Targets' facial width-to-height ratio biases pain judgments☆

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ABSTRACT

The accurate perception of others' pain is important for both perceivers and targets. Yet, like other person perception judgments, pain judgments are prone to biases. Although past work has begun detailing characteristics of targets that can bias pain judgments (e.g., race, gender), the current work examines a novel source of bias inherent to all targets: structural characteristics of the human face. Specifically, we present four studies demonstrating that *facial width-to-height ratio*, a stable feature of all faces, biases pain judgments. Compared to those with low facial width-to-height ratio, individuals with high facial width-to-height ratio are perceived as experiencing less pain in otherwise identical situations (Studies 1, 2, & 3), and as needing less pain medication to salve their injuries (Study 4). This process was observed for White but not Black targets (Study 2), and manipulations of facial width-to-height ratio affected pain perceptions even when target identity was held constant (Study 4). Together, these findings implicate face structure in judgments of others' pain.

1. Introduction

Accurately perceiving others' pain is functionally important both for those experiencing suffering and for those judging others' pain. Understanding when others are in pain may be a key component of empathy (Cheng, Yang, Lin, Lee, & Decety, 2008) and can help perceivers distinguish between those who are in actual need of assistance from those who are not. Although extensive past work has explored processes by which perceivers can accurately detect others' pain (e.g., empathy), the current work focuses instead on questions about how *biases* rooted in person perception influence judgments of others' pain. Indeed, a variety of target-level characteristics, ranging from social categories such as race and gender, to embodied facial cues such as babyfacedness, can bias our judgments of others and their capacities (for a review, see Kawakami, Amodio, & Hugenberg, 2017).

In the current work, we extend this well-established research tradition investigating biases in person perception to investigate how targets' stable facial characteristics can bias how perceivers judge targets' experience of pain. Specifically, we investigate whether variations in a face structure inherent in all human faces – *facial width-to-height ratio* (fWHR) – biases judgments when determining the extent to which others experience pain. To that end, we first provide a brief summary of factors that bias pain judgments, with a particular focus on the role of target characteristics in pain perception biases. We then turn to a discussion about the role of fWHR in person perception and how fWHR may bias the perception of others' pain. Finally, we present four novel

studies providing evidence for the hypothesized relationship between fWHR and pain perception.

2. Accuracy and bias in pain perception

Past work in the pain perception literature has primarily focused on the processes underlying pain perception *accuracy*. However, in the current work we pivot away from questions of accurate pain perception, instead focusing on characteristics inherent to the target that might *bias* pain judgments. Indeed, we believe that understanding how judgments of others' pain might be biased by perceivers' beliefs is an important topic of study. For example, patients expect that physicians can provide accurate diagnoses of pain, and society expects that jurors can render credible judgments of victims' harm based on their experiences of pain. However, when biases occur in such judgments, the interpretation of whether patients need treatment or whether victims need justice can be distorted. Research on biases in pain perception indicates that such biases can result from characteristics of the target, which we briefly review below.

One target characteristic from which pain judgment biases stem is gender. Research suggests that both men and women believe that men are less willing to report pain than women, and believe that women are more sensitive to pain and are less able to endure pain than men (Robinson et al., 2001). Meta-analytic evidence supports the notion that masculinity (which itself is associated with stoicism; Sanford, Kersh, Thorn, Rich, & Ward, 2002) is positively associated with both greater

pain tolerance and greater pain threshold (Alabas, Tashani, Tabasam, & Johnson, 2012). Experimental evidence corroborates this gender-based bias in pain perception. For instance, Robinson and Wise (2003) demonstrated that pain is underestimated for both men and women, but that this effect is larger for men. Relatedly, Pronina and Rule (2014) also found that pain is underestimated for both men and women; however, they found that participants primed with masculine concepts judged targets as experiencing less pain than when primed with feminine concepts.

Target race is another cue that generates robust and pervasive biases in pain judgments. Extensive evidence documents racial disparities in healthcare (Anderson, Green, & Payne, 2009; Green et al., 2003; Smedley, Stith, & Nelson, 2013). In particular, one domain in which healthcare reliably differs across race is in pain regulation. Compared to White individuals, people of color reliably have their pain under-estimated and undertreated (e.g., Anderson et al., 2009). One possibi-lity is that the pain experienced by people of color is recognized but under-treated, perhaps due to unequal access to healthcare or racial prejudice. However, recent research adopting a person perception fra-mework suggests that the pain experienced by people of color may simply not be recognized in the first place (Dore, Hoffman, Lillard, & Trawalter, 2014; Hoffman, Trawalter, Axt, & Oliver, 2016; Hollingshead, Meints, Miller, Robinson, & Hirsh, 2016; Trawalter, Hoffman, & Waytz, 2012; Waytz et al., 2015). Indeed, laypeople, chil-dren, nurses, medical students, and medical residents have all demon-strated beliefs that Black people feel less pain than White people in otherwise identical situations (Dore et al., 2014; Hoffman et al., 2016; Trawalter et al., 2012). Notably, these beliefs are independent of racial prejudice and negative racial attitudes (i.e., race-based antipathy). In-stead, the tendency to believe that Black people experience less pain than White people is associated with false beliefs linking Black people to non-human capabilities (Waytz et al., 2015) as well as erroneous beliefs about the biological differences between Black and White people (Hoffman et al., 2016).

