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Journal:	*Quarterly Journal of Experimental Psychology*
Manuscript ID	QJE-STD-23-208.R1
Manuscript Type:	Standard Article
Date Submitted by the Author:	05-Dec-2023
Complete List of Authors:	Bjornsdottir, R. Thora; University of Stirling, Psychology; Royal Holloway University of London, Psychology Beacon, Elizabeth; Royal Holloway University of London, Psychology
Keywords:	social class, race, gender, person perception, stereotypes

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DOI: 10.1177/17470218241230469

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Stereotypes Bias Social Class Perception from Faces: The Roles of Race, Gender, Affect, and Attractiveness

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RTB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Visualization, Writing; EB: Data curation, Formal analysis, Investigation, Writing

DOI: 10.1177/17470218241230469

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Abstract

People quickly form consequential impressions of others' social class standing from nonverbal cues, including facial appearance. Extant research shows that perceivers judge faces that appear more positive, attractive, and healthy as higher-class, in line with stereotypes associating high class standing with happiness, attractiveness, and better wellbeing (which bear a kernel of truth). A wealth of research moreover demonstrates strong stereotypical associations between social class and both race and gender. The current work bridged these areas of inquiry to explore (1) intersectional biases in social class impressions from faces and (2) how associations between social class and attractiveness/health and affect can be used to shift social class impressions. Our studies found evidence of race and gender stereotypes impacting British perceivers' social class judgments, with Black (vs. White and Asian) and female (vs. male) faces judged as lower in class. Furthermore, manipulating faces' emotion expression shifted judgments of their social class, with variations in magnitude by faces' race, such that emotion expressions shifted judgments of Black faces more than White faces. Finally, manipulating faces' complexion to appear healthier/more attractive shifted social class judgments, with the magnitude of this varying by faces' and perceivers' race, suggesting a role of perceptual expertise. These findings demonstrate that stereotypes bias social class impressions and can be used to manipulate them.

Key words: social class, race, gender, person perception, stereotypes, emotion, complexion

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Stereotypes Bias Social Class Perception from Faces:

The Roles of Race, Gender, Affect, and Attractiveness

Social class is a consequential social hierarchy that affects both life outcomes and everyday experiences, including social perception (e.g., Bjornsdottir et al., 2017; Dietze & Knowles, 2016, 2021). However, social class is only one social group membership that contributes to social hierarchy. Hierarchy also appears via other identities, such as race and gender (Sidanius & Pratto, 1999). Given their contribution to hierarchy, it is unsurprising that there are stereotypical links between social class, race, and gender (e.g., Heilman et al., 2015; Swencionis et al., 2017). However, the intersection between these identities remains to be more thoroughly explored, particularly in the domain of first impressions.

First impressions of social class can be formed rapidly from a variety of nonverbal cues (e.g., Kraus et al., 2019; Kraus & Keltner, 2009; Schmid-Mast & Hall, 2004), including facial appearance (Bjornsdottir & Rule, 2017). These impressions correlate with stereotype judgments (e.g., impressions of faces' social class correlate positively with judgments of their competence; Bjornsdottir et al., in press) and are moreover consequential – those perceived to be higher in social class standing are also judged as more suitable for employment, for example (e.g., Bjornsdottir & Rule, 2017; Kraus et al., 2019). It is therefore important to understand how people form social class impressions, including the *biases* affecting these impressions, and how these impressions may be *shifted* to help disrupt the perpetuation of inequality. Crucially, these questions must be considered while accounting for social class's intersection with gender and race. Here, we explored how various stereotypes affect impressions of social class, testing the roles of (1) faces' race and gender and (2) specific facial cues with links to social class stereotypes related to wellbeing and health.

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DOI: 10.1177/17470218241230469

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Social Class, Race, and Gender

Social class is stereotypically linked with both race and gender. For example, social class and race share stereotype content. In Western culture, both Black people and people of low social class standing are stereotyped as incompetent, whereas White people and those of high social class standing are stereotyped as competent (Swencionis et al., 2017). Individuals also show direct associations between social class and race: Black individuals are ranked as lower in status than White individuals (Dupree et al., 2021). Mental representations of these groups also reflect their overlaps. For example, mental representations of the poor appear more Black, whereas mental representations of the rich appear more White (Lei & Bodenhausen, 2017). Similarly, welfare recipients are mentally represented as Black and associated with stereotypes commonly linked to Black Americans (Brown-Iannuzzi et al., 2017). Other research indicates an overlap between occupational status and race perception, with job status-coded attire contributing to racial categorisations of Black-White racially ambiguous faces (Freeman et al., 2011).

