Article

Impulsive Facial-Threat Perceptions After Exposure to Stereotypic Crime News

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Abstract

Tests were performed to learn whether exposure to news about crimes committed by dark-skinned criminals increases impulsive facial-threat perceptions of meeting dark-skinned strangers in a subsequent situation (media-priming hypothesis), but only when the facial displays are ambiguous (ambiguity hypothesis). The assumption is that news stereotypes prime the "dark-skinned criminal" stereotype, which, in turn, influences subsequent face processing. An experiment with two groups was used to test this prediction. Participants allocated to the treatment group (*n* = 53) read about crimes committed by dark-skinned criminals. In contrast, for the control group (*n* = 52), cues indicating skin color were not mentioned at all. As predicted, the treatment increased the perceived facial threat of dark-skinned strangers, but only when the facial displays were ambiguous. Given the importance of the face in social interaction, I discuss important, real-world implications for recipients as well as for journalists and media organizations.

First impressions of faces are made within a split second (Willis & Todorov, 2006) and can have significant social consequences. For example, attractive people typically get better outcomes than unattractive people do in almost every important domain of life (Hamermesh & Biddle, 1994). In addition, baby-faced individuals are typically less likely to receive severe judicial outcomes as opposed to mature-faced individuals (Zebrowitz & McDonald, 1991), and "cute" baby faces elicit approach and protective

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responses (Berry & Zebrowitz-McArthur, 1986). In contrast, angry faces potentiate avoidance responses (Marsh, Ambady, & Kleck, 2005). Furthermore, there is proof that the perception of competence based solely on politicians' facial appearances can predict the outcome of elections (Todorov, Mandisodza, Goren, & Hall, 2005): Inferences of competence based on a short, one-second exposure to the faces of the winners and the runners-up for U.S. Senate races predict the election outcomes.

Taken together, this research shows that an adequate decoding of facial expressions in everyday life is very important. The present research investigated the role of exposure to news stereotypes within this perception process. The assumption is that exposure to stereotypic crime news where criminals are repeatedly paired with a specific facial attribute can bias this perception process. Building on previous content-analytic research that showed that crime news tends to associate specific (minority) groups with negative behavior, I hypothesize that exposure to crime news about crimes committed by dark-skinned criminals increases the perceived facial threat of meeting unknown, dark-skinned strangers in a subsequent situation. I assume that news stereotypes prime the "dark-skinned criminal" stereotype in the recipients' minds, which, in turn, influences subsequent face processing.

The primary contribution this study makes to news stereotype-priming literature is two-fold. First, it advances news stereotype research by showing effects on a factor which, to date, has not gotten the attention it deserves, but which is nonetheless socially extremely important. Imagine that exposure to media stereotypes substantially influences the perception of facial threats. This can have fundamental consequences on individuals and thus on society. The importance of the face in social interactions (e.g., everyday life, judicial outcomes, voting behavior) has already been mentioned. Second, it advances theory by testing the media-priming effect on different levels of ambiguity: I hypothesize that news stereotype priming is observable only for faces with ambiguous facial displays.

First, I start with a review of news stereotype-priming research. Next, I theorize a link between facial-perception research and media priming. This leads to the development of the primary research hypothesis (i.e., the news-exposure effect on impulsive facial-threat perceptions). After that, I discuss the boundary conditions of this effect by focusing on ambiguity.

News Stereotype Priming

Stories about crime are omnipresent in news coverage. As Gilliam and Iyengar (2000) noted, crime news utilizes several attributes for successful news reporting, and employs episodic reporting including such things as concrete events with relevance for ordinary people, emotion, drama, and attention-getting visuals or words. Although there are differences between television news and newspapers (e.g., importance of visuals, possibility of re-reads), there are high similarities (see Gilliam & Iyengar, 2000): Crime news typically provides an orderly and predictable set of scenarios and roles. The authors argued that in many cases, expectations are so well developed that when recipients encounter "incomplete" stories, they actually fill in "missing" information. One important detail of common crime scripts is that specific social categories

are overrepresented as offenders. This element of the crime script is the focus of the present research. It has been shown that especially historically marginalized social categories are typically paired with crime on (local) television news (e.g., Dixon & Linz, 2000) or in (tabloid-style) newspapers (e.g., Arendt, 2010). Such a basic news bias pertaining to stereotyping, prejudice, and discrimination has been revealed in several countries such as Germany (Ruhrmann & Songül, 2000), the United States (Dixon & Linz, 2000), Austria (Arendt, 2010), and the Netherlands (Vergeer, Lubbers, & Scheepers, 2000).

The consequence of exposure is that "the news may create or cause cognitive associations" (Oliver & Fonash, 2002, p. 138) between crime and historically marginalized groups. I use an implicit social-cognition model of media priming as the theoretical framework to explain such effects (Arendt, 2013a). Stereotypes are conceptualized as cognitive associations that consist of a concept representing a social category and an attribute (Greenwald et al., 2002). Attributes included within stereotypes refer to attributes that individuals believe characterize an entire social group. Thus, the use of stereotypes can keep individuals from processing new information about each unique individual because some group-based generalizations are already present. From an information-processing perspective, stereotypes can thus offer efficient shortcuts (see Fiske & Taylor, 2013). Given the fact that the mass media is everywhere in our world, it comes as no surprise that we receive many such simplified pictures from mass-mediated portrayals (e.g., Dixon, 2006).

Once formed, stereotypic memory traces can be re-activated (i.e., primed) by additional media exposure. This can influence subsequent perceptions of social stimuli. Thus, media-stereotype priming refers to the short-term impact of stereotypic news on subsequent perceptions, judgments, and behaviors (Roskos-Ewoldsen, Roskos-Ewoldsen, & Carpentier, 2009). Media priming has a reliable effect according to one meta-analysis (Roskos-Ewoldsen, Klinger, & Roskos-Ewoldsen, 2007).

It is important to refer to a distinction drawn by current stereotype theory, which separates stereotyping into two stages: automatic activation of concepts held in the memory and their (more or less) controlled application. Stereotypical associations that are held in the memory can become activated, irrespective of whether a person considers these associations as accurate or not (Greenwald et al., 2002). However, stereotype application refers to the use of stereotypical associations in making judgments about a social stimulus. Thus, even if stereotypes were automatically activated, individuals could reject these cognitions and decide not to use them for an overtly expressed judgment (Devine, 1989). Nevertheless, individuals must have the motivation and the ability (e.g., time, cognitive resources) to do so (Gawronski & Bodenhausen, 2006; Olson & Fazio, 2009).

Building on previous research, I expected that each exposure to a dark-skinned as opposed to a light-skinned criminal should strengthen the cognitive association between "dark skin" and "crime" in the memory via the simultaneous activation of both concepts (Dixon & Azocar, 2007). Most importantly, the assumption here is that the strength of the automatic association can be understood as the potential for one concept (e.g., dark skin) to activate another (e.g., criminal; see Greenwald et al., 2002).