Whereas the limited literature on biases in pain perception has fo-cused primarily on social categories (e.g., gender, race), in the present work, we seek to extend this understanding of biases in pain perception to facial width-to-height ratio. We turn now to a discussion of fWHR with a particular focus on how and why we hypothesized it may be implicated in pain perception.

3. Facial width-to-height ratio (fWHR)

Facial width-to-height ratio is a static face structure inherent to all faces. As shown in Fig. 1, fWHR is typically measured as the ratio be-tween bizygomatic width and upper face height (Hehman, Flake, & Freeman, 2015; Weston, Friday, & Liò, 2007). Although ori-ginally thought to be sexually dimorphic (Weston et al., 2007), mounting research finds 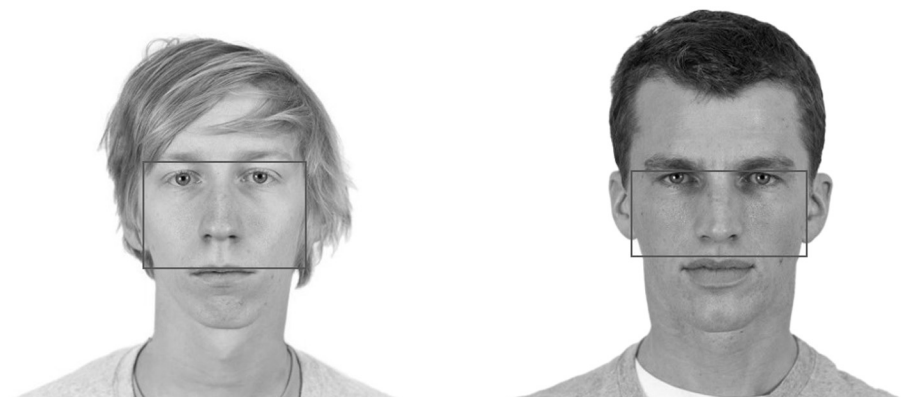little evidence for a strong relationship between fWHR and sex (Geniole, Denson, Dixson, Carré, & McCormick, 2015; Kramer, 2017; Kramer, Jones, & Ward, 2012; Lefevre et al., 2012; Özener, 2012).

Research does, however, find abundant evidence linking fWHR with interpersonal aggression and behavioral dominance. For instance, high fWHR hockey players are more likely to spend time in the penalty box (Carré & McCormick, 2008). Indeed, meta-analytic evidence provides reliable support for the notion that relatively high fWHR individuals tend to be aggressive (Geniole et al., 2015; Haselhuhn, Ormiston, & Wong, 2015). In addition, fWHR is associated with how aggressive a person appears to be (e.g., high fWHR faces are rated as more likely to be guilty of assault than are low fWHR faces, Deska, Lloyd, & Hugenberg, 2017b). Recent work has demonstrated that both high fWHR men (Carré & McCormick, 2008; Carré, McCormick, & Mondloch, 2009) and women (Geniole, Keyes, Mondloch, Carré, & McCormick, 2012) are perceived as more ag-gressive than their low fWHR counterparts. Thus, fWHR both accurately predicts aggressive behavior and appears to be associated with a facial stereotype of behavioral dominance and aggression.

Building on these links between target fWHR and behavioral dom-inance and aggression, as well as past demonstrations that target level characteristics such as gender and race bias judgments of others' pain, we proposed that targets' fWHR might similarly bias pain judgments. Specifically, we hypothesized that high fWHR targets may be seen as experiencing relatively less pain than low fWHR targets, which may have downstream consequences such as perceiving less need for pain medication to salve their injuries. Insofar as high fWHR targets are seen as relatively brutish and animalistic (e.g., Deska et al., 2017b), they might also be seen as relatively insensitive to pain.

In the current work, we provide evidence across four studies for the hypothesis that perceivers would rate high fWHR individuals as ex-periencing less pain in otherwise identical situations and need less pain medication to salve their wounds, relative to low fWHR individuals. In Study 1, we sought to provide initial evidence for this hypothesis by showing participants individuals who naturalistically varied in their fWHR and asking them to assess how much pain they believed each target would feel across a variety of situations. Study 2 was designed as a replication and extension of Study 1. The design was identical except for the inclusion of both Black and White faces to test if race and fWHR independently or interactively bias pain judgments. A third study was designed to provide an additional replication and extension of the previous studies while also including a series of exploratory media-tional analyses to investigate potential mechanisms underlying a fWHR-based bias in pain judgments. Finally, Study 4 was designed to provide a more stringent test of the hypothesis that fWHR biases pain judg-ments. Rather than selecting faces that varied naturalistically on fWHR, we instead employed faces that were digitally manipulated to be higher or lower in fWHR, allowing us to hold target identity (and other non-fWHR parts of the face) constant while manipulating target fWHR.

Fig. 1. Facial width-to-height ratio is measured as the ratio between bizygomatic width (i.e., distance between left to right zygion) and upper face height (i.e., distance between mid-brow and upper lip). The face on the left has relatively low fWHR whereas the face on the right has relatively high fWHR.