Stereotypical links between social class and race are not limited to Black versus White. For example, Asian Americans are perceived as higher in status (albeit more foreign) than Black Americans but lower in status than White Americans (Dupree et al., 2021; Kahn et al., 2009; Zou & Cheryan, 2017). This is consistent with the perception of Asians as a 'model minority', a label referencing the stereotypical expected educational or career success of Asian people (Lee et al., 2009) often in comparison to Black Americans, and the 'cold but competent' Asian stereotype (Lin et al., 2005). Altogether, extant research makes clear that social class and race are conceptually linked. However, the majority of research in this area has been conducted in the context of the United States, potentially limiting generalizability to other cultural contexts.

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DOI: 10.1177/17470218241230469

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Research also shows ties between social class and gender. Men are broadly stereotyped as more competent than women (particularly more 'traditional' women; Cuddy et al., 2008), paralleling the stereotypical differences in competence between high and low social class individuals (e.g., Durante & Fiske, 2017; Fiske et al., 2002, 2007). The association of higher power and higher status occupations with men is consistent with women's perceived lack of competence and lack of fit with these higher status roles (Heilman, 2001; Heilman et al., 2015). Although these stereotypical links between social class and gender have been consistently demonstrated, little work has explored how this affects person perception. In opposition with stereotypes, Ghavami and Mistry (2019) found that adolescent girls were perceived as higher in class than adolescent boys, based on impressions from social media profiles. Bjornsdottir (2019) similarly found that women's faces were rated as higher in social class than men's faces. The contrast between these findings and those in the stereotype literature warrant further investigation.

Given the complexity of hierarchies in society, it is important to examine impressions of social class when considering its intersection with other social group memberships. Indeed, research has demonstrated that stereotypes of intersections of gender and race/ethnicity differ from stereotypes of these group memberships in isolation (Ghavami & Peplau, 2013). Most relevant to the current work, extant findings show that the perception of adolescents' social class from their social media profiles differs by intersections between gender, race, and sexual orientation (Ghavami & Mistry, 2019). Here, we aimed to bridge between those findings and the vast literature demonstrating stereotypical or perceptual overlaps between social class and either gender or race. We therefore tested how individuals' race, gender, and their intersection predict (i.e., bias) first impressions of social class from their faces in Study 1.

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Manipulating Social Class Impressions

Given the potential consequences of first impressions of social class (e.g., judgments of hiring suitability; Bjornsdottir & Rule, 2017; Kraus et al., 2019), it is also crucial to understand how social class impressions can be manipulated, and whether these manipulations are consistent across race and gender. Extant research points to some possibilities, with more positive, attractive, and healthy-looking faces perceived as higher in social class (Bjornsdottir & Rule, 2017; Bjornsdottir, 2019). Indeed, emotion expressions can effectively shift impressions of individuals' social class standing, with emotion expressions' valence (vs. specific emotion content) affecting judgments: The same individual is perceived as higher in social class standing when expressing positive emotion and lower in class standing when expressing negative emotion (Bjornsdottir & Rule, 2020), in line with valenced stereotypes of social class (e.g., Aknin et al., 2009).

However, emotion expressions also share associations with both gender and race, suggesting that emotion expressions may not manipulate social class impressions as effectively for all groups of people. For example, expressions of happiness and anger are each associated with gender (with women and men, respectively) both morphologically and stereotypically (Adams et al., 2015). This, in turn, affects perceptions of both gender and emotion expression, with gender-ambiguous smiling faces more likely to be perceived as women than men and faster detection of anger in men's than women's faces, for example (e.g., Becker et al., 2007; Hess et al., 2009). Similarly, research shows a stereotypical association between Blackness and anger that affects both race and emotion perception—for example, more ready perception of anger in Black than White faces (Halberstadt et al., 2022; Hugenberg & Bodenhausen, 2003, 2004). We therefore tested faces' race and gender as moderators of emotion expressions' efficacy in shifting social class impressions in Study 2.

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Another potent cue to social class perception is attractiveness or perceived health (which strongly interrelate), following stereotypes linking better health and greater attractiveness with higher social class standing (e.g., Dion et al., 1972; note that there are real class differences in health; e.g., Mazzuco & Suhrcke, 2011). One method which effectively shifts perceptions of attractiveness and health, and thus provides a promising candidate for shifting impressions of social class, is via skin complexion. Specifically, increased skin carotenoid colouration (primarily skin yellowness) affects perceptions of attractiveness and health, with increased carotenoid colouration increasing perceived health and attractiveness (e.g., Ip et al., 2019; Lefevre & Perrett, 2015; Stephen et al., 2011). The efficacy of manipulating carotenoid colouration in shifting attractiveness and health perceptions (including across both race and gender) suggests that this aspect of complexion may also shift social class impressions. We tested this question in Study 3 and explored possible moderation by faces' race and gender.

