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"Sound and safe": The effect of ambient sound on the perceived safety of public spaces

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ABSTRACT

The amount of crime to which individuals are exposed on a daily basis is growing, resulting in increased anxiety about being alone in some public places. Fear of crime usually results in avoidance of places that are perceived to be unsafe, and such avoidance can have negative financial consequences. What can be done to reduce fear in relatively safe public places that are nevertheless perceived as being unsafe? In this paper, we explore the effect of auditory input (type of ambient sound) on perceived social presence and one's feeling-of-safety in public spaces such as car parks and metro stations. In one field study and four laboratory studies, we demonstrate that different ambient sounds convey social presence to a different degree. When perceived social presence is higher and positive, the feeling-of-safety is also higher. Additionally, we show that an increase in perceived safety has a positive effect on consumers' satisfaction with the public area and even raises their willingness to purchase a monthly membership card for the public area. Furthermore, the effect of ambient sound on such consumer responses is serially mediated by perceived social presence and feeling-of-safety.

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1. Introduction

People are frequently exposed to crimes in their daily lives. According to the Eurostat data[1] of the European Commission, the numbers of reported crime incidences in 2010 are 5,933,278 for Germany, 4,150,097 for England, 2,621,000 for Italy, and 2,297,484 for Spain. These numbers suggest the occurrence of thousands of crime incidences per day in several countries. In addition to hearing about some of these crimes on news programs, people encounter fictitious crimes in books, movies, and television series. After such exposure to real and unreal crime, people are fearful when they are alone in public places. In fact, many public spaces such as car parks, metro stations, railway platforms, airport tunnels, and bus stops are considered "anxiogenic" (Loukaitou-Sideris, 2006).

Fear of crime leads to psychological stress and usually results in avoidance of places that are perceived to be unsafe. Such a habit of avoidance negatively affects commercial and leisure activities, road use, and social interaction (Warr, 2000). For example, if people do not feel safe at the underground car park of a mall, they may have a tendency not to go to that mall, causing a revenue loss. The same applies to private parking areas, where people pay to park. Hence, a misperception about the safety of a place has negative financial consequences. An effective way to avoid such misperception and increase perceived safety in such places is to manipulate some environmental cues.

In this paper, we focus on one factor that can influence perceived safety in public areas and that is also easy to incorporate into a public place, namely, "ambient sound." We believe that incorporating specific ambient sounds will create a sense of social presence and hence be effective in regulating people's fear. Warr (1990) shows that the presence of a companion increases one's feeling-of-safety. Accordingly, if a sound creates a positive sense of presence, it should also increase perceived safety. Additionally, we would like to note that incorporating ambient sound in a physical space is a subtle manipulation that does not make the possibility of crime more salient; on the other hand, other preventive actions (e.g., increasing the amount of security cameras, and security guards) lead to an increase in the self-declared levels of worry about crimes, because these preventive actions remind consumers about crimes (Ekblom, Law, & Sutton, 1996).

We show that sound or auditory input can play a large role in people's feeling-of-safety that is later translated into consumer satisfaction and purchase intentions. In one field study (conducted in an underground car park in Paris) and four laboratory studies (one in Paris, one in a midwestern city in the United States, and two in Istanbul), we demonstrate that ambient sounds influence perceived social presence and the feeling-of-safety in a public place. Additionally, we provide evidence that perceived social presence and the feeling-of-safety mediate the

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[1] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Crimes_recorded_by_the_police_Total_crime,_2004-2010_new.png&filetimestamp=20130731134759.

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effect of ambient sounds on consumers' satisfaction with their experience in the public area and on their willingness to purchase a membership card for that area.

To the best of our knowledge, this study is the first to systematically investigate the connection between auditory input, social presence, safety perception, and the aforementioned consumer responses. We show that sounds influence specific emotions such as social presence and perceived safety, even when individuals know that these sounds are broadcasted through a music system. Our results have many implications for the design of such public spaces as parking areas of shopping malls, concert halls, metro stations, and movie theaters. Additionally, although some research in marketing has focused on ambient music in stores, only a few studies demonstrate the effect of ambient sound in other spaces.

2. Literature review and conceptual development

How can sound allay anxiety about the environment? In this section, we review literatures on fear derived from specific environmental cues, and on the effect of sound on emotions and social presence.

2.1. Fear from environmental cues

Some environmental cues (e.g., darkness, silence) lead to the anticipation of possible threats and hence cause fear (Russell, 1979; Warr, 1990). People commonly report their fear of being subject to a crime when they are in dark, quiet, and desolate places (Vrij & Winkel, 1991; Warr, 1990). For example, LaGrange, Ferraro, and Supancic (1992) suggest that environmental features of neighborhoods, such as broken windows and abandoned buildings, produce fear, regardless of the actual crime rates in those areas.

Extant literature demonstrates that fear reveals itself through behavior (e.g., distress cries, freezing, and defecation) and sometimes leads to avoidance of fearful experience (Russell, 1979). According to survey data in the United States, the most common reaction to the fear of crime is spatial avoidance, in other words, staying away from places that are perceived to be unsafe (Warr, 1994). These places quickly turn into "no-go" areas (Stafford, Chandola, & Marmot, 2007). People take different routes when they travel and become more attentive about when to leave their houses (Warr, 1994).

People's reluctance to go to specific areas results in customer and revenue loss for those places. For example, if people do not feel safe at the underground car park of an apartment that they are considering buying, this negative experience may affect their preference and purchasing decision for the apartment. Or if they feel uncomfortable leaving their car in a private parking lot, they will not use that specific lot again. They may even talk to others about their fearful experience, creating negative word of mouth for the place. Hence, the management of such places must increase the perceived safety in their facilities.

Pain (2000) suggests that manipulating the physical environment dramatically influences perceived safety. For example, studies show that an ambient cue such as lighting increases perceived safety in public places — greater light enhances perceived safety (Herbert & Davidson, 1995; Painter, 1996; Ramsey & Newton, 1991). In this paper, we focus on another ambient cue, sound, and pay attention to the effect of the type (rather than magnitude) of the ambient sound on perceived safety.

2.2. Sound, music, and emotions

Music is one environmental cue with demonstrated effects on individuals' mood, perceptions, and behaviors (Yorkston, 2010). Within a retail context, research has shown that ambient music affects product choice (Areni & Kim, 1993), time spent (Yalch & Spangenberg, 2000), sales (Mattila & Wirtz, 2001; Milliman, 1982, 1986), pace of shopping (Milliman, 1986), perception of shopping time (Chebat, Gelinas-Chebat, & Filiatrault, 1993), and perception of store (Hui, Dube, & Chebat, 1997). For example, Yalch and Spangenberg (2000) show that more familiar background music (vs. less familiar) decreases consumers' actual duration of shopping time in a department store. Conversely, when consumers are given a restricted time to shop, more familiar background music increases their perception regarding the duration of the shopping time. Yalch and Spangenberg (2000) suggest that consumers devote more attention to unfamiliar music and hence are distracted, causing them to remember their activities less. When they remember less, duration appears to be shorter. Areni and Kim (1993) show that classical music played in a wine shop results in consumers choosing more expensive wines. Their results support the notion that a fit between music and context improves persuasion (MacInnis & Park, 1991). Additionally, Milliman (1982) demonstrates that people move more slowly with slower music in a retail environment and hence spend more time there and purchase more. Milliman (1986) also tests the effect of musical tempo in a restaurant and demonstrates that diners eat more quickly when fast music is playing.

