

Dogs can enhance social perceptions: The influence of dogs on women's perceptions of safety in emotional contexts

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Abstract

Research has shown that dogs enhance safety-related social attributes of the individuals whom they accompany. We aimed to expand previous results by examining, in a sample of undergraduate women, the ability of dogs to improve people's social image in various emotional contexts. Participants ($n = 281$) assessed the safety-related attributes of a man and a woman depicted alone or accompanied by a dog in threatening and safe contexts. Using semantic differential scales, they were assessed in safety-related attributes that have been shown to be affected by threatening situations and modulated by the presence of a dog: aggressive - nonaggressive, untrustworthy - trustworthy, unfriendly - friendly, and dangerous - harmless. The results indicated that the man (i.e., high-aversive scenes) and woman (i.e., low-aversive scenes) in threatening scenes benefitted from the presence of a dog; they were perceived as less aggressive, more trustworthy, friendly, and harmless when walking with a dog compared to the alone condition. In safe contexts, the man (i.e., low-positive scenes) was also perceived more favorably by the participants when portrayed with a dog (vs. alone); however, the woman (i.e., high-positive scenes) was similarly perceived when alone and accompanied by a dog condition, according to the results for the majority of the social perception scales, which indicated a ceiling effect. Overall, the results show that the presence of a dog affects the perception that women have of the owner's safety-related image in aversive and low-positive contexts; however, dogs do not enhance the already favorable perceptions of owners in high-positive scenes. These findings indicate that the effect of the presence of a dog on individuals' social image is affected by the emotionality of the context in which they are portrayed.

Keywords: urban public spaces, dog, safety-related characteristics, social perception, human-animal interaction.

Introduction

Various researchers have studied the positive effect of dogs on human health (Friedman & Krause-Parello, 2018; Knight & Edwards, 2008; McNicholas et al., 2005). Specifically, human-dog interactions produce physical benefits; for instance, owning a dog can decrease blood pressure in older adults with hypertension (Friedmann et al., 2013) and provides motivation to exercise (e.g., Dall et al., 2017; Sirard et al., 2011), which decreases the risk of many chronic diseases and obesity (Booth et al., 2012; Saris et al., 2003). Psychological well-being is also improved by companion dogs; lower rates of loneliness, depression, and anxiety have been reported (Crossman et al., 2020; Le Roux & Kemp, 2009; Powell et al., 2019).

One of the mechanisms through which dogs influence well-being is their role as a social catalyst, i.e., their ability to facilitate human social interactions. For instance, the presence of a dog is associated with increased positive non-verbal behaviors (e.g., smiling), greater social approachability (i.e., more and longer social interactions with strangers), and higher rates of solicited and unsolicited helping behaviors from strangers (Eddy et al., 1988; Guéguen & Ciccotti, 2008; Hart et al., 1987; Lawson, 2001; McNicholas & Collis, 2000; Messent, 1985; Wells, 2004). In addition to promoting casual social interactions and introductions, dogs can facilitate the formation of new friendships (Wood et al., 2015). Dogs also serve as social catalysts in disabled populations (e.g., those with intellectual disabilities; Bould et al., 2018), and help families with autistic children (Burrows et al., 2008). This role as social facilitators might be partly explained by dogs' ability to enhance the positive social attributes of the individuals whom they accompany (Guéguen & Ciccotti, 2008; Wells, 2004). In line with this, people portrayed with a dog (vs. alone or with a bunch

of flowers) are perceived as happier and wealthier (Lockwood, 1983; Rossbach & Wilson, 1992), and elicit higher levels of tolerance (Lawson, 2001). Another study indicated that dog ownership could increase men's attractiveness by signaling caretaking behavior compatible with long-term relationships (Tifferet et al., 2013). In the same manner, the presence of a dog can affect one's professional image. For instance, the presence of a dog improves perceptions of therapists' personal qualities, i.e., enhances their likability and trustworthiness, which in turn elicits greater intent to self-disclose (Schneider & Harley, 2006). Furthermore, university students tended to perceive professors as more friendly when there was a dog in the office, compared to a cat or no animal (Wells & Perrine, 2001).

