line (played on the violins) comes to the fore, moving in long slow notes, and so too does some of the figuration (faster-moving notes) on the violas and second violins. The basses, playing pizzicato, perform the same role in all pieces, marking out the *tempo* by articulating emphatic points in the bar. They also supply the bassline for the harmony, but in this they are largely duplicating the role of the cellos.

For the "sad" minor mode piece, the musical composers chose the key of **C minor**, and used minor chords only, as far as possible. However, even in a minor mode music piece, the composer has both major and minor chords it his/her disposal. There are three minor chords available in the key of Cminor: Cm, Fm and Gm. In addition, the composers have used the chord G, rather than Gm, at cadences (ends of sequences). Though it is a major chord, it paradoxically helps to define the key as C minor.

For the "inspiring" major mode piece, the composers transformed the "sad" piece into **C major** by shifting all E flats up to E natural, all A flats up to A natural, and all B flats up to B natural. This created a piece harmonised entirely with major chords. To connote determination, they replaced the long slow notes of the cello with a pattern of shorter, more strongly articulated notes.

For the "afraid" minor piece, the composers shifted all the notes from the "sad" C minor piece upwards by 9 semitones. This put the whole piece into **A minor**, and it was then possible for them to raise, or lower, any notes they chose by an octave.