Outside the retail context, Vinovich (1975) plays a video that has fixed information and manipulates the music played along with it. He shows that different types of music create different moods and then lead to different interpretations of the same video. As such, the music is seen as relevant information for the cognitive interpretation of the ambiguous video drama. In an advertising context, Park and Young (1986) demonstrate the effect of music on consumers' attitudes toward the brand, focusing on consumers' involvement levels with the advertisement. Their results suggest that for consumers with high involvement with an advertisement, music works as a distraction and lowers the scores for attitudes toward the brand. However, for consumers with low involvement with the advertisement, likeable music (vs. no music) increases positive attitudes toward the brand. Meyers-Levy and Zhu (2010) demonstrate that consumers may perceive an advertisement's background music to have different meanings ("referential meaning," i.e., semantic meaning that music may bring to mind, and "embodied meaning," i.e., hedonic meaning that arises from the level of stimulation triggered by the music's structural characteristics, such as the energy level) dependent on their gender and need for cognition. Thus, perceived meaning influences consumers' perceptions regarding the advertised product. Zhu and Meyers-Levy (2005) also suggest that more cognitive resources are needed to make use of the referential (vs. embodied) meaning of music. Moreover, Tansik and Routhieaux (1999) demonstrate that music reduces pre-surgical anxiety. They find that music reduces cortisol levels in the saliva of patients (cortisol being an important hormone in the body, secreted by the adrenal glands, and an indicator of stress). However, this reduction in anxiety levels is not correlated with better evaluations of the hospital's services. That is, the effect of music on patients' anxiety levels is not reflected in consumer evaluations. The authors' results are in line with Park and Young's (1986) findings that within a high-involvement context, the effect of music on consumer responses is attenuated. Cooke, Chaboyer, Schluter, and Hiratos (2005) also provide evidence regarding the calming effect of music on pre-operative anxiety. Taking into consideration the effect of music on people's perceptions and anxiety levels, we believe that music will also be effective in manipulating perceived safety in public areas.

Interestingly, prior research on the effect of music on emotions, including that in the aforementioned studies, has focused mainly on instrumental music. However, other research on auditory input (not music) shows that vocal sounds, whether they come from humans or animals, can also affect individuals' emotional states. We discuss this research next.

2.3. Sound and social presence

Biocca, Harms, and Burgoon (2003) define social presence as "the sense of being together with another." Social presence may be perceived either in the real presence of humans and animals or with their

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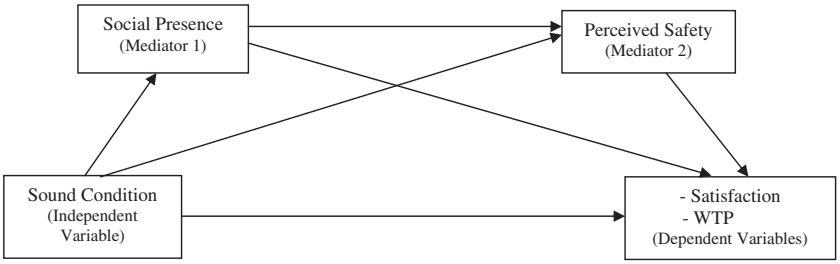

Fig. 1. Conceptual framework — serial mediation model for sound condition, social presence, perceived safety, and consumer responses.

simulation (Biocca et al., 2003). People encounter vocal (animal or human) sounds in their daily lives even when they are alone in their houses watching television, in their cars listening to the radio, or jogging in a forest or meadow. Social presence literature provides evidence that vocal sounds are potent social cues that "enhance the illusion of interaction with a social entity" (Lombard & Ditton, 1997). Lombard and Ditton also suggest that media such as television and radio are capable of generating a sense of presence and that viewers show emotional responses (a perceived sense of presence) to visual images and sounds broadcasted by televisions and radios. People even talk to the images of people on television screens (Lemish, 1982). Lombard et al. (2000) show that people incorrectly perceive media personalities as real social presence. They even feel as though they are sharing space with others who are actually at a remote physical site (Mühlbach, Böcker, & Prussog, 1995). Accordingly, we expect that when people listen to broadcasted animal or human vocal sounds, they feel some sense of social presence. We believe the "vocal" nature of the sounds creates perceived social presence, because these sounds create the illusion of having others around.

The presence of others can have opposite effects (frightening or soothing) depending on who those others are (Warr, 1990). The presence of others would be frightening for people who perceive a criminal intention toward themselves. However, Warr (1990) suggests that when bystanders do not seem to have criminal intentions, the presence of others normally reduces fear. People assume that having others around will make an individual less attractive as a target when compared to an isolated individual (Warr, 1985). Additionally, individuals feel safer in the presence of others, because they presume that others will come to their aid if needed (Warr, 1990). Accordingly, the presence of others has a soothing effect under conditions of imminent threat and provides a sense of security (Mikulincer, Shaver, & Pereg, 2003). Hence, we expect that when individuals are exposed to animal or human vocal sounds, these sounds will create a sense of social presence in the environment and will have a soothing effect, consequently increasing perceived safety. However, if individuals perceive any threatening element in these vocal sounds, they would experience fear. Accordingly, we expect vocal sounds that are perceived to be non-threatening to create a positive sense of social presence and hence increase one's feeling-of-safety.

Building upon the "sound, music, and emotion" and "sound and social presence" literatures, we believe that ambient sound that gives the impression of having social contact with a living being (who is not considered as a threat) should have a positive impact on the feeling-of-safety. Hence, vocal sounds (either human or animal) should be more effective than instrumental sounds in terms of reducing anxiety, because they give the illusion of interacting with living beings. In other words, they convey a "sense of presence of other living beings," which may enhance the feeling-of-safety. Further, we predict that when consumers feel safer in a public place, they will have more positive consumer responses toward the public area. Hence, we hypothesize the following:

Hypothesis 1. Ambient vocal sounds will result in greater perceived social presence compared to ambient instrumental sounds and no ambient sounds.

Hypothesis 2. Ambient vocal sounds (that are not perceived to be threatening) will increase perceived safety in public places compared to ambient instrumental sounds and no ambient sounds.

Hypothesis 3. Ambient vocal sounds (that are not perceived to be threatening) will result in more positive consumer responses (in terms of satisfaction and willingness to purchase) compared to ambient instrumental sounds and no ambient sounds.

Hypothesis 4. Perceived social presence and perceived safety will (serially) mediate the effect of ambient sound on consumer responses.

Our conceptual framework is given in Fig. 1.
Next, we discuss our studies, beginning with the field study.

3. Study 1a

We communicated with several car parks and asked for permission to broadcast different ambient sounds in their parking areas and then to investigate the effect of these sounds on car parkers' safety perceptions. We received permission to manipulate sound in a large, underground car park in Paris that could hold 670 cars and was used by people who worked in that area. Customers could access it from the street level via three stairwells. The stairwells contained no natural light at any time of day, but they did have good artificial lighting. Nevertheless, it was generally known that people felt a little unsafe and alone in the stairwells. The confined space, however, allowed us to easily introduce an ambient, artificial sound. We used the same sound in all three stairwells at the same time.