The presence of a dog also affects perceptions of social danger (i.e., the perceived threat of being attacked by another person; Andrews & Gatersleben, 2010). In a previous study (Delgado-Rodríguez et al., 2022), we assessed women participants' emotional reactions and sense of safety while viewing scenes of varying emotional intensity (from highly aversive to highly positive), i.e., a man in threatening scenes (high-aversive), a woman in threatening scenes (low-aversive), a man in safe scenes (low-positive), and a woman in safe scenes (high-positive). A man and a woman (in threatening and safe contexts) were portrayed alone or with a dog (i.e., "alone" and "dog" conditions), and participants were asked to imagine that were alone while facing this situation (e.g., walking down a threatening street in which there was a man walking with a dog). The results clearly showed that the participants felt better (i.e., more positive valence, more in control, and calmer) and safer when the man (in threatening and safe contexts) or woman (only in threatening contexts) was accompanied by a dog (vs. a man or woman alone, respectively). This suggest that

dogs affect safety-related social attributes of people even in threatening urban scenes. However, although previous literature has shown that people accompanied by a dog are perceived as friendlier and less dangerous (characteristics associated with safety) (Lockwood, 1983; Rossbach & Wilson, 1992), no studies have examined whether the presence of a dog enhances perceptions of the owner even in the context of highly threatening situations. In other words, previous studies examining the social characteristics of dog owners associated with safety (Lockwood, 1983; Rossbach & Wilson, 1992) did not control for the emotionality of the context in which the people and dogs were placed, so it is not known whether enhancement of dog owners' image as being safe occurs in all contexts. Assessing social perceptions of others in different emotional contexts might improve understanding of dogs' ability to impart positive social attributes to the individuals who they accompany.

We presented college women with the same pictures used in our previous studies, i.e., pictures of a man or a woman (walking alone and with a leashed dog) in threatening and safe urban public spaces. The participants were asked to assess three safety-related attributes of the depicted individual using semantic differential scales that have been shown to be affected by the presence of a dog: unfriendly-friendly, dangerous-harmless, and untrustworthy-trustworthy (Lockwood, 1983; Rossbach & Wilson, 1992; Schneider & Harley, 2006). We also included an aggressive-nonaggressive scale, because the stimuli involve threatening scenes (e.g., a man walking in an unsafe alley at night with no other passers-by). In this context, the aggressiveness attributed to the actor is relevant because being attacked is a real danger perceived by women in threatening situations (Burgess, 1995; Coble et al., 2003; Henderson & Bialeschki,

1993; Valentine, 1990). Moreover, women perceive that they are at higher risk of physical aggression in this context (Stanko, 1990).

Based on previous literature indicating that presence of a dog enhances people's safety-related characteristics (Lockwood, 1983; Rossbach & Wilson, 1992) and on our previous study in which women felt better and safer while viewing a man or woman walking with a dog in threatening scenes, we expect that safety-related social perceptions will be more favorable for men and women portrayed in threatening situations with a dog (vs. alone), i.e., they will be perceived as friendlier, harmless, more trustworthy, and nonaggressive. As for safe contexts, a ceiling effect could appear in high-positive contexts (i.e., women in safe scenes), in which the presence of a dog does not further enhance the actors' image. This effect has previously been described; it was shown that the positive effect of dogs on people's image seems to be enhanced in less positive situations (Schneider & Harley, 2006; Tifferet et al., 2013).

Method

Participants

We recruited 288 college women from the University of Jaén (Andalusia, Spain). No specific inclusion or exclusion criteria were applied, although some participants were excluded because of inconsistent image ratings (i.e., assessing several images only on some scales; $n = 4$) or problems with the identification code (different codes were included in Google Form and Psychopy [$n = 3$]). Thus, of the 288 undergraduate females who completed the study, we analyzed the data of 281 (M age = 21.43, $SD = 2.73$). We included only women because they feel less safe than men (Blöbaum & Hunecke, 2005; Boomsma & Steg, 2014) and seem to benefit more from the presence

of a dog in terms of the sense of safety (Christian et al., 2016) Further, women have a greater tendency than males to embrace dog companionship experience across underlying dimensions such as symbiotic relationship (i.e., the mutually beneficial bond between person and dog) (Dotson & Hyatt, 2008). The University of Jaén Institutional Review Board approved this study (SEPT.21/1.OTR).