Hence, when an environmental input stimulus such as the face of an unknown stranger is encountered in a situation following exposure to news stereotypes, cues that activate *dark skin* in the memory will also activate *criminal* or associatively related concepts (e.g., aggressive, rude, dangerous, angry) with an increased likelihood. Indeed, research has shown that even brief exposure to news stereotypes can have an effect on the strength of automatic associations in the memory (e.g., Arendt, 2012; Park, Felix, & Lee, 2007).

There is vast empirical evidence showing that exposure to stereotypic news coverage can have detrimental priming effects on societally important outcome factors. For example, Oliver (1999) found that individuals tend to misidentify a White offender depicted in the news as Black. Participants identified photographs immediately after exposure and again three months later. Over time, participants exposed to the stereotypic media content showed an increase in misidentification. Individuals were increasingly likely to misidentify Blacks, despite having been exposed to a White offender. There are many studies showing similar, important consequences of media-stereotype exposure (e.g., Dixon, 2007, 2009; Mastro, Behm-Morawitz, & Kopacz, 2008; Oliver & Fonash, 2002). Prior research has also identified important moderators of such effects. At a most basic level, news stereotype-priming effects fade with time (Arendt, 2013b) and are dependent on the frequency of activation (Arendt, 2013c). This is consistent with priming research outside the news stereotype context (Grant & Logan, 1993; Higgins, Bargh, & Lombardi, 1985; McNamara, 2005; Roskos-Ewoldsen et al., 2007; Roskos-Ewoldsen et al., 2009; Srull & Wyer, 1979). Furthermore, individuals already holding stereotypic thoughts and feelings before exposure tend to show even stronger exposure effects (Dixon, 2006), and members of the stereotyped social category are less likely to show news effects; rather, under some circumstances, they show effects even in the opposite direction (Gilliam & Iyengar, 2000). In addition, there is evidence that prior news consumption (i.e., long-term exposure to news stereotypes) moderates subsequent exposure effects (Dixon, 2006): Those with high levels of prior exposure show stronger effects.

The Face in Media-Priming Research

Media research already exists on the manipulation of facial features. Dixon and Maddox (2005) examined the memorability of a perpetrator of a crime story. Data analysis indicated that individuals found the perpetrator more memorable when he was Black rather than White. This investigation focused on how different facial attributes (i.e., a White, a light-skinned Black, a medium-skinned Black, and a dark-skinned Black perpetrator) influence memorability. In a similar vein, the results of an experiment conducted by Oliver, Jackson, Moses, and Dangerfield (2004) showed that readers' memories of Afrocentric features were significantly more pronounced when the news story contained crime, particularly violent crime. Although these studies made important contributions to the media-priming literature, they did not investigate the research problem that is central to the present study: news stereotype effects on impulsive facial-threat perceptions.

Media Effects on Impulsive Facial-Threat Perceptions

Now, I try to connect news stereotype-priming research and facial-perception research (see also Arendt, Steindl, & Vitouch, 2014). As already mentioned, individuals evaluate faces in a few hundred milliseconds (Willis & Todorov, 2006). Such a fast, impulsive face evaluation is beneficial in social interactions because emotional expressions often signal the behavioral intentions of the individual displaying the emotion (Marsh et al., 2005). An accurate and quick assessment of a potential threat was beneficial in our hunter-gatherer ancestors and continues to be so even in today's world (Oosterhof & Todorov, 2008).

A study conducted by Hugenberg and Bodenhausen (2003) can be viewed as the necessary link between news stereotype research and research on the perception of facial threat. The authors hypothesized that stereotypes influence the decoding of facial displays. The authors used short movies in which the computer-generated facial expressions morphed from neutral to threatening expressions. The clips featured dark-skinned and light-skinned faces. Participants responded by pressing a button when they thought they saw a new (i.e., hostile) expression unambiguously displayed by the target. Evidence from their experiment confirmed the hypothesis. Individuals with a strong automatic association between the group concept (i.e., dark skin) and negative attributes saw hostility appearing more quickly on dark-skinned faces compared to light-skinned faces.

Combining the findings from previous research reviewed above whereby even brief exposure to media stereotypes can influence automatic stereotype activation, and whereby automatically activated evaluations increase perceived facial threat, I deduced the first hypothesis:

> *Hypothesis 1 (H1):* Exposure to crime news about crimes committed by dark-skinned criminals increases impulsive facial-threat perceptions of meeting dark-skinned strangers in a subsequent situation.

Given the fact that the human face is central to social interactions and therefore of primary importance in social perception, such media effects have serious implications for everyday life. Although news stereotype research has already documented the effects on automatically activated stereotypes or attitudes (e.g., Park et al., 2007), as being dependent on facial features (e.g., Oliver et al., 2004), and has revealed other important consequences as reported above (e.g., Gilliam & Iyengar, 2000), research has yet to prove the link between exposure to news stereotypes and the impulsive perception of facial threat. Thus, the repeated mass-mediated pairing of a social category (e.g., based on skin color) with attributes such as "criminal" may not only prime (or form) stereotypes or attitudes in the recipient's mind (i.e., relevance on the cognitive and affective level) but also color face processing during actual social interaction in ways that can increase the likelihood that essentially any dark-skinned person is perceived as potentially threatening (i.e., relevance on the behavioral level). Therefore, the present research did not focus on the consequences of media-stereotype exposure

on the "pictures in our heads" (Lippman, 1922). Instead, the present research investigates whether media stereotypes might influence actual social behavior by influencing the perception of facial displays.

Ambiguity as a Boundary Condition

Roskos-Ewoldsen and colleagues (2009) stated that "research exploring the boundaries of media priming effects is important" (p. 88). I have already referred to previous research revealing the moderators of news stereotype-priming effects (temporal delay, frequency of activation, prior stereotypes, group membership, prior news exposure). Ambiguity is a further factor that is theoretically assumed to act as a moderator. Media-priming researchers argue—at least on an implicit level—that primed memory traces should influence the interpretation of a social-target stimulus under the condition of ambiguity. For example, Roskos-Ewoldsen and colleagues (2007) noted that a "typical newscast covers a wide variety of topics, which may result in the priming of a correspondingly wide variety of concepts, which increases the likelihood that one of the primed items will influence how we interpret later *ambiguous* information" (p. 54, italics added). This notion has enormous face validity. Consider an example (see Hansen & Hansen, 1988): Suppose sex role stereotypes had been primed by watching sex role stereotypes (e.g., sexualized depictions in commercials). In a subsequent situation, the viewer observes a real man and woman interacting socially. The media-priming hypothesis states that due to the fact that sex role stereotypes have just recently been activated, the perceiver is likely to evaluate the social interaction more in terms of the primed stereotype. However, if the woman and man romantically kiss each other while holding each other arm-in-arm, the situation is unambiguous. In this situation, media priming may not exhibit any effect at all. Nevertheless, when both are standing and engaged in a conversation laughing with each other, the situation can be perceived as more ambiguous: Are they flirting or just joking? According to the media-priming hypothesis, the perceiver is more likely to interpret this social interaction in terms of flirting instead of joking.