3.1. Methodology

3.1.1. Design

The study used a one-way between-subjects design with three conditions: instrumental sound, animal vocal sound, and no sound. For the instrumental-sound condition, we used a classical music concert (the Concerto a cinque op. 5 no. 7 Allegro from Albinoni). For the animal-vocal-sound condition, we used a recording of bird sounds from Western European birds.[2] Literature on linguistics and biology demonstrates that analogies exist between human language and communication systems of some other animals and that, in several respects, sounds uttered by birds offer the nearest analogy to human language. Miyagawa, Berwick, and Okanoya (2013) suggest that human language combines two communication forms found in animals: (1) the expression layer — changeable organization of sentences, and (2) the lexical layer — the core content of a sentence. For example, birdsongs resemble the expression layer of the sentences, whereas the communicative waggles of bees or sounds comprising short messages by primates resemble the lexical layer. Miyagawa et al. (2013) indicate that humans can both communicate essential information like bees and primates, and have a melodic capacity and ability to recombine parts of sentences like birds.

[2] We used sound alternatives that the manager responsible for the atmosphere of the car park approved. The manager did not approve human vocal sound.

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Because of its resemblance to human language and melodic capacity, we decided to use birdsongs for the animal-vocal-sound condition. Because birdsongs have a melody like the instrumental music we use, it also allows us to control for tempo and rhythm of the sound conditions to some extent. Additionally, we set the volume of the two ambient-sound conditions at the same level to avoid any confounding effect of a change in the volume level, because greater loudness could presumably suggest greater social presence (Bruner, 1990). The three different sound conditions were played in different blocks of time. To assess car parkers' perceptions of safety, experimenters approached customers after they had parked their cars and been through the stairwells. Experimenters manned each of the three stairwells. Compliance with questioning was 90%, which was not a surprise, with each participant being offered a half-hour of free parking for answering the questionnaire.

3.1.2. Procedure and measure

Seventy-seven individuals whose ages varied between 22 and 74 agreed to participate (47 males and 30 females). Questions concerned perceived safety and demographics. Perceived safety was measured using a five-item 5-point scale (worried, tense, comfortable, safe and alone) anchored at "strongly disagree" and "strongly agree". We also asked participants in the two ambient-sound conditions whether they had noticed the music in the stairwell and whether they had realized it was coming from loudspeakers. All participants responded in the affirmative to both questions. Finally, we measured some demographics.

3.2. Results and discussion

Gender and age did not have a significant effect on perceived safety (all ps > .20) and were not considered further.

To explore the effect of ambient sounds on perceived safety, we conducted an analysis of variance with perceived safety as the dependent variable and ambient sound (animal vocal, instrumental, and no sound) as the independent variable. The main effect for ambient sound on perceived safety was marginally significant ($F(2, 74) = 2.96$, $p = .06$; Cronbach's alpha for perceived safety = .66). Simple contrast tests showed that participants felt higher perceived safety in the underground car park when animal vocal sounds were played in the stairwells ($M_{animalvocalsound} = 3.82$) versus when instrumental sounds ($M_{instrumentalsound} = 3.48$; $F(1, 74) = 4.06$, $p < .05$) or no sound ($M_{nosound} = 3.50$; $F(1, 74) = 4.85$, $p < .05$) was present. We found no significant difference between the no-sound and the instrumental-sound conditions ($p > .20$). If we collapsed the no-sound and instrumental-sound conditions, we found a significant difference between the animal-vocal-sound condition and the no-/instrumental-sound condition ($F(1, 75) = 5.98$, $p < .05$). Supporting (H2), these results suggested that vocal sounds had a significant effect on increasing the perceived safety in this car park versus no sound and instrumental sound. Note that we obtained this result despite participants knowing that both sounds were broadcasted from a music system.

In study 1b, we determine whether our results replicate in a more tightly controlled environment — a laboratory in Paris.

4. Study 1b

We created a videotape that was recorded in the underground car park from study 1a. The video was recorded from the participant's perspective with the intention of creating an environment where participants were able to imagine that they were actually walking in the car park. Zettl (1990) suggested that subjective camera shots created a view through the entity's eyes and hence transformed the viewer from a spectator to an active participant of event, encouraging the viewer to feel part of the event and sometimes even to react physically to the event by shouting and/or moving. To facilitate this perspective of the self and not of an observer, our video showed what a participant would see if she were walking in the car park. Thus, the participant could not see her own body (i.e., the videographer's) and could hear her own (i.e., the videographer's) footsteps in the video. The same ambient sounds – animal vocal sound (birdsongs) and instrumental sound (classical music) – used in the field study were incorporated into this video. The sound of the footsteps was present in all three conditions (including the no-sound condition). AtooMedia, a professional agency in Paris that designs and installs sounds for retail outlets, prepared the video.[3]

4.1. Methodology

4.1.1. Design and procedure

Similar to the field study, we used a one-way between-subjects design with three sound conditions (animal vocal, instrumental, and no sound). Eighty-five students from a university in Paris participated in this laboratory experiment as part of their course requirements (29 males and 56 females). Participants were asked to watch the video (60 s) before they answered the questionnaire. Then, we measured perceived safety the same way as in study 1a, except that we used 7-point scales instead of 5-point scales. We also asked respondents questions about demographics.

4.2. Results and discussion

Gender and age did not have a significant effect on perceived safety (all ps > .20) and were not considered further.

We conducted an analysis of variance with perceived safety as the dependent variable and ambient sound as the independent variable. Our results revealed a significant main effect for sound ($F(2, 84) = 3.87$, $p < .05$; Cronbach's alpha for perceived safety = .82). Simple contrast tests showed, as hypothesized (H2) that participants felt higher levels of perceived safety when animal vocal sounds were played in the video ($M_{animalvocalsound} = 4.58$) versus when instrumental sounds were played ($M_{instrumentalsound} = 3.72$; $F(1, 84) = 5.09$, $p < .05$) or no sound was played ($M_{nosound} = 3.81$; $F(1, 84) = 6.71$, $p < .05$). We found no significant difference between the no-sound and instrumental-sound conditions ($p > .20$).

4.2.1. Post-test

We conducted a post-test to explore whether participants perceived the sound conditions used in studies 1a and 1b to be appropriate for the car park and whether participants' attitudes toward the different sound conditions were similar. We measured perceived appropriateness of the sounds ("I believe the sound used in the car park is appropriate") with a 7-point item anchored at "strongly disagree" to "strongly agree." We measured participants' attitudes toward the sound conditions with a three-item 7-point scale anchored at "strongly disagree" and "strongly agree," along which participants indicated how much they agreed with the following statements: (1) "I have a positive attitude toward the sound in the car park," (2) "I have a favorable attitude toward the sound in the car park," and (3) "I think the sound in the car park is good" (Cronbach's alpha = .95).