Materials

Stimuli

Pictures were taken from our previous study (Delgado-Rodríguez et al., 2022), in which a man and a woman were photographed alone, and with medium- and small-sized dogs (Portuguese Podengo-like mixed-breed and wire-haired Dachshund, respectively) in three threatening and three safe urban scenes. In the current study, we used pictures in which the man and woman were alone and accompanied by the medium-sized dog in the three threatening/safe urban scenes (Table 1). The same actor (i.e., a man or woman) and dog (medium-size) were used in all pictures. The woman was 32 years old (height, 1.61 m; weight, 78 kilograms), and the man was 39 years old (height, 1.64 m; weight, 65 kilograms). Their faces were pixelated given that humans' faces are powerful affective cues (Jack & Schyns, 2015). An adult dog was depicted to avoid features associated with puppyhood. The three threatening and three safe contexts were from our previous study; they were selected from among 50 urban public spaces with characteristics associated with threatening ($n = 25$) and safe ($n = 25$) urban environments, as described in previous studies (Andrews & Gatersleben, 2010; Blöbaum & Hunecke, 2005; Blom et al., 2010; Boomsma & Steg, 2014; Valentine, 1990). The three most threatening and safe spaces were used to portray actors and dog. Pictures in the same urban space/emotional category (e.g., a

threatening street) had the same perceptual features (e.g., same position of and distance from the camera) across actors (a man and woman) and conditions (depicted alone vs. depicted with dog). Using the variable combination of actor gender (man vs. woman) and emotional context (threatening vs. safe) allowed us to study the effect of the presence of a dog in four contexts differing in emotionality (man/threatening, woman/threatening, man/safe, and woman/safe): to ensure that the four contexts differed in emotionality, we examined differences between them in valence, arousal, dominance, and threatening/safe. For the valence, dominance, and threatening/safe ratings, the results were as follows: man/threatening < woman/threatening < man/safe < woman/safe. For arousal ratings, the results were as follows: man/threatening > woman/threatening > man/safe > woman/safe. Based on those results, we referred to man/threatening and woman/threatening as high- and low-aversive contexts, respectively. Likewise, we referred to man/safe and woman/safe as low- and high-positive contexts, respectively.

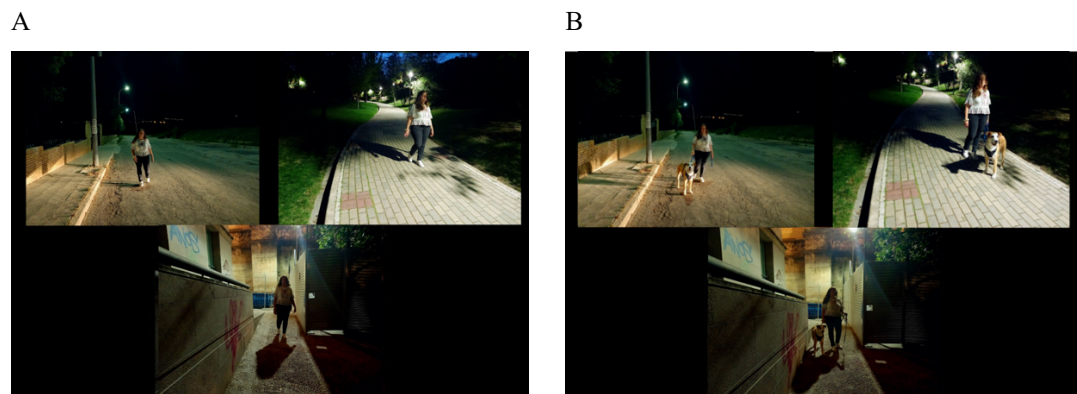
Table 1.
Categories of images.