Ambiguity refers to situations in which (social) information does not have an obvious, unanimously agreeable interpretation. For example, Frisch and Baron (1988) defined ambiguity "as the subjective experience of *missing* information relevant to a prediction" (p. 152; italics added). In contrast, unambiguous situations "provide clear outcomes that would be obvious to others" (Mastro et al., 2008, p. 9). When interpreting ambiguous social information, judgments must be made under uncertainty. In the example made above, a woman and a man romantically kissing each other will likely elicit an obvious, unanimously agreeable interpretation. In contrast, when both are standing and are engaged in a conversation, the flirting, as well as the joking interpretation is possible.

There is a line of research testing the ambiguity hypothesis using the so-called mismemory-effect approach (Dixon, 2007, 2009; Gilliam & Iyengar, 2000; Oliver, 1999; Oliver & Fonash, 2002). This mismemory effect describes a phenomenon where an "incomplete" crime script generates strong expectations for "*missing*" details. This

leads recipients to "fill in" the gaps in the story. These filled-in story details are then memorized in addition to the "real" story details.

I have already discussed Gilliam and Iyengar's (2000) perspective on crime scripts. In the context of the present research, the mismemory effect describes the phenomenon whereby individuals who read a crime story with no reference to the perpetrator's skin color do indeed tend falsely to recall having seen a dark-skinned perpetrator consistent with the pervasive cultural stereotype of "dark-skinned criminals." For example, Dixon (2009) found that when exposed to unidentified suspects, participants were more likely to guess that the suspects were Black rather than White. This is consistent with a vast number of studies in social cognition showing that individuals routinely engage in top-down processing in which expectations concerning social groups and their attributes guide the encoding and memory of social information (Fiske & Taylor, 2013). As Dixon (2009) noted, this effect "results from 'ambiguous' targets being processed" (p. 26). As the recipients lack concrete evidence about the offender, they infer what "must" be the case (Gilliam & Iyengar, 2000, p. 564).

Along similar lines, other studies using the ambiguity concept found supporting empirical evidence as well (Chang, 2014; Mastro et al., 2008). Based on this literature, ambiguity of facial expressions is expected to represent a boundary condition for the news stereotype-priming effect: If the facial expression is unambiguously angry or neutral, individuals may not have any difficulties decoding the meaning. However, when the facial expression is ambiguous (i.e., somewhere in between neutral and angry), individuals may have much more difficulty in decoding the meaning and/or the behavioral intentions of the individual displaying the emotion. In this situation, the perceiver may rely on the use of stereotypes to fill in missing stereotype-consistent information. Other facial attributes such as skin color may be used as a heuristic to gather more evidence for the decision. As news stereotype exposure can prime stereotypic memory traces, those exposed to stereotypic news may rely more on their stereotypes. As already noted, this may increase the likelihood that essentially any dark-skinned stranger encountered in a subsequent situation is perceived as a potential threat.

The first hypothesis assumes that exposure to news stereotypes influences impulsive facial-threat perceptions. However, I expected media-priming effects to occur only if the facial expression was ambiguous. The ambiguity hypothesis, therefore, constrains the scope of the first hypothesis[1]:

> *Hypothesis 2 (H2)*: Exposure to stereotypic crime news has an effect on impulsive facial-threat perception but only when the facial displays are ambiguous.

As the review of the previous literature suggests, a substantial amount of research has addressed the ambiguity hypothesis. Although previous research has accumulated a considerable body of data, the present research, however, can add supplementary empirical evidence to this literature. First, some studies used the "mismemory-effect" approach (e.g., Oliver & Fonash, 2002) and, thus, investigated a rather cognitive bias. The present research tries to reveal a bias in the impulsive perception of *affective*

social information (i.e., emotional expressions). Second, previous research studied ambiguity rather as an attribute of the media content such as unidentified suspects (i.e., Dixon, 2009) or as a recipient-related factor such as attitudinal ambivalence (Chang, 2014). However, theory actually predicts that priming should be most effective when the target in a subsequent situation following news exposure is ambiguous. The present research thus uses facial expressions of *target* persons. Third, in contrast to previous research using ambiguity as a nominal variable (e.g., identified or unidentified subjects), the present research tests the ambiguity hypothesis using an experimentally manipulated factor with varying levels of ambiguity. The manipulation of facial expressions using three-dimensional face-modeling software allows for the creation of facial expressions on a continuum ranging from unambiguously "neutral" to unambiguously "angry," with ambiguous expressions falling on a *metric continuum* in between (see Arendt, 2013c).

Unambiguously emotional faces are rarely observable in everyday interaction. In contrast, individuals typically have to decode somewhat ambiguous facial displays. This requires "at least a modicum of interpretation" (Hugenberg & Bodenhausen, 2003, p. 640). Although the study of the ambiguity hypothesis within the facial-perception context is an important contribution to theory, it is important from a practical point of view as well: "Disambiguating an ambiguous facial display is not only a common occurrence" (p. 640) but also one in which media-stereotype exposure may have a potent influence.

Additional Theorizing

The activation of associatively related concepts when encountering a social stimulus such as facial displays operates rather automatically (see Bargh, 1994). Nevertheless, this does not mean that individuals do not have the power to resist their automatically evoked thoughts about a stranger. Even if negative thoughts were automatically activated when encountering an unknown, dark-skinned stranger, individuals can reject these cognitions and decide never to use them for an overtly expressed judgment (Devine, 1989). However, such a correction requires a certain amount of processing time, intention, and cognitive capacity. Thus, only if the individual is motivated to arrive at an unbiased judgment and has enough time to reflect is a correction process possible. For example, the flexible correction model (Wegener & Petty, 1997) suggests that people can adjust their judgment if they are aware of a contextual effect. This can be stereotypic media content that is perceived as noncredible. Specifically, this theory assumes that if individuals perceive themselves to be influenced, they will attempt to correct these influences by shifting their judgment in the opposite direction of the perceived bias. For example, Arendt (2012) showed that attributed text-credibility moderated the effects of media-stereotype exposure on explicit stereotypes (i.e., overtly expressed stereotypic judgments) but not the effects on implicit stereotypes (i.e., automatically activated stereotypic concepts). The fact that perceived credibility moderated the effect with regard to the overtly expressed stereotypic judgment, but not regarding implicit stereotypes, leads to the conclusion that media stereotype's impact

on automatically evoked responses is relatively independent from correction processes.