We conducted an analysis of variance with sound condition as the independent variable and perceived appropriateness of the sounds as the dependent variable. We found no significant main effect of sound condition ($M_{animalvocalsound} = 4.33$, $M_{instrumentalsound} = 4.29$, and $M_{nosound} = 4.76$) on perceived appropriateness ($F(2, 43) = .41$, $p > .20$). Simple contrast tests revealed no significant difference between the effects of any two sound conditions on perceived appropriateness (all ps > .20). Another analysis of variance with sound condition as the independent variable and attitude toward the sounds as the dependent variable also revealed no significant main effect of sound condition ($M_{animalvocalsound} = 3.76$, $M_{instrumentalsound} = 4.45$,

[3] The video of the instrumental condition can be seen at http://youtu.be/eLQuHluSwEs.

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and $M_{nosound} = 3.83$) on participants' attitudes toward the sounds ($F(2, 43) = .82$, $p > .20$). Simple contrast tests also revealed no significant difference between the effects of any two sound conditions on attitude toward the sounds (all ps > .20). We find that different sound conditions (animal vocal, instrumental, and no sound) do not affect either perceived appropriateness or participants' attitudes toward the sound. Accordingly, different perceptions regarding appropriateness of the sound conditions or participants' attitudes toward the sound conditions cannot lead to our results.

Although studies 1a and 1b assume perceived safety increases with animal vocal sounds because of perceived social presence, this process is not measured. In study 2, we directly measure social presence.

5. Study 2

Studies 1a and 1b examined the effect of no sound, instrumental sound, and animal vocal sound on perceived safety. Interestingly, participants in both studies associated animal vocal sounds with higher perceived safety than instrumental sounds. The thought that birds were actually in the area could have had a soothing effect on participants. However, the participants knew that both sounds were broadcasted from a music system and that no birds were in the area. In study 2, we added human vocal sounds as another sound condition. We argue that vocal sounds create a sense of social presence and increase perceived safety in a public place. Accordingly, we expected human vocal sounds to also be effective in conveying social presence and thus increasing perceived safety. In this study, we additionally measured perceived social presence and satisfaction. We explored the effect of ambient sound on perceived social presence, perceived safety, and satisfaction with the public place. Further, we tested if perceived social presence and perceived safety serially mediated the effect of ambient sound on satisfaction.

5.1. Methodology

5.1.1. Design

We used a one-way between-subjects design with four sound conditions: human vocal, animal vocal, instrumental, and no sound. We used the same video as in study 1b but changed the sounds used. In determining the sounds, we were fastidious in controlling various aspects of sound. Besides volume, which we controlled across the sound condition in studies 1a and 1b, we also controlled two other aspects of sound — tempo and rhythm. Prior research suggests a positive relationship between musical pace (tempo) and affect. Studies show that fast music is more joyous than slow music, which is considered more tranquil (Hevner, 1937; Swanwick, 1973). Prior research has also examined rhythm of music and found that people perceive firm rhythms (high pitch) to be more serious and smooth-flowing rhythms (low pitch) to be more playful (Hevner, 1936).

Thus, in creating human vocal, animal vocal, and instrumental sounds, we tried to equate volume, tempo, and rhythm as much as possible. We selected different versions of the same music, Alleluia, arranged by Ralph Manuel, as the instrumental and human vocal sounds. In the instrumental-sound condition, the music was played with only instruments, whereas in the human-vocal-sound condition, human voices alone created the music. Additionally, we arranged the tempo, rhythm, and volume of the sound conditions to be as similar as possible in order to avoid confounding effect of tempo, rhythm, and volume across three sound conditions.

5.1.2. Measures and procedure

One hundred and one students from a midwestern university in the United States participated in this study as part of a paid subject pool. The participants were asked to watch the 60-second video of the car park and then answer a questionnaire. First, we measured perceived safety in the same way as in study 1b. We measured satisfaction with the car park using a three-item 7-point scale (adopted from Oliver, 1980) along which participants indicated how much they agreed with the following statements: (1) "I am satisfied with this car park," (2) "Parking in this car park is a positive experience," and (3) "Parking in this car park is a good experience." Next, we measured perceived social presence using a five-item 7-point scale (adopted from Gefen & Straub, 2004) anchored at "strongly disagree" and "strongly agree": (1) "This car park is a friendly place," (2) "This car park seems to be alive," (3) "There is a sense of human warmth in this car park," (4) "I feel like there are others in this car park," and (5) "I feel human sensibility in this car park." This social-presence scale assumes a positive presence of others where respondents do not detect a threat from the presence of others. We then examined mood using a four-item 7-point scale anchored at "strongly disagree" and "strongly agree": (1) "Currently I am in a good mood," (2) "As I answer these questions I feel very cheerful," (3) "For some reason I am not very comfortable right now," and (4) "At this moment I feel 'edgy' or irritable" (Peterson & Sauber, 1983). Finally, participants were questioned regarding their demographics.

5.2. Results and discussion

The effects of gender, age, and mood were not significant (all ps > .20) and were not considered further.

5.2.1. Perceived safety

An analysis of variance with perceived safety as the dependent variable and sound as the independent variable revealed a significant main effect for sound ($F(3, 97) = 6.70$, $p < .01$; Cronbach's alpha for perceived safety = .88). Consistent with H2, we found that perceived safety was highest when the video had human vocal sounds ($M_{humanvocalsound} = 5.05$), followed by animal vocal sounds ($M_{animalvocalsound} = 4.04$), instrumental sound ($M_{instrumentalsound} = 3.55$), and no sound ($M_{nosound} = 3.21$).

Simple contrast tests suggested that perceived safety with human vocal sounds was significantly higher than with animal vocal sounds ($F(1, 97) = 6.14$, $p < .01$), instrumental sounds ($F(1, 97) = 14.61$, $p < .01$), and no sound ($F(1, 97) = 16.38$, $p < .01$). Further, perceived safety with animal vocal sounds was marginally higher than with instrumental sounds ($F(1, 97) = 2.81$, $p < .10$), and significantly higher than with no sound ($F(1, 97) = 4.96$, $p < .05$). Perceived safety with instrumental sounds was not significantly higher than with no sound ($p > .20$).

5.2.2. Satisfaction

Another analysis of variance with "satisfaction" with the car park as the dependent variable and sound as the independent variable revealed a marginally significant main effect of sound on satisfaction ($F(3, 97) = 2.59$, $p = .06$; Cronbach's alpha for satisfaction = .91) (H3). Consistent with H3, satisfaction was highest when the video had human vocal sounds ($M_{humanvocalsound} = 5.26$), followed by animal vocal sounds ($M_{animalvocalsound} = 4.75$), instrumental sounds ($M_{instrumentalsound} = 4.34$), and no sound ($M_{nosound} = 3.92$).

Simple contrast tests revealed that satisfaction was significantly higher with human vocal sounds than with instrumental sounds ($F(1, 97) = 3.96$, $p < .05$) and with no sound ($F(1, 97) = 6.34$, $p < .05$). We found no significant difference between the effect of human vocal sounds and animal vocal sounds on satisfaction ($p > .20$). Further, satisfaction with animal vocal sounds was marginally higher than with no sound ($F(1, 97) = 3.66$, $p = .06$), but not significantly higher than with instrumental sounds ($p > .20$). Finally, we found no significant difference between the effect of the instrumental-sound and no-sound conditions on satisfaction ($p > .20$).