Emotional context	Actors depicted	Types of urban space
Threatening	Man walking alone	Street, park, and suburb
	Man walking accompanied by a dog	Street, park, and suburb
	Woman walking alone	Street, park, and suburb
	Woman walking accompanied by a dog	Street, park, and suburb
Safe	Man walking alone	Street, park, and parking
	Man walking accompanied by a dog	Street, park, and parking
	Woman walking alone	Street, park, and parking
	Woman walking accompanied by a dog	Street, park, and parking

Given that our aim was to examine the modulatory effect of the dog on social perception in the four different emotional contexts (high/low-aversive and low/high-positive), the same actor (man or woman, alone or with a dog) was presented in all

three threatening or safe contexts simultaneously (e.g., the woman in the three threatening scenes while walking alone [Figure 1A] or walking with the dog [Figure 1B]). By showing the same actor simultaneously in all three types of urban space within each emotional context (i.e., threatening street, threatening park, and threatening suburb; safe street, safe park, and safe parking: see Table 1), we intended participants to have a global image of the actor in each emotional scene (threatening or safe) and condition (alone or accompanied by a dog) before the rating.

Figure 1.
Sample images presented to participants.



Note: This figure shows two slide categories; A depicts a woman walking alone in the three threatening urban public spaces (suburb, park, and street) and B depicts a woman walking with a dog in the same spaces.

Assessment measures

We used four different 9-point Likert-type semantic scales to assess social perceptions of the man and woman across picture categories. The scales were anchored by adjectives with opposing meanings. We selected the following adjective pairs from a previous study that assessed the influence of animals on social perceptions (Lockwood, 1983): aggressive-nonaggressive, dangerous-harmless, unfriendly-friendly, and untrustworthy-trustworthy. Because we aimed to assess the modulatory role of dogs on

perceptions of safety-related attributes, we selected adjectives likely to be more associated with perceived threat/safety. The negative polarity of the scales was at the left extreme (1: e.g., aggressive, dangerous), and the positive polarity was at the right extreme (9: e.g., nonaggressive, harmless); thus, lower ratings indicate more negative evaluations.

The 10-item Animal Attitude Scale (AAS-10) (Herzog et al., 2015) assessed participants' attitudes toward animals via statements scored on a 5-point Likert scale. We used the validated Spanish version (Suárez Yera et al., 2022) of the AAS-10, which has been shown to be a psychometrically robust brief measure of attitudes to animal welfare, with acceptable reliability (Cronbach's $\alpha = 0.8$). The Cronbach's α of the AAS-10 in the current study was 0.76. Total AAS-10 scores ranged from 10 to 50, with higher scores indicating more concern for animal welfare.

Procedure

The experiment was performed online in groups of approximately 50 individuals¹. The participants were on a Google Meet during the whole procedure, to maximize control of the environment while performing the experiment. Participants could expose their doubts to the researcher by activating their microphone or through the chat option (allowing the rest of the participants to benefit from other's doubts, similarly to face-to-face experimental sessions), however, participants could not interact each other privately. After signing the informed consent form (which was provided via a link to a Google Form), they were presented with sociodemographic and dog-related questions on a second Google Form (Table 2). Ultimately, we verbally explained both how to use the scales and the image assessment task; those

instructions were read at each session to ensure that each participant heard the same information.

Table 2. Participants' sociodemographic and dog/ownership-related information.

Questions	Mean (SD)/Frequency
Age (y)	21.43 (2.73)
Rodential area	Urban (>10.000 habitants): 174 Rural (<10.000 habitants): 107
Present dog ownership (Yes/No)	Yes: 143 No: 138
Importance attributed to dog (Yes/No) ¹	Yes= 142 No= 1
Past dog ownership ²	Yes: 55 No: 83
Importance attributed to dog in the past ³	Yes= 54 No= 1
AAS-10 score	40.08 (5.17)

Note: SD, standard deviation; AAS-10: Animal Attitude Scale, 10-items version. Excluding the age and AAS-10 scores, the data are frequencies.

¹ Sample comprises all current dog owners ($n = 143$).

² Sample comprises all participants who currently do not own a dog ($n = 138$).

³ Sample comprises all participants who owned a dog in the past ($n = 55$).

Image assessment task. Participants were presented with images of a woman or a man, alone or accompanied by a dog in threatening or safe urban spaces. As Table 1 shows, the human actors and dogs were depicted in three threatening (street, park, and suburb) and safe (street, park, and parking) urban spaces. Images were presented simultaneously in groups of three using the same actors (man or woman), dog condition (depicted alone vs. depicted with dog), and emotional context (threatening or safe; see *stimuli* section). Each “slide” (comprising three images) remained on the screen for 6 seconds. The participants were instructed to *rate the person that appears in the three images*. The rating scales (aggressive-nonaggressive, untrustworthy-trustworthy, unfriendly-friendly, and harmless-dangerous) appeared, one by one, after

the slides and remained on the screen until the participants had made their responses (by clicking on them with the mouse). The experiment was conducted using Pavlovia (<https://pavlovia.org/>) and was programmed in PsychoPy 3.2.3 (Peirce et al., 2019). Four pseudorandomized picture orders were used across the participants. More than one repetition of the same emotional context (i.e., threatening or safe) and dog condition (actor depicted alone vs. depicted with a dog) was avoided. At the end of the experiment, the participants were debriefed and thanked.