As already mentioned, first impulsive impressions from faces are made within a split second (Willis & Todorov, 2006): Faces can be judged even after a 100-millisecond exposure. During this brief exposure time, controlled thinking is not possible. Thus, the assumption is that only the automatic activation stage of stereotyping is likely to be involved at this stage of impression formation. A correction process should not occur. Even if the media content is perceived as noncredible, individuals do not have the time to correct for a presumed contextual effect when forming a fast, impulsive impression of a person. Therefore, a third hypothesis could be postulated:

> *Hypothesis 3 (H3):* The media-priming effect on impulsive facial-threat perceptions is independent of the perceived credibility of the stereotypic media content.

Method

An experiment was undertaken to test whether reading stereotypic crime news influences the impulsive perception of facial threat. The study builds on previous content research that showed that crime news tends to associate specific social (minority) groups with negative behavior (Dixon, 2009). In Austria, where the experiment was conducted, it has been documented that the category of "foreigners" is overrepresented as criminals in the leading tabloid-style daily newspaper (Arendt, 2010). In addition, (dark) skin color is repeatedly paired with crime in specific Austrian news media, which may contribute to the reinforcement of the "dark-skinned criminal" stereotype (Horvath, 2006). As already noted, similar news stereotypes have been revealed in other countries such as Germany (Ruhrmann & Songül, 2000), the United States (Dixon & Linz, 2000), and the Netherlands (Vergeer et al., 2000) as well.[2]

An experimental design with two groups was used. Participants read eight crime articles merged with four unrelated, bogus texts. The crime articles were manipulated: For the treatment group (*n* = 53), "dark-skinned criminals" were mentioned as the offenders. In contrast, for the control group (*n* = 52), skin color was not mentioned at all. After reading the crime texts, participants completed the impulsive facial-threat perception task.

Participants

One hundred five students enrolled in a lecture on communication research participated in the study. Of these students, 74.3% were female. The participants ranged in age from 19 to 37 (*M* = 21.91, *SD* = 2.69).[3]

Experimental Manipulation

Crime articles were constructed from original texts published by a highly circulated, daily tabloid newspaper. It is fairly uncommon that dark skin is overtly referred to in

crime texts (Arendt, 2010) but is presented in a more subtle way through visuals (Messaris & Abraham, 2001) or language (Wodak & Reisigl, 1999). Thus, specific foreign nationalities targeted at countries (stereotypically) associated with dark-skinned inhabitants were used to prime the "dark-skinned criminal" stereotype. I used specific nations based on a pretest (Arendt et al., 2014). This pretest ensured that the reading of these specific nations (e.g., Nigeria, India, Turkey) activated the "dark-skinned" concept in the participants' memory. The eight crime texts for the control condition and the treatment condition were identical with only one exception: Nation concepts served as cues to activate the "dark-skinned" concept in the treatment texts, once in the headline, and once more in the body of each text. In contrast, for the control group, cues indicating skin color were not mentioned at all. All the texts were similar to each other: There was only one male offender per text, all crimes took place in the same European city (but in different districts), and all had a similar (short) text length.

Measures

Impulsive facial-threat perceptions. We measured impulsive facial-threat perceptions after reading in an ostensibly unrelated part of the experiment. Computer-generated faces from six unknown people were presented on a computer screen. Of these persons, three were dark-skinned and three were light-skinned. Eleven computer-generated faces were used for each person. This resulted in 66 face pictures (=11 facial-threat levels × 6 persons). These faces were created using three-dimensional face-modeling software that generates highly realistic facial structures. The faces were taken from previous facial-perception research and, thus, are pretested and validated (Corneille, Hugenberg, & Potter, 2007). These 11 faces ranged from "0% angry" to "100% angry" in increments of 10%. I expected a sigmoid functional relationship between the facial-threat level and "angry" ratings based on previous research (Corneille et al., 2007, Figure 4). Of interest, what constitutes an ambiguous threat level can be deduced empirically when looking at participants' threat ratings. I defined ambiguous-threat levels as the range between unambiguous neutral and unambiguous angry facial expressions (i.e., between the bottom and the top of the s-curve). Thus, it is defined as the range of facial-threat levels where there is a substantial increase in threat perceptions (i.e., a strong increase in the slope of the s-curve). One visual example is given in the "Results" section.

The ostensible goal of the task was in the investigation of "how judgments are made under time pressure." Faces were presented for 300 milliseconds (i.e., short flashes) and then were overlapped with a mask (a black rectangle with white noise). Participants had to press the left button if they thought the facial expression was "neutral" (German: *neutral*). If they thought the facial expression was "angry" (*zornig*), they had to press the right button. Most importantly, the decision had to be made after the face was seen only for a very short time. Thus, the decision is assumed to be impulsive, driven only by the mere first impression of the face. Although participants had as much time as they wanted after the face was masked, the procedure provoked fast, split-second responses (see the "Results" section).[4]

After a practice block, the test block was administered and consisted of 66 individual trials presented in random order: 6 computer-generated persons (3 dark-skinned + 3 light-skinned) × 11 (different threat levels). The software recorded the judgments (neutral or angry) for each face and the latencies of these judgments (i.e., time elapsed between the onset of the face and participant's judgment) in milliseconds. The forced-choice decisions (coded as 0/1) and the latency scores were averaged for each threat level across all dark-skinned persons.[5]

Attributed text-credibility. To measure the perceived credibility of the crime articles, I used a scale from previous research (Arendt, 2012). Participants were asked on a 7-point scale ranging from *I totally disagree* (1) to *I totally agree* (7) about their agreement with four statements ("The texts were credible," "The texts inspired confidence," "The texts were well-researched," "The texts were well-balanced and fair"; $M = 2.42$, $SD = 1.08$, Cronbach's α = .79).

Procedure

Small groups of participants were welcomed in a waiting room. The experimenter went with them to another room. Each participant sat down in front of a computer in individual research cubicles. First, they read the tabloid articles. Second, they took the impulsive facial-threat perception task. Finally, they filled out a computer-administered survey. After finishing the data collection, the participants were debriefed and dismissed.

Results

The assumption was that reading about "dark-skinned criminals" in stereotypic crime news influences impulsive facial-threat perceptions of unknown, dark-skinned strangers encountered in a subsequent situation (H1), but only when the facial expression is ambiguous (H2). To test these predictions, a mixed analysis of variance (ANOVA) with Greenhouse-Geisser correction was conducted to assess whether there were treatment condition (between-subjects) and facial-threat-level (within-subjects) differences in the perceived facial threat from dark-skinned strangers. Results indicated a significant main effect of facial-threat level, $F(6.02, 619.77) = 404.08$, $p < .001$, partial $\eta^2 = .80$, but not of the treatment condition, $F(1, 103) = 1.25$, $p = .27$, partial $\eta^2 = .01$. More importantly, there was an interaction between the experimental condition and facial-threat level, $F(6.02, 619.77) = 2.22$, $p = .04$, partial $\eta^2 = .02$. This indicates that even though individuals in the treatment condition did not generally rate the dark-skinned faces as any more or less threatening than individuals in the control condition, individuals in the treatment condition did rate faces with a particular facial-threat level differently than individuals did in the control condition. At a most basic level, this supports H1.