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5.2.3. Social presence

A third analysis of variance with perceived social presence as the dependent variable and sound as the independent variable indicated a significant main effect for sound ($F(3, 97) = 3.91$, $p < .01$; Cronbach's alpha for perceived social presence = .84). As hypothesized (H1), participants felt the greatest social presence with human vocal sounds ($M_{humanvocalsound} = 4.08$), followed by with animal vocal sounds ($M_{animalvocalsound} = 3.73$), instrumental sounds ($M_{instrumentalsound} = 3.27$), and finally with no sound ($M_{nosound} = 2.86$).

Simple contrast tests showed that perceived social presence with human vocal sounds was not significantly higher than with animal vocal sounds ($p > .10$), but was significantly higher than with instrumental sounds ($F(1, 97) = 5.00$, $p < .05$) and with no sound ($F(1, 97) = 8.66$, $p < .01$). Additionally, perceived social presence with animal vocal sounds was marginally higher than with instrumental sounds ($F(1, 97) = 2.93$, $p < .10$), and significantly higher than with no sound ($F(1, 97) = 6.69$, $p < .05$). We found no significant difference between the effect of instrumental sound and no sound ($p > .20$) on perceived social presence.

5.2.4. Serial mediation

Serial mediation assumes a causal link between the mediators, with a specific direction of causal flow (Hayes, 2012). To test H4 – that the effect of sound on satisfaction would be mediated by both perceived social presence and perceived safety respectively – we used the PROCESS computational macro (Model 6) for SPSS from Hayes (2012). We collapsed the data to have two sound conditions (vocal vs. non-vocal) to run the serial mediation analysis. In serial mediation, mediators are assumed to have a direct effect on each other (Hayes, 2012), and the independent variable (sound conditions) is assumed to influence mediators in a serial fashion that subsequently influences the dependent variable (satisfaction). As Fig. 1 shows, the specific indirect effects of sound on safety are through (1) social presence, (2) social presence and perceived safety, and (3) perceived safety.

The indirect path of the effect of sound on satisfaction through social presence was significant, with the 95% confidence interval excluding zero (effect size = .2128, CI: .0653, .4632). Vocal sounds increased perceived social presence, which in turn increased satisfaction with the car park. The indirect path of the effect of sound on satisfaction through both social presence and perceived safety, respectively, was significant, with the 95% confidence interval excluding zero (effect size = .2893, CI: .1070, .5540). Vocal sounds serially increased perceived social presence and perceived safety, which in turn increased satisfaction. And finally, the indirect path of the effect of sound on satisfaction through perceived safety was also significant, with the 95% confidence interval excluding zero (effect size = .3556, CI: .0229, .7799). Vocal sounds increased perceived safety, which in turn increased satisfaction. Hence, we could conclude that the effect of sound condition was carried to satisfaction through perceived social presence and the feeling-of-safety, respectively (H4) (please see Fig. 2 for the path coefficients).

6. Study 3

Studies 1a, 1b, and 2 examine the effect of sound on perceived social presence, perceived safety, and satisfaction in a car park. In study 3, we explore the effect of ambient sound in a metro station to see whether we can replicate our results in another public area. Additionally, we examine the effect of ambient sound on participants' behavioral intentions, such as their willingness to purchase a monthly metro pass. Thus, we demonstrate how vocal ambient sounds increase perceived social presence and the feeling-of-safety, which are then reflected in consumers' behavioral intentions.

6.1. Methodology

6.1.1. Design

We used a one-way between-subjects design with four sound conditions: human vocal, animal vocal, instrumental, and no sound. We prepared a video in a metro station, and used the same sounds as in study 2. We controlled various aspects of sounds as in study 2.

6.1.2. Measures and procedure

147 students from a university in Istanbul participated in this study as part of their course requirements. The participants were asked to watch the 60-second video of the metro station, and then answered a questionnaire. In this experiment, we included a new item to measure the effect of ambient sounds on participants' willingness to purchase a monthly metro pass. First, participants indicated how much they agreed with the following statement on a 7-point scale: "I would like to purchase a monthly metro pass to use in this metro station." Then, we

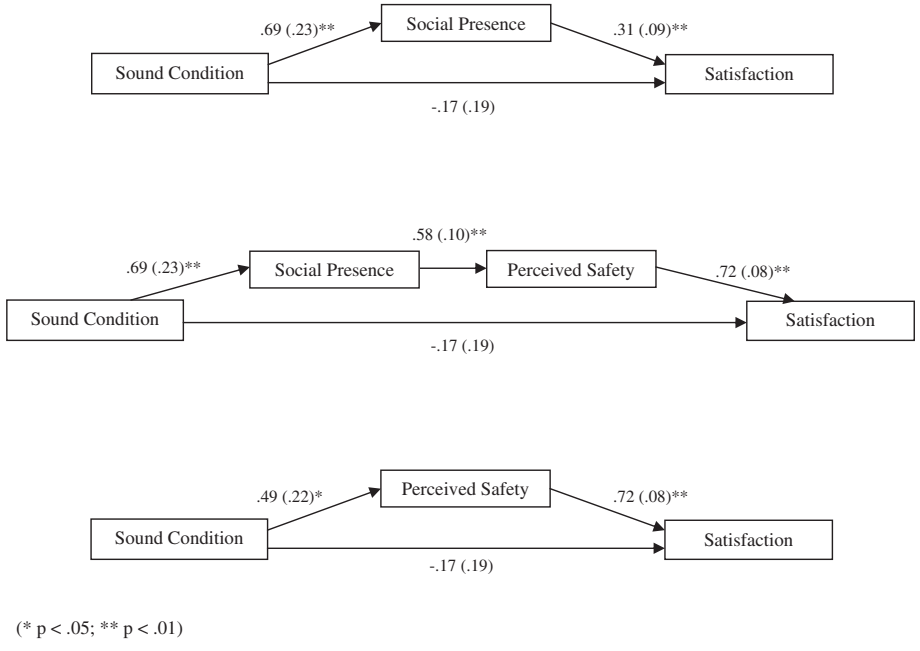

Fig. 2. Study 2 — path coefficients for serial mediation models for the effect of sound condition on social presence, perceived safety, and satisfaction.

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measured perceived safety and perceived social presence consecutively as in study 2. Next, we measured perceived appropriateness of the sound conditions as in Study 1. Additionally, we measured participants' attitudes toward the sounds using a three-item 7-point scale anchored at "strongly disagree" and "strongly agree," along which participants indicated how much they agreed with the following statements: (1) "I have a positive attitude toward the sound in the metro station," (2) "I have a favorable attitude toward the sound in the metro station," and (3) "I think the sound in the metro station is good." Then, we measured the average duration (in seconds) participants took to answer the questions to explore whether the sound conditions had any effect on the attention given to the questions. Finally, participants were questioned regarding their demographics.

6.2. Results and discussion

The effects of gender and age were not significant (all ps > .20) and were not considered further.

6.2.1. Manipulation check

To rule out possible alternative explanations, such that participants' perceptions regarding the appropriateness of the sound conditions, or their attitudes or attention levels toward the sound conditions might lead to our findings, we explored the effect of sound conditions on these variables. First, we conducted an analysis of variance with sound condition as the independent variable and perceived appropriateness of the sound as the dependent variable. We found a significant main effect of sound condition on perceived appropriateness ($F(3, 144) = 6.55$, $p < .01$). Contrast tests revealed the no-sound condition ($M = 5.00$) was considered significantly more appropriate than the three sound conditions — instrumental sounds ($M = 3.71$; $F(1, 144) = 13.33$, $p < .01$), animal vocal sounds ($M = 3.61$; $F(1, 144) = 15.05$, $p < .01$), and human vocal sounds ($M = 3.86$; $F(1, 144) = 10.20$, $p < .01$) — which were not significantly different from each other (all ps > .20).