Statistical analyses

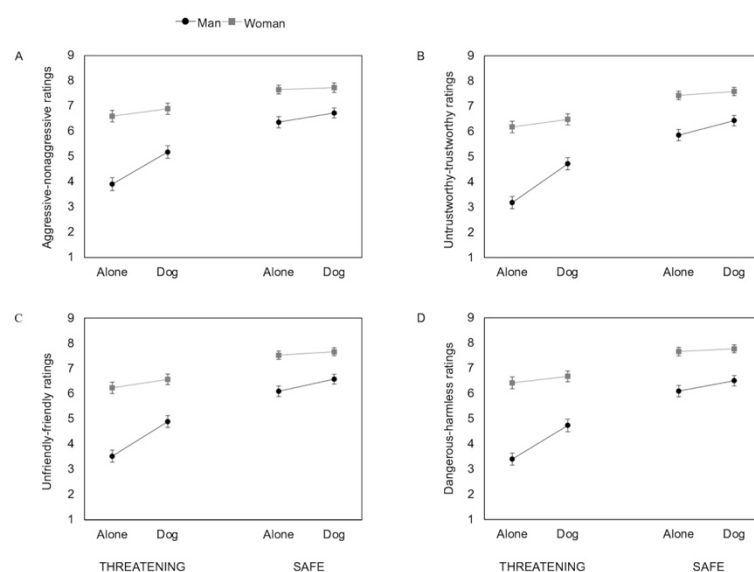
Since we aimed to examine whether the presence of a dog modulated social perceptions of the actors (man or woman) depending on the emotional context (threatening or safe), we performed separate repeated-measures ANOVAs for each semantic scale, with emotional context (threatening vs. safe), actor (man vs. woman), and “dog presence” (depicted alone vs. with a dog) as within-participant variables. The Greenhouse-Geisser correction was used to control for violation of the sphericity assumption. The post-hoc Šidák procedure was used to adjust for multiple comparisons. To control for the impact of outliers, we winsorized scores $> 3 SD$ above or below the mean. A small number of images were winsorized². Significance was set at $p < 0.05$ for all analyses and we used partial η^2 to quantify effect sizes. All data were analyzed using SPSS for Mac software (version 21.0; SPSS Inc., Chicago, IL, USA).

Results

Aggressive-nonaggressive scale (lower ratings correspond to higher perceived aggressiveness of the actor). The ANOVA yielded significant main effects of

emotional context ($F_{(1,280)} = 334.27, p < 0.001, \eta_p^2 = 0.54$), actor gender ($F_{(1, 280)} = 300.80, p < 0.001, \eta_p^2 = 0.52$), and dog presence ($F_{(1, 280)} = 63.87, p < 0.001, \eta_p^2 = 0.19$). The threatening contexts and male actor had lower scores (i.e., were perceived as more aggressive) than the safe contexts and female actor, respectively. Actors depicted alone had lower ratings than those accompanied by a dog. The ANOVA also showed a significant emotional context \times actor gender \times dog presence interaction, $F_{(1, 280)} = 17.02, p < 0.001, \eta_p^2 = 0.057$. Because our main interest was the modulatory role of dog presence (actor depicted alone vs. with a dog), we performed post hoc comparisons according to emotional context (threatening and safe) and actor gender (man and woman). In the threatening emotional context, the *man* ($p < 0.001$) and *woman* ($p < 0.01$) alone had lower ratings than those accompanied by a dog. In the safe emotional context, the *man* alone had lower ratings than the man accompanied by a dog ($p < 0.01$); however, the ratings did not differ between the *woman* alone and woman accompanied by a dog ($p = 0.400$; Figure 2 A).