H2 predicted that stereotypic media content produces priming effects when facial expressions are ambiguous. Thus, I did not expect substantial differences at very low or very high facial-threat levels, but at an intermediate level. Due to the fact that the faces are validated, the assumption was that very low and very high levels would produce clear judgments (0, 1) on the "neutral or angry" forced-choice measure. As already
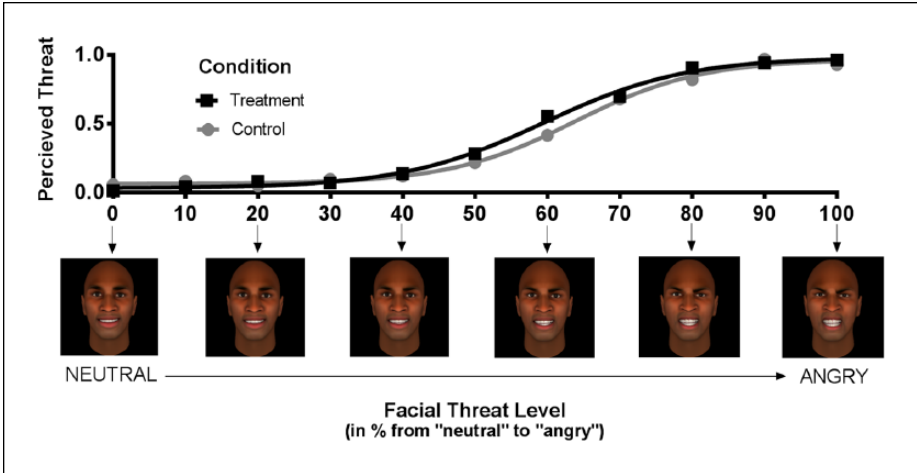
Figure 1. Impulsive facial-threat perception of unknown, dark-skinned strangers dependent on the experimental conditions for different facial-threat levels.
Note. The error bars have been omitted for a better illustration. The perceived-threat values can be interpreted similarly to those of relative frequencies: In unambiguous neutral faces, participants almost never pressed the "angry" button (perceived threat ≈ 0). In contrast, in unambiguous angry faces, participants pressed the "angry" button nearly every time (perceived threat ≈ 1). The two s-curves are fitted using nonlinear regression analysis (see text).

noted, I expected a sigmoid functional relationship between facial-threat level and perceived-threat ratings (Corneille et al., 2007). The strongest effects of news stereotype exposure were expected in the area around the inflection point of the s-curve.

To gain a thorough understanding of the media effect, nonlinear regression analysis was used to fit two sigmoid functions (a four-parameter model with variable slope) to the data: one for each experimental condition. I used the means and the corresponding standard deviations from the mixed ANOVA as input values for nonlinear regression (equations are not reported). It points to an increase in the impulsive perception of facial threat in the treatment condition compared to the control condition. This is presented in Figure 1.

To test H2 formally, I calculated the mean threat ratings across the ambiguous and unambiguous facial-threat levels. What constitutes an ambiguous threat level was defined with the help of the sigmoid functions. Both s-curves have a very similar appearance, as found in previous research (Corneille et al., 2007). Both sigmoid functions allow for the definition of the range of the facial-threat levels where there is a substantial increase in effect size (i.e., a strong increase in the s-curve's slope). This increase starts at the threshold (i.e., where the threat ratings leave the bottom) and continues until the effect size reaches toward the top, which is an asymptote. As can be seen in Figure 1, facial-threat levels of 50%, 60%, 70%, and 80% are clearly within the range of the slope's increase. Therefore, I calculated the means of threat perceptions for dark-skinned faces over ambiguous and unambiguous threat levels.

Next, I used a mixed ANOVA to assess whether there were treatment condition (between-subjects) and ambiguity (ambiguous or unambiguous facial-threat level; within-subjects) differences in the perceived threat of dark-skinned strangers. If ambiguity moderates the news stereotype-priming effect, a significant interaction effect should emerge. This is what I found, $F(1, 103) = 6.48$, $p = .01$, partial $\eta^2 = .06$. As expected, the treatment condition ($M = 0.61$, $SD = 0.18$) differed substantially from the control condition ($M = 0.53$, $SD = 0.19$) in the perceived facial threat of ambiguous faces, $t(103) = 2.09$, $p = .02$. In contrast, when comparing the means of the unambiguous facial-threat levels of 0%, 10%, 20%, 30%, 40%, 90%, and 100%, I found no mean difference between the treatment group ($M = 0.33$, $SD = 0.10$) and the control group ($M = 0.32$, $SD = 0.07$), $t(103) = 0.48$, $p = .64$. Taken together, the data support the assumption that exposure to news stereotypes produces an impulsive facial-threat perception bias, but only in ambiguous facial expressions. H2 was supported.[6]

Until now, I have only used data for dark-skinned faces. Nevertheless, data for light-skinned faces were also recorded. It is important to note that the theory assumes an effect when the skin color of the faces encountered in a subsequent situation corresponds to the skin color of the (dark-skinned) mediated criminals. In this case, the news stereotype was assumed applicable for the interpretation of new social information. I did not hypothesize the same effect for light-skinned faces. As a first step, I ran the same mixed ANOVA for light-skinned faces as reported in the last paragraph. Although the interaction (Treatment × Ambiguity) achieved significance for dark-skinned faces, there should be no interaction for light-skinned faces. In fact, the interaction effect did not achieve significance, $F(1, 103) = 0.27$, $p = .60$, partial $\eta^2 = .003$. This points to the fact that there was no news stereotype-priming effect for light-skinned faces.

To formally test if the skin color of the target (dark-skinned or light-skinned) moderates the treatment effect, a further mixed ANOVA was conducted. I assessed whether the two-way interaction (Treatment × Ambiguity) reported above was significantly dependent on the target's skin color. I expected the news stereotype-priming effect (i.e., the exposure effect on perceived threat, but only for ambiguous faces) only for dark-skinned faces rather than for light-skinned faces. This would be indicated by a significant, three-way interaction. This is supported by the data, $F(1, 103) = 6.70$, $p = .01$, partial $\eta^2 = .06$. Taken together, this indicates that reading about "dark-skinned criminals" influenced the perceived facial threat of dark-skinned faces but did not influence the impulsive threat perceptions of light-skinned faces.