A second analysis of variance with attitude toward the sound used in the metro station (Cronbach's alpha = .96) as the dependent variable mirrored the results for perceived appropriateness of sound. We found a significant main effect of sound on attitude toward the sound ($F(3, 144) = 5.42$, $p < .01$). Contrast tests revealed that attitude toward the no-sound condition ($M = 2.85$) was significantly lower than in the three sound conditions – instrumental sounds ($M = 4.04$; $F(1, 144) = 10.06$, $p < .01$), animal vocal sounds ($M = 4.17$; $F(1, 144) = 11.91$, $p < .01$), and human vocal sounds ($M = 4.07$; $F(1, 144) = 10.41$, $p < .01$) – which were not significantly different from each other (all ps > .20).

Finally, to demonstrate that different sound conditions did not have an effect on the attention paid to the questions, we conducted an analysis of variance using sound condition as the independent variable and average time spent (in seconds) for each sound question as the dependent variable. Our results revealed no significant main effect of no sound ($M = 6.23$), instrumental sound ($M = 5.74$), animal vocal sound ($M = 5.87$), and human vocal sound ($M = 6.04$; $p > .20$) conditions on the average time spent answering questions. Simple contrast tests revealed no significant difference between the effects of any two sound conditions on average time spent (all ps > .20).

We argue that animal vocal and human vocal sounds result in greater social presence, perceived safety, and willingness to purchase than no sound and instrumental sounds. However, this pattern is not reflected in the effect of sound condition on perceived appropriateness of the sounds, attitude toward the sounds, or average time spent on the questions. These results on perceived appropriateness, participants' attitudes toward the sounds, and average time spent to answer questions cannot explain our findings.

6.2.2. Willingness to purchase

An analysis of variance with willingness to purchase a monthly metro pass as the dependent variable and sound as the independent variable indicated a significant main effect of sound ($F(3, 144) = 3.23$, $p < .05$) on willingness to purchase. As hypothesized (H3), participants had the greatest willingness to purchase a metro pass when exposed to human vocal sounds ($M_{humanvocalsound} = 3.92$), followed by animal vocal sounds ($M_{animalvocalsound} = 3.78$), no sound ($M_{nosound} = 3.18$), and instrumental sounds ($M_{instrumentalsound} = 3.03$).

Simple contrast tests revealed that willingness to purchase with human vocal sounds was not significantly higher than with animal vocal sounds ($p > .20$), but was significantly higher than with instrumental sounds ($F(1, 144) = 6.81$, $p < .05$), and with no sound ($F(1, 144) = 4.49$, $p < .05$). Additionally, willingness to purchase with animal vocal sounds was significantly higher than with instrumental sounds ($F(1, 144) = 4.76$, $p < .05$), and marginally higher than with no sound ($F(1, 144) = 2.88$, $p = .09$). We found no significant difference between the effects of instrumental sound and no sound on willingness to purchase ($p > .20$).

6.2.3. Perceived safety

Another analysis of variance with perceived safety as the dependent variable and sound as the independent variable revealed a marginally significant main effect of sound ($F(3, 144) = 2.96$, $p = < .10$; Cronbach's alpha for perceived safety = .91) on perceived safety. Consistent with H2, we saw that perceived safety was highest with human vocal sounds ($M_{humanvocalsound} = 3.42$), followed by with animal vocal sounds ($M_{animalvocalsound} = 3.24$), instrumental sounds ($M_{instrumentalsound} = 3.02$), and no sound ($M_{nosound} = 2.70$). When we collapsed the data to have two sound conditions (non-vocal vs. vocal), we found a significant difference between non-vocal ($M = 2.86$) and vocal ($M = 3.33$) sound conditions on perceived safety ($F(1, 146) = 5.08$, $p < .05$).

Simple contrast tests revealed that perceived safety with human vocal sounds was significantly higher than with no sound ($F(1, 144) = 5.87$, $p < .05$), but not significantly higher than with instrumental sounds ($p > .10$) and with animal vocal sounds ($p > .20$). Further, perceived safety with animal vocal sounds was marginally higher than with no sound ($F(1, 144) = 3.31$, $p = .07$), but not significantly higher than with instrumental sounds ($p > .10$). Perceived safety with instrumental sounds was not significantly different than no sound ($p > .20$).

6.2.4. Social presence

An analysis of variance with perceived social presence as the dependent variable and sound as the independent variable indicated a significant main effect of sound on perceived social presence ($F(3, 144) = 7.60$, $p < .01$; Cronbach's alpha for social presence = .85). As hypothesized (H1), participants felt the greatest social presence with human vocal sounds ($M_{humanvocalsound} = 3.41$), followed by with animal vocal sounds ($M_{animalvocalsound} = 3.37$), instrumental sounds ($M_{instrumentalsound} = 2.58$), and no sound ($M_{nosound} = 2.29$).

Simple contrast tests revealed that perceived social presence with human vocal sounds was not significantly higher than with animal vocal sound ($p > .20$), but was significantly higher than with instrumental sounds ($F(1, 144) = 8.35$, $p < .01$) and with no sound ($F(1, 144) = 15.10$, $p < .01$). Additionally, perceived social presence with animal vocal sounds was significantly higher than with instrumental sounds ($F(1, 144) = 11.32$, $p < .05$) and with no sound ($F(1, 144) = 13.73$, $p < .01$). We found no significant difference between the effect of instrumental sounds and no sound on perceived social presence ($p > .20$).

6.2.5. Serial mediation

To test H4 – that the effect of sound on willingness to purchase would be mediated by both perceived social presence and perceived safety respectively – we used the PROCESS computational macro (Model 6) for SPSS from Hayes (2012). We collapsed the data to have two sound conditions (vocal vs. non-vocal) to run the mediation

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analysis. The indirect path of the effect of sound on willingness to purchase through perceived social presence was significant, with the 95% confidence interval excluding zero (effect size = .2576, CI: .1876, .8646). The indirect path of the effect of sound on willingness to purchase through both social presence and perceived safety, respectively, was significant, with the 95% confidence interval excluding zero (effect size = .0811, CI: .0113, .2297). And finally, the indirect path of the effect of sound on willingness to purchase through perceived safety was also significant, with the 95% confidence interval excluding zero (effect size = .1701, CI: .0401, .3706). Vocal sounds serially increased perceived social presence and perceived safety, which in turn increased willingness to purchase a metro pass. Hence, we conclude that the effect of sound condition was carried through to willingness to purchase via both perceived social presence and perceived safety (H4). Vocal sounds increased perceived social presence and perceived safety, which in turn increased willingness to purchase. (Please see Fig. 3 for the path coefficients.).