Figure 2. Social perception results for the woman and man, alone and with a dog.



Note: Lower ratings indicate that the pictures are perceived as more aggressive (A), untrustworthy (B), unfriendly (C), and dangerous (D).

Regarding the three-way significant interaction for each semantic scale, statistical differences between the man and woman within each emotional context and dog presence category were seen (all p s < 0.001).

Untrustworthy-trustworthy scale (lower ratings indicate that the man or woman is perceived as less trustworthy). The ANOVA yielded significant main effects of emotional context ($F_{(1,280)} = 398.67, p < 0.001, \eta_p^2 = 0.59$), actor gender ($F_{(1, 280)} = 390.70, p < 0.001, \eta_p^2 = 0.58$), and dog presence ($F_{(1, 280)} = 103.125, p < 0.001, \eta_p^2 = 0.27$). The threatening context and man had lower ratings (i.e., were perceived as less trustworthy) than the safe context and woman, respectively. Actors depicted alone had lower ratings than those accompanied by a dog. The ANOVA also showed a significant emotional context \times actor gender \times dog presence interaction ($F_{(1, 280)} = 26.23, p < 0.001, \eta_p^2 = 0.09$; Figure 2B). In the threatening emotional context, the *man* ($p < 0.001$) and *woman* ($p < 0.01$) alone had lower ratings than the man and woman accompanied by a dog, respectively. The same results were found in the safe emotional context; the *man* ($p < 0.001$) and *woman* ($p < 0.05$) alone had lower ratings than the man and woman accompanied by a dog, respectively.

Unfriendly-friendly scale (lower ratings indicate that the man or woman is perceived as less friendly). The ANOVA yielded significant main effects of emotional context ($F_{(1,280)} = 404.91, p < 0.001, \eta_p^2 = 0.59$), actor gender ($F_{(1, 280)} = 342.28, p < 0.001, \eta_p^2 = 0.55$), and dog presence ($F_{(1, 280)} = 93.34, p < 0.001, \eta_p^2 = 0.25$). The threatening contexts and man were rated lower (i.e., less friendly) than the safe context and woman, respectively. Actors depicted alone had lower ratings than those accompanied by a dog. The ANOVA also showed a significant emotional context \times actor gender \times dog presence interaction ($F_{(1, 280)} = 18.19, p < 0.001, \eta_p^2 = 0.061$; Figure 2C). In the threatening emotional context, the *man* ($p < 0.001$) and *woman* ($p < 0.01$) alone had

lower ratings than the man and woman accompanied by a dog, respectively. In the safe emotional context, the *man* alone had lower ratings than the man accompanied by a dog ($p < 0.001$), however, the ratings did not differ between the *woman* alone and woman accompanied by a dog ($p = 0.057$).

Dangerous-harmless scale (lower ratings indicate that the man or woman is perceived as more dangerous). The ANOVA yielded significant main effects of emotional context ($F_{(1,280)} = 401.26, p < 0.001, \eta_p^2 = 0.59$), actor gender ($F_{(1, 280)} = 410.77, p < 0.001, \eta_p^2 = 0.60$), and dog presence ($F_{(1, 280)} = 79.25, p < 0.001, \eta_p^2 = 0.22$). The threatening contexts and man had lower ratings (i.e., were perceived as more dangerous) than the safe context and woman, respectively. Actors depicted alone had lower ratings than those accompanied by a dog. The ANOVA also showed a significant emotional context \times actor gender \times dog presence interaction ($F_{(1, 280)} = 24.66, p < 0.001, \eta_p^2 = 0.081$; Figure 2D). In the threatening emotional context, the *man* ($p < 0.001$) and *woman* ($p < 0.01$) alone had lower ratings than the man and woman with a dog, respectively. In the safe emotional context, the *man* alone had lower ratings than the man accompanied by a dog ($p < 0.001$). In the case of the *woman*, there were no differences between the alone and dog condition ($p = 0.136$).