H3 assumed that the media-priming effect on the impulsive perception of facial threat is independent of the perceived credibility of the stereotypic media content. To test this hypothesis, the mean of all ambiguous facial-threat levels (50%, 60%, 70%, 80%) was predicted by experimental condition, attributed text-credibility, and their interaction term. A moderation effect would be indicated by a significant interaction term. As predicted, the unstandardized interaction term did not achieve significance, *Coeff.* = −0.01, *SE* = 0.03, $p = .89$. Thus, the media effect on the perception of impulsive facial threat was largely independent of the perceived credibility of the crime news articles. This supports H3.
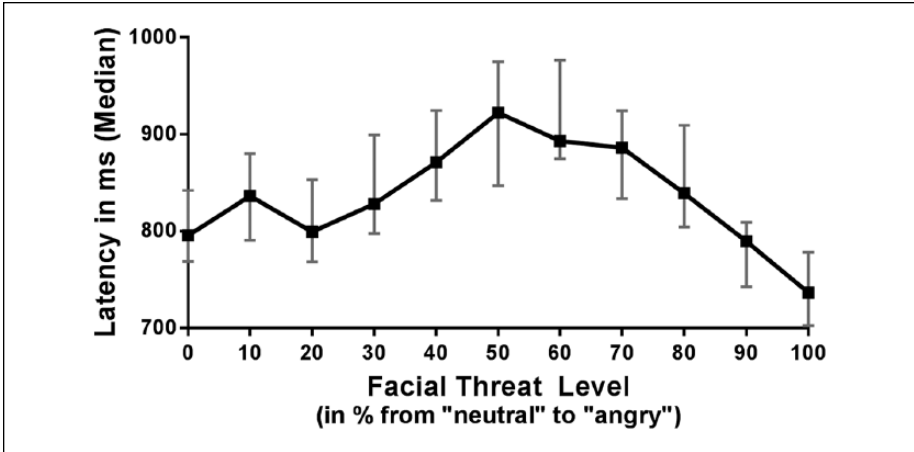
Figure 2. Latencies (*Mdn*) of the "neutral or angry" forced-choice decision for dark-skinned faces dependent on the facial-threat level.
Note. The latencies describe the time elapsed between the onset of the face and the participant's judgment. Error bars represent the confidence interval (95%, bootstrapping, 1,000 samples, percentile method). Points are connected with lines for a better illustration.

Additional Analyses

Due to the fact that ambiguous facial expressions are more difficult to decode, it seems reasonable to assume that individuals have to consider more additional information to "fill in" the "missing" information (see Notes 4 and 5). Thus, I additionally tested if the participants needed longer to reach a conclusion for ambiguous faces rather than for unambiguous faces. The lab software recorded the latencies in milliseconds for each facial-threat response. I ran a similar analysis as reported for H1, except that the latencies were used as the dependent variable. Due to the fact that the latency data were skewed, a nonparametric test was chosen. In fact, a Friedman test showed that there were differences among the mean ranks of facial-threat ratings of dark-skinned faces, $\chi^2(10, N = 105) = 128.53, p < .001$. This effect was largely driven by ambiguous facial-threat levels (see Figure 2). Participants needed longer to build a judgment for ambiguous faces rather than for unambiguous faces.[7]

Discussion

Facial expressions play an important role in the display and perception of emotional states and thus are very important in everyday life. Data from the present experiment showed that exposure to news stereotypes can influence the perception of a facial threat from unknown strangers: Reading news about crimes committed by dark-skinned criminals increased the perceived facial threat of meeting dark-skinned strangers in a subsequent situation, but only when the facial display was ambiguous. This finding is especially remarkable when one considers the fact that the stereotypic crime

texts neither mentioned skin color directly, nor did they contain any pictures of dark-skinned criminals. Thus, the effect is due only to the mentions of foreign nationalities that are associated with dark skin (stereotype). This finding advances news stereotype-priming research by showing an effect on a highly relevant social factor (i.e., impulsive facial-threat perceptions), which has not been investigated prior to the present experiment. Although previous research revealed that media-stereotype exposure has consequences on stereotypes and attitudes, the present study indicates that media stereotypes might influence actual social behavior by influencing the impulsive perception of facial displays of stereotyped targets (see Arendt et al., 2014).

Furthermore, the experiment adds supportive empirical evidence to the inherent assumption of media-priming effects under conditions of ambiguity rather than unambiguity. Thus, this study investigated the conditions under which media-priming effects occur and—equally importantly—the conditions under which they do not. The present research, thus, is consistent with previous research testing the ambiguity hypothesis using the mismemory approach (Dixon, 2009; Gilliam & Iyengar, 2000; Oliver, 1999; Oliver & Fonash, 2002). In addition, the effect of media-stereotype exposure appeared to be largely independent of the perceived credibility of the media content.

The most apparent and socially relevant consequence is that exposure to such stereotypic crime news can have detrimental consequences on the impulsive perception of facial threat. Note that this is not a general effect, but it seems to be limited to members of a social category who have a direct correspondence within the media content: Reading about dark-skinned criminals influenced the perception of the facial threat from dark-skinned strangers encountered in a subsequent situation. Reading these texts did not have a general effect on the interpretation of facial threat for all humans: The perception of light-skinned individuals' facial threat was not influenced by exposure.

Imagine that reading about dark-skinned criminals influences the threat perception of dark-skinned politicians. Considering the pervasiveness of the "dark-skinned criminal" stereotype (Dixon & Azocar, 2007; Horvath, 2006), it comes as no surprise that U.S. campaigners might (at least implicitly) have had a similar idea in mind when trying to lighten Barack Obama's face during his election campaign. In contrast, opponents may try to darken skin color to exploit negative associations that voters might have with darker skin. Similar strategies may be used in advertising as well (see Caruso, Mead, & Balcetis, 2009).

Are We Somewhat Defenseless?

It is important to note that individuals are *not* defenseless against news stereotype-priming effects on impression formation. Please remember the distinction drawn by current stereotyping theory between the automatic activation of stereotypic associations held in the memory and the (more or less) controlled decision to use them (Devine, 1989). At the automatic activation stage of the stereotyping process, individuals can be seen as somewhat defenseless: First, exposure to media stereotypes heightens the strength of the automatic association between a social-group concept

and attributes. Second, when encountering a social stimulus activating the social-group concept in a subsequent situation, the previously-linked attribute becomes automatically activated with an increased likelihood. Based on the current experiment, this has detrimental consequences on *impulsive* facial-threat perceptions. However, it is important to note that people can correct their first impressions (during the second stage of the stereotyping process) for a more controlled response: Even if the first impression automatically evoked when encountering a face is negative, individuals can decide not to use these first impressions for an overall judgment of this person.

It is the task of mass communication research to reveal mediated stereotypes and their effects. Only by knowing that our impulsive perceptions based on our "gut feelings" may be systematically biased can we correct such automatically evoked reactions when we are interacting with stereotypically depicted category members. Of interest, there is evidence that we can resist our automatically evoked reactions by using reflexive thinking (Arendt, 2013a). If we spend some time and cognitive effort in rumination, we can decide not to use our automatically evoked impulsive responses (Devine, 1989). Thus, a good first strategy to overcome possible detrimental news effects is to take the time to think. A second strategy, as Dixon (2009) noted, is that we should actually be very careful of what we are reading: "You should definitely expose yourself to the news, but you should consider what kind of news you consume. Be very careful of crime news, and approach it with a critical eye" (p. 29). These recipient-based strategies (taking the time to think, selective exposure) can be seen as a heuristic to overcome possible negative-news stereotype effects.