7. Study 4

In previous studies, we explored the effect of different ambient sounds (vocal vs. non-vocal) in such public areas as a car park and a metro station, and demonstrate the effect of vocal sounds on perceived social presence, the feeling-of-safety, satisfaction with the public area, and finally, on consumers' willingness to purchase. Our results reveal that vocal sounds increase perceived social presence and hence lead to an increased feeling-of-safety, satisfaction, and willingness to purchase. However, as discussed previously, the existence of others around might have a frightening effect if people see them as threats, in which case, we would no longer expect an increase in perceived social presence to have a positive effect on one's feeling-of-safety. In this study, we use a vocal sound that might be perceived as threatening and compare its effect with the effect of non-threatening vocal-sound and no-sound conditions on perceived social presence, feeling-of-safety, and willingness to purchase.

7.1. Methodology

7.1.1. Design

We used a one-way between-subjects design with three sound conditions: threatening vocal sound, non-threatening vocal sound, and no sound. We used the same video taken in the metro station.

7.1.2. Pre-test

To identify the sound conditions, we conducted a pre-test with 77 students. We used the birdsongs from previous studies as the non-threatening-vocal-sound condition. For the threatening-vocal-sound condition, we used the sounds of wild birds. We arranged the tempo, rhythm, and volume of the sound conditions to be as similar as possible.

We used a 7-point item anchored at "strongly disagree" to "strongly agree" to measure whether vocal sounds are perceived to be threatening ("The sounds in the metro station made me more alert"). We believe a possible threat in the environment will increase individuals' alertness. We conducted an analysis of variance with sound condition as the independent variable and perceived threat from the sounds as the dependent variable. Our results revealed a significant main effect of sound condition ($M_{threateningvocalsound} = 5.84$, $M_{notthreateningvocalsound} = 4.74$, and $M_{nosound} = 4.92$) on perceived threat ($F(2, 75) = 3.62$, $p < .05$). Simple contrast tests revealed that perceived threat with threatening vocal sounds was significantly greater than with non-threatening vocal sounds ($F(1, 75) = 6.38$, $p < .05$) and with no sound ($F(1, 75) = 4.36$, $p < .05$). We found no significant difference between the effect of non-threatening vocal sounds and no sound on perceived threat ($p > .20$).

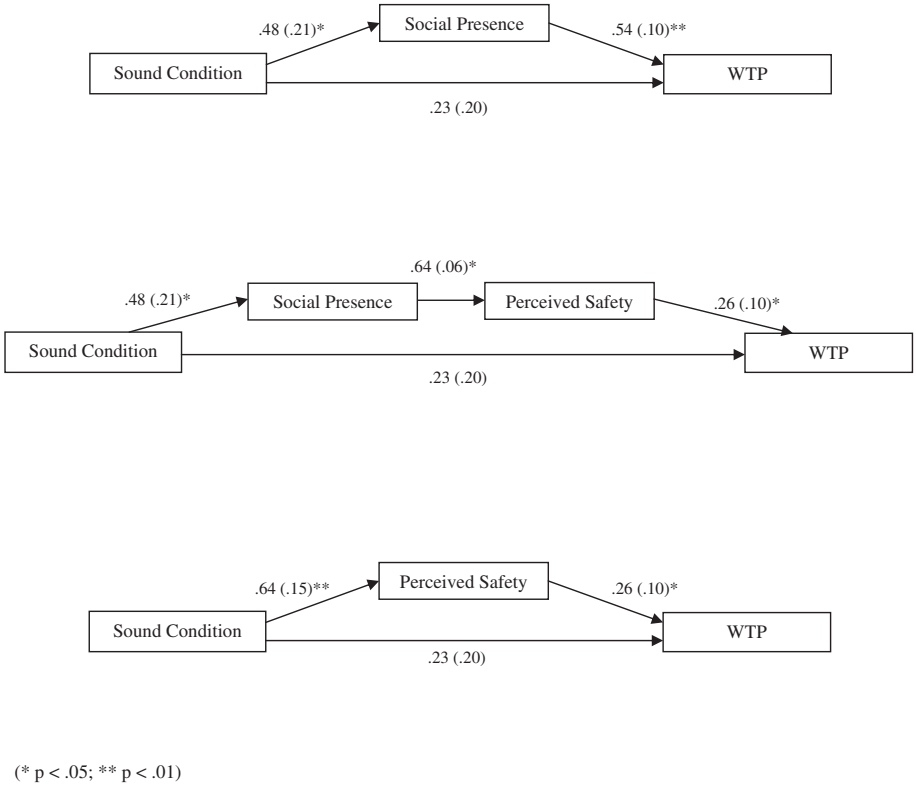

Fig. 3. Study 3 — path coefficients for serial mediation models for the effect of sound condition on social presence, perceived safety, and willingness to purchase (WTP).

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7.1.3. Measures and procedure

One hundred and thirteen students from a university in Istanbul participated in this study as part of their course requirements. The participants were asked to watch the 60-second video of the metro station, and then answered a questionnaire. First, we measured willingness to purchase a metro pass and perceived safety consecutively as in the previous study. Then, we measured social presence slightly differently with a three-item 7-point scale anchored at "strongly disagree" and "strongly agree," along which participants indicated how much they agreed with the following statements: (1) "I feel like there are others in this metro station," (2) "This metro station seems to be alive," and (3) "Sounds in this metro station create a sense of presence of others" (Cronbach's alpha = .63). We included only neutral items in the scale. The scale we used in the previous studies was positive in nature and would not be suitable to measure perceived social presence when participants were exposed to the threatening-vocal-sound condition. Next, as in the pre-test, we measured whether vocal sounds were perceived to be threatening. Finally, participants were questioned regarding their demographics.

7.2. Results and discussion

The effects of gender and age were not significant (all ps > .20) and were not considered further.

7.2.1. Manipulation check

An analysis of variance with perceived threat as the dependent variable and sound as the independent variable revealed a significant main effect of sound on perceived threat ($F(2, 110) = 13.02$, $p < .01$). As expected, perceived threat was highest for the threatening sounds ($M_{threateningvocal} = 6.11$), followed by no sound ($M_{nosound} = 4.87$) and non-threatening sounds ($M_{notthreateningsound} = 4.42$). Simple contrast tests demonstrated that perceived threat with threatening vocal sounds was significantly higher than with no sound ($F(1, 110) = 13.14$, $p < .10$) and with non-threatening vocal sounds ($F(1, 110) = 24.38$, $p < .01$). Perceived threat with no sound was not significantly different than not threatening vocal sounds ($p > .20$).

7.2.2. Willingness to purchase

An analysis of variance with willingness to purchase a monthly metro pass as the dependent variable and sound as the independent variable revealed a marginally significant main effect of sound ($F(2, 110) = 22.59$, $p < .10$) on willingness to purchase. Willingness to purchase was highest with non-threatening vocal sounds ($M_{nonthreateningvocal} = 3.63$), followed by no sound ($M_{nosound} = 3.34$), and lowest with threatening vocal sounds ($M_{threateningvocal} = 2.84$).

Simple contrast tests revealed that willingness to purchase with non-threatening vocal sounds was significantly higher than with threatening sounds ($F(1, 110) = 5.07$, $p < .05$) but not significantly higher than with no sound ($p > .10$). We found no significant difference between the effects of no-sound and threatening-vocal-sound conditions on willingness to purchase ($p > .20$).