Discussion

We aimed to assess the ability of the presence of a dog to modulate safety-related social perceptions of people portrayed in emotional urban public spaces. Participants rated pictures of a man or a woman, walking alone or with a dog, in threatening and safe urban spaces. The results indicated that the man and woman benefitted from the presence of a dog in threatening contexts (i.e., in high- and low-aversive contexts,

respectively). In safe scenes, the man also benefitted from the presence of a dog (i.e., low-positive); however, perceptions of the woman in safe scenes (i.e., high-positive) were similar while walking alone and with a dog, according to the majority of the social perception scales (i.e., aggressive-nonaggressive, unfriendly-friendly, and dangerous-harmless), indicating a ceiling effect. Those findings indicate that social perceptions of individuals accompanied by a dog are influenced by the emotionality of the context in which they are portrayed.

Our results indicated that the dog enhanced the safety-related social image of the actors in aversive and low-positive contexts. Specifically, the man and woman were perceived as more friendly, harmless, trustworthy, and nonaggressive when walking with a dog compared to the alone condition. Those findings are in line with previous literature indicating that people portrayed with a dog are perceived more favorably in terms of characteristics associated with safety (e.g., are considered as friendlier, safer, and less dangerous; Lockwood, 1983; Rossbach & Wilson, 1992) and other non-safety-related attributes (Guéguen & Ciccotti, 2008; Wells, 2004); e.g., when accompanied by a dog, individuals are perceived as happier and wealthier than when depicted alone, with flowers or with other animals such as cats or birds (Geries-Johnson & Kennedy, 1995; Lockwood, 1983; Rossbach & Wilson, 1992; Wells & Perrine, 2001). This “dog effect” on people’s image might be one of the mechanisms underlying dogs’ ability to increase human interactions (i.e., to serve as a social catalyst); for example, the presence of a dog increases non-verbal behaviors such as smiling, as well as approachability, and leads to solicited and unsolicited interactions with strangers (Eddy et al., 1988; Guéguen & Ciccotti, 2008; Hart et al., 1987; Lawson, 2001; McNicholas & Collis, 2000; Messent, 1985; Wells, 2004).

Despite this clear dog effect on human interactions, previous studies did not examine whether the presence of a dog promotes behaviors related to social interactions in threatening contexts. Based on the current results (i.e., dog owners are perceived more favorably in terms of safety-related characteristics in threatening contexts), we speculate that dogs may positively affect social human interactions even in the context of negative scenes (e.g., a lonely street at night). People who love animals, particularly dogs, are perceived as more kind, thoughtful, and sensitive; this favorable conception might also extend to social characteristics associated with safety, thus leading pedestrians to interact more with dog owners.

In line with the current results, we demonstrated in a previous study (Delgado-Rodríguez et al., 2022) that women felt more comfortable when encountering a man or woman accompanied by a dog (vs. alone) in threatening urban public spaces (as depicted in images); specifically, women felt more positive, more in control, and calmer and safer when viewing—and imaging that they were encountering— a man or a woman accompanied by a dog in a threatening scene (vs. alone). We consider that this might be due to enhancement of the safety-related social characteristics of dog owners associated with the presence of their dog. Perceiving a person as less aggressive or more trustworthy in threatening situations will decrease psychological arousal and increase the sense of safety, control, and positive valence. Of course, this explanation remains speculative given that we did not directly measure the relationship between emotional reactivity and social perceptions. Future studies should assess whether the enhancement of safety-related characteristics is directly related to the improved emotional reactions.

Despite the beneficial effects of the presence of a dog mentioned previously, our results also indicate that the presence of a dog does not affect people's image in high-positive contexts; in safe contexts, women accompanied by a dog and depicted alone were similarly perceived in terms of safety-related social attributes. We attribute this finding to a ceiling effect, in line with previous studies that reported similar results. For instance, authors that examined the impact of a dog on men's attractiveness (as assessed by women participants) found a greater effect for men previously perceived as relatively less warm and caring (Tifferet et al., 2013). Likewise, the presence of a dog enhances the image of psychotherapists (i.e., they are perceived as more trustworthy) and willingness to disclosure among individuals who had less positive perceptions of psychotherapists (Schneider & Harley, 2006). This ceiling effect has also been found in terms of the calming effect of the presence of a dog during a dental procedure (Havener et al., 2001); in that case, the dog reduced psychological arousal only in children who initially verbalized distress on arrival at the clinic. Lastly, we also found in our previous study (Delgado-Rodríguez et al., 2022) that the dog effect was less obvious in the context of high-positive scenes (i.e., "woman/safe"); in that context, physical features of dogs such as size seemed to be more important with respect to emotional reactions and sense of safety than the presence of a dog itself. Overall, such results have been considered indicative of a ceiling effect (Schneider & Harley, 2006).