Implications for Journalists

What should be clear at this point is that negative depictions of social (minority) groups in the media can have detrimental consequences. Therefore, what journalists report on is not without consequences. I already pointed to recipient-based strategies (taking the time to think, selective exposure) that can be used to overcome possible negative effects. Nevertheless, a media-based strategy is also worth noting. Journalists should question if reporting some group-related characteristics such as nationality or skin color is relevant to the story (Gilliam & Iyengar, 2000). There seem to be two conflicting interests at play: On the one hand, some journalists may argue that it is the duty of professional journalism to report every detail of the story, including group-related characteristics. It would be a form of self-censorship, which goes hand-in-hand with an inherent negative connotation. In addition, the detailed coverage of social-category cues may raise community awareness and identify criminal suspects. On the other hand, media-stereotyping research has revealed that exposure to stereotypic content can have negative consequences such as biased, impulsive facial-threat perceptions. Assuming that most journalists do not want to be prejudiced, there should, whenever possible, be widespread agreement to omit some group-related characteristics pertaining to historically marginalized social categories. Thus, the most important question in this context of two conflictive interests is if it *really* is necessary to report social-category cues that refer to historically marginalized minority groups.

Clearly, it is not the intention and is not within the scope of this research to give a definitive answer. In contrast, I argue that journalists should ask the "really necessary" question each time before including group-related information into their news coverage. Of course, in some situations it may be seen as necessary (e.g., crime alerts) and in other situations there is simply no possibility of omitting category-related characteristics (e.g., a well-known politician accused of corruption). That is a matter of public concern. Even in such cases, the question remains if group-related information must be covered saliently (e.g., in headlines, leads, or visuals; see Arendt, 2012, for an investigation of effect thresholds on automatic stereotype activation). Taken together, the cautious request from a realist viewpoint is that group-related characteristics pertaining to historically marginalized groups should be omitted wherever possible.

For media organizations, it might be a valuable goal to facilitate hiring journalists with sufficient (social scientific) knowledge of society, culture, and its (historically marginalized) groups and media stereotypes. It should be an important part of education, included in the curricula of communication departments, to disseminate the available knowledge from media-stereotyping research to future media practitioners. Furthermore, increasing the diversity in newsrooms can also help in achieving this goal (see Gilliam & Iyengar, 2000, for a similar argument).

Limitations

Like every study, this one has its limitations. First, the "angry" concept was used as the target concept in the impulsive facial-threat perception task. This was done based on previous research, where the angry concept was also used (Corneille et al., 2007). Nevertheless, the angry concept only deals with a presumed emotional expression of another person. In contrast, perceived facial threat requires an additional step: Even if we recognize anger in someone's facial display, we have to make additional inferences based on the social situation to infer the level of threat for us. However, I introduced the perception task with the sentence that researchers "are interested if the facial expression appears neutral or angry for you." The phrase "for you" was mentioned three times in the task introduction to make this salient to the participants. Furthermore, angry faces potentiate avoidance and defensive responses (Marsh et al., 2005). Thus, the angry concept seemed to be a good starting point for an impulsive facial-threat perception task. Nevertheless, future research can use different concepts such as "proximate" ones that deal directly with threat (e.g., threatening) as well as more "distant" ones (e.g., competence). The selection of distant concepts depends on the broadness of the culturally held stereotype under study (see Devine, 1989). However, such spreading activation effects are possible and certainly worth testing.

Second, it should be noted that this research only investigated the main effect of exposure to news stereotypes on the impulsive perception of facial threat. This study did not investigate the processes underlying this effect. However, I argue that a causal relationship between news stereotype exposure and impulsive facial-threat perceptions should be examined first. This is done in the current experiment. Then, the

conditions under which this effect is more or less pronounced or even eliminated (moderators), as well as the mechanisms underlying this effect (mediators) can be investigated. One important question with regard to mediation is which specific concept associations mediate the media effect on impulsive facial-threat perceptions. From theory's perspective, one would assume that the associative link between the group concept (e.g., skin color) and relevant attributes (e.g., criminal, dangerous, angry) should mediate the treatment effect. With regard to moderation, the face exposure time could be a relevant moderator variable. If the time is varied, this may have serious implications for the resulting media-priming effect on the perception of facial threat. Please note that I investigated news effects on impulsive facial-threat perceptions based on short flashes of the faces (i.e., 300 milliseconds). If the participants had a longer time to look at each of the faces (e.g., 10 seconds), this would make a correction process possible and thus more likely (see the "taking the time to think" reduction strategy described above). It seems likely that individuals, when having enough time to reach a decision, and who are highly motivated to act in an unprejudiced manner, correct for possible, presumed negative media influences. The study of potential moderators (e.g., exposure time) and mediators (e.g., automatically activated associations) would be a good starting point for future research.

Third, the study attempted to measure impulsive facial-threat perception. However, insofar as all faces have to go through some kind of conscious attentional filter—the faces were not presented subliminally—there may be a reflective aspect to the processing that occurs (see Uhlmann et al., 2012; for a discussion of impulsive and reflective processes, see Strack & Deutsch, 2004). Therefore, individuals could have attempted to override their automatically evoked responses. Although participants had as much time as they wanted after each face was masked, the procedure provoked fast, split-second responses. Taken together, the measurement technique used captures a far greater proportion of impulsive processing compared to reflective processing. The absence of a moderation effect of attributed text-credibility additionally supports this interpretation.

Fourth, a student sample was used to test the hypotheses. This was mainly due to economic reasons. Although student samples have well-known shortcomings (e.g., Meltzer, Naab, & Daschmann, 2012), I think that the specific context of the study may increase the appropriateness of such samples. I studied news stereotype effects on impulsive facial-threat perceptions, which are assumed to operate on a rather automatic level of information processing. Although students may differ from the general population on important factors such as political ideology or education—which may affect deliberate judgments—such factors operate in a rather controlled stage of information processing. Therefore, these factors may play a smaller role in impulsive responses (done in a split second) based on rather automatic processes.

Fifth, the present research used computer-simulated faces of unknown strangers as the dependent variable. This implies two potential shortcomings: First, the computer simulations may lack external validity. I am aware of this drawback, but computer-generated faces were used due to their high internal validity. This is consistent with previous face-perception research (Corneille et al., 2007). Only the use of a

state-of-the-art, three-dimensional, face-modeling software allowed for a reliable manipulation of different facial-threat levels. Second, I used the faces of strangers. As the faces were unknown to the participants, they had no prior knowledge of the people depicted. However, if an individual knows the person expressing the facial display, information other than the mere facial expression (or other features such as skin color) can be used based on already available, person-related information. For example, if a person knows that the individual is choleric, the perceiver may generally perceive a higher facial threat. Future research may create face pictures of real and well-known individuals (e.g., politicians), for example, from existing audio-visual materials. If short movies in which politicians change their facial display from neutral to angry (or other emotional states) are available, individual threat pictures can be extracted. Of course, the facial-threat continuum cannot be regarded as being as finely graduated as with computer simulations. However, this procedure has more external validity and thus can be used as a supplement to the method used in the present experiment.