7.2.3. Perceived safety

An analysis of variance with perceived safety as the dependent variable and sound as the independent variable revealed a significant main effect of sound ($F(2, 110) = 4.95$, $p < .01$; Cronbach's alpha for perceived safety = .82) on perceived safety. As expected, we found that perceived safety was highest with non-threatening vocal sounds ($M_{nonthreateningvocal} = 2.93$), followed by no sound ($M_{nosound} = 2.54$), and was lowest with threatening vocal sounds ($M_{threateningvocal} = 2.20$).

Simple contrast tests revealed that perceived safety with non-threatening vocal sounds was marginally higher than with no sound ($F(1, 110) = 2.85$, $p < .10$) and significantly higher than with threatening vocal sounds ($F(1, 110) = 10.04$, $p < .01$). Perceived safety with no sound was not significantly different than with threatening vocal sounds ($p > .20$). These results suggest that only when vocal sounds were non-threatening did they have a positive effect on the feeling-of-safety.

7.2.4. Social presence

An analysis of variance with perceived social presence as the dependent variable and sound as the independent variable indicated a significant main effect of sound on perceived social presence ($F(2, 110) = 8.82$, $p < .01$). As hypothesized (H1), participants felt a greater social presence with vocal sounds ($M_{threateningvocal} = 3.05$; $M_{nonthreateningvocal} = 2.81$; $M_{nosound} = 2.18$).

Simple contrast tests revealed that perceived social presence with threatening vocal sounds ($F(1, 110) = 16.47$, $p < .01$) and non-threatening vocal sounds ($F(1, 110) = 8.74$, $p < .01$) was significantly greater than with no sound. We found no significant difference between the effect of threatening and non-threatening vocal sounds on perceived social presence ($p > .20$). We observed that vocal sounds, whether threatening or not, had similar effects on perceived social presence in the metro station.

Our results demonstrate that when participants perceived vocal sounds to be threatening, increased social presence no longer positively influenced their feelings-of-safety or their willingness to purchase. On the contrary, increased social presence had a negative effect. Hence, perceived social presence no longer mediated the effect of sound conditions on perceived safety. However, as expected, perceived safety still mediated the effect of sound on willingness to purchase.

7.2.5. Mediation

To test H4 – that perceived safety would mediate the effect of sound on willingness to purchase – we used the PROCESS computational macro (Model 4) for SPSS from Hayes (2012). The indirect path of the effect of sound on willingness to purchase through perceived social presence was significant, with the 95% confidence interval excluding zero (effect size = .2811, CI: .1184, .5073). (Please see Fig. 4 for the path coefficients.).

8. Conclusion

The effect of "sound" on consumer behavior has received much attention recently (Klink, 2000, 2001; Krishna, 2010; Lowrey & Shrum, 2007; Lowrey, Shrum, & Dubitsky, 2003; Meyers-Levy & Zhu, 2010; Spence, 2011, 2012; Yorkston & Menon, 2004). Our work adds to this stream of literature and suggests how different types of ambient sounds can affect perceptions of social presence, perceived safety, satisfaction, and willingness to purchase. Furthermore, although marketing research has investigated ambient music in shopping malls, little work has studied the effect of sound in other spaces. We demonstrate that sounds have a significant effect on the perceived safety of individuals in public places. We show that vocal sounds that are not perceived to be threatening increase perceived safety (versus instrumental sound or no-sound) by increasing perceived social presence. Additionally, we show that increased perceived safety translates into positive consumer responses for public places such as car parks and metro stations. However, when the vocal sounds are perceived to be threatening, increased social presence no longer positively affects perceived safety and other consumer responses.

The results of our first study provide some real-world evidence that ambient sounds can affect perceived safety of an environment. Specifically, we find that animal vocal sounds – versus instrumental sounds and no sound – increase perceived safety of individuals in a car park. We replicate these findings in a tightly controlled laboratory environment. In our second study, we include human vocal sounds as one of our sound conditions and perceived social presence as one of our mediators in the analysis. We demonstrate that perceived social presence and perceived safety mediate the effect of ambient sound on satisfaction. In our third study, we change our context and investigate the effect

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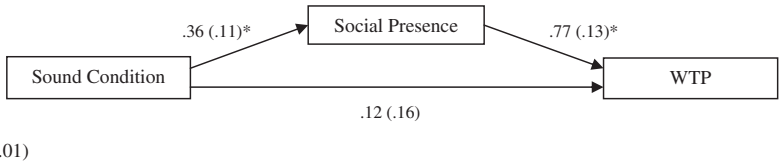

Fig. 4. Study 4 — path coefficients for mediation model for the effect of sound condition on perceived safety and willingness to purchase (WTP).

of ambient sound in a different public place, a metro station. Our results reveal that individuals have a greater willingness to purchase a monthly metro pass when they are exposed to vocal sounds (animal or human) versus no sound or instrumental sounds. We demonstrate that perceived social presence and perceived safety mediate the effect of sound on willingness to purchase. Finally, in our fourth study, we show that the effects found in the first three studies occur only when vocal sounds are not perceived to be threatening and hence create a positive sense of social presence. When vocal sounds are perceived to be threatening, increased social presence negatively affects perceived safety and other consumer responses.

This research contributes to the social presence literature by focusing on the role of vocal sounds on the sense of social presence — prior social presence literature has looked at the effect of human conversation but not at the effect of vocal music. Also, it has not compared the effect of human, animal, and instrumental music on social presence. We show that vocal music garners more perceived social presence and results in more perceived safety than instrumental music. We demonstrate that even human vocal music (not conversation) has the potential to create a greater feeling of social contact.

Our results have many important managerial implications as well. Some areas that are open to the public may actually be safe, but people may not think they are. Because people avoid going to places where they feel unsafe, their reluctance can have negative financial consequences for those places. By using ambient vocal sounds (human vocal sounds or animal vocal sounds) and not instrumental sounds, as is often done, or having no sound, which is the norm, increasing the perceived safety of such spaces might be possible, leading to more positive consumer responses. Additionally, we speculate that increased social presence in a public area might even dissuade perpetrators and decrease the occurrence of crimes.

Note that our research has many possibilities for further exploration in future research. We considered music and not conversation, because we felt such a focus could allow us to better control tempo and rhythm. However, future research should test if our results extend to conversation. Chattopadhyay, Dahl, Ritchie, and Shahin (2003) identify three voice characteristics – syllable speed, interphrase pausation, and pitch – and investigate their effects on consumers' response to advertising. They demonstrate that a voice with a faster syllable speed and low pitch leads to more favorable advertising and brand evaluations. Additionally, Moore, Hausknecht, and Thamodaran (1986) show that when the speech rate is faster than normal, consumers will have a reduced opportunity to process the substance of the advertisement and will focus more on the peripheral cues, such as the likeability of the voice. In this research, we equated the sound characteristics of volume, tempo, and rhythm as much as possible. The effects of such sound characteristics on perceived social presence and the feeling-of-safety might be investigated in the future. For example, a very low-pitched human vocal sound might create a social presence but not of the good kind (one might think an intruder is present). Similarly, future research could examine the effect of sound resonance on perceived social presence. We would expect sounds with a high resonance to create a feeling-of-emptiness and hence affect perceived social presence. Additionally, individual differences (e.g., susceptibility to anxiety) might exist in how sound affects perceived social presence and safety. As such, as we begin this research on sound and safety, many more questions could be explored.

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