We performed additional analyses to examine the possible effect of attitude toward animals on our results. For each scale, we averaged responses to images of men with a dog and women with a dog in both threatening ("threatening-dog" variable) and safe ("safe-dog" variable) scenes. Both variables were included in multiple regression

analyses with AAS-10 as the outcome variable (one regression model for each scale); the results indicated that only the threatening-dog variable significantly predicted AAS-10 scores for the unfriendly-friendly scale ($\beta = .143$; $t = 2.09$; $p < 0.05$). For the other scales, the threatening-dog and safe-dog variables did not predict the attitude toward animals. Those results are in line with literature indicating that attitude toward animals does not modulate the effect of the presence of a dog on participants' perceptions (Friedmann et al., 1993; Schneider & Harley, 2006). Another strength of the current study was that we used emotional contexts that were thoroughly evaluated in a previous study; we created a set of emotional urban public spaces that were assessed using scales pertaining to sense of safety and emotional valence, arousal, and dominance (by means of the Self-Assessment Manikin/SAM; Bradley & Lang, 1994), along with pleasant, neutral, and unpleasant images from the International Affective Picture System (Lang et al., 2008). We followed the same procedure that has been used previously to validate other sets of emotional pictures (e.g., Lang et al., 2008; Miccoli et al., 2014, 2016; Moltó et al., 2013; Vila et al., 2001). The six scenes in which the actors and dog were depicted in the current study were the three most threatening-aversive and three most safe-positive urban public spaces in our previous study.

The current results should be evaluated with consideration of some methodological limitations. First, the results cannot be generalized to all dog breeds; we used a non-stigmatized medium-sized dog (the Portuguese Podengo-like mixed-breed) with physical characteristics associated with high "agreeableness" (e.g., floppy-eared; Hecht & Horowitz, 2015). Using stigmatized breeds such as the American pit-bull terrier might produce different results, since such breeds can negatively impact

observers' perceptions (Gazzano et al., 2013). The current results might also have been influenced by the importance attributed to dogs; 70.5% of our sample have or have had a dog as a companion animal, and 99% of these indicated that their dogs were important to them. Including individuals with less positive attitudes toward dogs might have led to different results. Given that we aimed to study the dog effect in a population likely to feel less safe in threatening contexts, we only included undergraduate women; including men in future studies would be interesting because men and women tend to differ in terms of the cues that prompt a threat response (Blöbaum & Hunecke, 2005; Boomsma & Steg, 2014), and in terms of behaviors and attitude toward animals (Herzog, 2007).

Conclusions

Our results indicated that the presence of a dog in threatening urban spaces enhances the perceptions of the owners' safety-related characteristics (i.e., aggressiveness, trustworthiness, friendliness, and dangerousness) compared to men and women portrayed alone. In safe contexts, the man portrayed in the images again benefitted from this dog effect; however, the woman was assessed similarly regardless of whether she was alone or accompanied by a dog, indicating a ceiling effect in the high-positive context; the dog did not enhance the already favorable social image of the woman. Our study extends previous results by shedding light on the emotional contexts under which dogs impart positive social attributes to the individuals who they accompany.

Disclosure Statement

The authors state there are no conflicts of interest.

Notes

¹ We run six experimental sessions. 52 participants were assessed at the first session, 45 at the second, 44 at the third, 54 at the fourth, 48 at the fifth, and 45 at the sixth session.

² Aggressive-nonaggressive scale: in the threatening context, woman with a dog ($n = 1$). In the safe context, man with a dog ($n = 1$), woman alone ($n = 2$), and woman with a dog ($n = 5$). Untrustworthy-trustworthy scale: in the safe context, man with a dog ($n = 2$), woman alone ($n = 2$), and woman with a dog ($n = 2$). Unfriendly-friendly scale: in the safe context, man with a dog ($n = 1$), woman alone ($n = 1$), and woman with a dog ($n = 2$). Dangerous-harmless scale: in the safe context, man with a dog ($n = 2$), woman alone ($n = 2$), and woman with a dog ($n = 2$).

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