Sixth, a regression-based approach was used to test H3, which assumed that the media-priming effect on impulsive facial-threat perceptions is independent of the perceived validity of the stereotypic media content. I used standard nil-null hypothesis significance testing to test this hypothesis. Nonsignificant results were interpreted as the absence of a moderation effect. It is important to note that this cannot be interpreted in terms of statistical equivalence (Weber & Popova, 2012): Equivalence testing would be an alternative method to test this hypothesis. Notwithstanding, those tests require the definition of a minimum substantial effect (i.e., lowest effect size that researchers identify as consequential). This was not possible in the current research project due to the lack of previous knowledge. However, the very high p value of the interaction term points (at least) to the absence of a substantial moderation effect of credibility.

Conclusion

Despite the limitations, I found that exposure to news stereotypes influences impulsive facial-threat perceptions of strangers from negatively depicted social groups. Skin color, however, is only one factor in impression formation. Similar media-priming effects should be detectable with other person-related features that activate a social category (e.g., dialect, clothing). Given the importance of the face and other highly salient, person-related features in social interaction, a targeted research effort on news stereotypes' role in this perception process is important.

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Notes

1. One might argue that research in psychology clearly supports the ambiguity hypothesis. This may be true for priming effects investigated by psychologists (e.g., repetition or semantic priming; see McNamara, 2005). Nevertheless, it is important to note that priming investigated by (cognitive or social) psychologists and priming effects investigated by communication researchers (or *media* psychologists) might be fundamentally different phenomena, and even within the field of communication, there seem to be noteworthy differences between media-violence priming, media-stereotype priming, and political priming (Roskos-Ewoldsen, Roskos-Ewoldsen, & Carpentier, 2009). For instance, political-priming effects typically last longer than priming effects found in psychological experiments (Roskos-Ewoldsen, Klinger, & Roskos-Ewoldsen, 2007). This raises the question if both phenomena are really the same: "Simply because both are called 'priming' does not mean they are then the same phenomenon" (Roskos-Ewoldsen et al., 2009, p. 79). Thus, *media* research into the ambiguity hypothesis using externally valid, real-world media primes, which appear on a regular basis in media outlets, is necessary to advance news stereotype-priming literature.
2. Most of the news stereotype research, including the studies using variables such as facial expression or skin color, has been conducted in the United States. In this context, the dichotomy "Black/White" seems appropriate because prejudice against African Americans had been investigated. Nevertheless, this is dependent on the actual context where the study is conducted. In Austria, skin color plays a role in the stereotyping process as well. However, skin color must be seen more on a continuum between a rather light and a rather dark skin. In this country, stereotypic news coverage referring to skin color often goes hand-in-hand with concepts such as "immigration," "foreigners," and "asylum seeking" (Horvath, 2006). Although Blacks also are targets of stereotyping, prejudice, and discrimination, individuals with only slightly darker skin compared to the "average" of the majority group (e.g., individuals from Northern Africa, the Middle East, or Southeastern Europe) are also targets of prejudice. By using the term *dark/light-skinned*, a more valid description of the Austrian (or Middle-European) context is made. Therefore, I decided to use this term. It must be noted that this study is targeted at the effects of skin color rather than on the broader race concept used in the U.S. studies. Nevertheless, skin color is of primary salience among the many phenotypic features and thus of primary importance in determining category membership (see Maddox, 2004).
3. In Austria, the term *race* (German: *Rasse*) is a very negatively connoted word due to the time under the Nazi regime. This is why using this term in a questionnaire is hard to justify and undoubtedly elicits discomfort in the participants (as well as in the researcher). As this was an experimental design using a random-allocation procedure, participants were not asked for their race and/or skin color. For the sake of completeness, it should be noted that a predominately "light-skinned" sample was used (based on experimenter observation).
4. Due to the fact that ambiguous facial expressions are more difficult to decode, individuals have to consider more additional information. In unambiguous faces, there seems to be enough "weight" at one side of the "balance scale" due to the mere recognition of the facial expression. The clear-cut inclination of the balance into one of two directions

(angry or neutral) is easy to detect. In contrast, in ambiguous facial expressions, social information keeps the "beam" more or less balanced. The perceiver has to collect some additional weight for one side of the scale. Such additional weight can be collected by also considering other facial features. If media exposure has strengthened the cognitive link between *skin color* and detrimental attributes such as *dangerous* or *criminal*, then skin color could be a sufficient additional weight that tips the beam to the "angry" side of the scale. Processing this additional information should need more time than information processing in a situation with a clear-cut inclination to one of the directions.

5. It is important to note that the method used does not allow for a comparison between dark-skinned and light-skinned faces in absolute terms. I used different computer-generated persons for dark-skinned and light-skinned targets. Thus, the absolute amount of difference can be attributed to other factors (see Corneille, Hugenberg, & Potter, 2007; Schmidt & Cohn, 2001). What is most important in this study is the relative difference between the experimental conditions: I test the hypotheses for dark-skinned faces by comparing both experimental groups. However, data for light-skinned faces were also collected for validity reasons (see the "Results" section). The Inquisit (Milliseconds Software LLC) script containing the used impulsive facial-threat perception task can be obtained upon request.

6. A sigmoidal relationship starts out with a gradual slope, which increases to an inflection point, and then levels off as it approaches a maximum value. Although the term *ambiguous* facial-threat level should be understood in relative terms, I defined facial-threat levels as ambiguous when they were located in the threat range with a sharp slope: in the range from the point where the curve starts increasing in slope to the point where the maximum perceived facial-threat value is almost approached. The facial-threat level of 40% is around the threshold-threat level. It depends on whether you look at the curve of the control or the treatment group. Thus, I ran the same analysis for ambiguous-threat levels, including the 40% threat level. This analysis reaches the same conclusion. There was a difference in ambiguous faces (40%, 50%, 60%, 70%, 80%) between the treatment condition ($M = 0.52$, $SD = 0.17$) and the control condition ($M = 0.45$, $SD = 0.17$), $t(103) = 1.91$, $p = .03$. In contrast, when comparing the means of the unambiguous facial-threat levels of 0%, 10%, 20%, 30%, 90%, and 100%, I found no mean difference between the treatment group ($M = 0.35$, $SD = 0.06$) and the control group ($M = 0.36$, $SD = 0.10$), $t(103) = 0.76$, $p = .45$.

7. The same pattern appeared in light-skinned faces, $\chi^2(10, N = 105) = 132.32$, $p < .001$.

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