The Current Work

The current research addressed these gaps to provide a more thorough understanding of social class impressions from faces, examining both group memberships (gender, race) and facial cues (emotion expression, carotenoid colouration) that may bias impressions of social class standing due to their stereotypical associations.[1] In Study 1, we tested whether faces' race (Asian, Black, White) and gender (women, men) predicted first impressions of their social class. In Study 2, we tested the efficacy of emotion expressions shifting social class

[1] Note that our aim was not to disentangle social class judgments from other, stereotypically-related judgments. Given the overlap between impressions of social class and other traits (e.g., competence, trustworthiness, warmth), we do not argue that the group memberships and facial cues we examine here uniquely impact judgments of social class. Indeed, we anticipate that there would be some correspondence between how these group memberships and cues affect judgments of social class and of stereotypically-related traits, in line with recent findings showing that the specific facial morphology and complexion features driving these related judgments overlap (Bjornsdottir et al., in press).

DOI: 10.1177/17470218241230469

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impressions across race (Black, White) and gender (women, men). Finally, in Study 3, we tested whether manipulating carotenoid colouration shifted impressions of faces' social class, again testing whether this differed by faces' race (Asian, Black, White) and gender (women, men). Because research in face perception documents a variety of ingroup advantages and ingroup favouritism effects (for example, own-race and own-gender advantages in face recognition; e.g., Lall & Tanaka, 2023; Singh et al., 2022; Wright & Sladden, 2003), it is crucial to account for not just faces' group memberships, but also perceivers'. We therefore recruited Black, White, and Asian perceivers and examined whether their impressions differed. Our perceiver samples were British, with the aim to broaden the focus of this largely North American-centric literature. We preregistered all studies and make our data and code available on the Open Science Framework (OSF; https://osf.io/zcxtp/?view_only=2ce5e24012f74ad4b1fcbd890309e15b), and all studies received ethical approval from Royal Holloway, University of London (Study 1: #2481, Study 2: #2418, Study 3: #2984).

Study 1: Race and Gender Biases in Social Class Impressions

A wealth of work documents stereotypical associations between Whiteness and higher social class standing (e.g., Brown-Iannuzzi et al., 2019; Dupree et al., 2021; Freeman et al., 2011; Lei & Bodenhausen, 2017) and men and higher social class standing (e.g., Heilman et al., 2015). However, the *intersection* between race and gender in social class perception and the additional effect of perceivers' racial group membership remain underexplored.

Study 1 therefore built upon extant work to specifically test how faces' race, gender, and their intersection bias impressions of social class. We also tested how faces' race and gender relate to certain aspects of facial appearance that perceivers use to infer social class, namely attractiveness/health and positive versus negative affect (Bjornsdottir & Rule, 2017). We tested these questions with three participant samples: an initial sample of primarily White

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British perceivers (preregistered: https://osf.io/2hspw/), and then replicated the study with samples of Black British (preregistered: https://osf.io/tms8g/) and Asian British (preregistered: https://osf.io/gyczp/) perceivers. This enabled us to examine possible effects of perceiver race on biased social class impressions. We ran these as separate studies but report them together for brevity.

We anticipated that White and Asian faces would be perceived as higher in social class than Black faces, in line with extant findings. We also anticipated that perceptions of Asian faces' social class might be lower, equivalent, or higher than of White faces, based on previous findings. In line with existing findings in the person perception literature (Bjornsdottir, 2019; Ghavami & Mistry, 2019), we expected that women might be perceived as higher in class than men, though gender/status stereotypes suggested the opposite pattern. We furthermore expected any race differences in social class perceptions to be stronger for men's than for women's faces (in line with intersectional invisibility; Purdie-Vaughns & Eibach, 2008). Whether attractiveness and affect cues related to social class perceptions differently by face race and gender was exploratory. We expected consistent patterns of results across participant samples, but also anticipated that Black perceivers might alternatively not perceive Black faces (ingroup members) to be lower in class, compared to Asian and White faces.

Method

Stimuli

We collected 240 neutral face photos of Asian, Black, and White women and men (40 photos of each race/gender intersection) from the Chicago Face Database (Ma et al., 2015). Because of the relation between social class impressions and both attractiveness/health and affect demonstrated in previous research (Bjornsdottir & Rule, 2017), we did not wish for these cues to act as confounds. Using the database norming data, we therefore ensured that

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happiness (i.e., affect) ratings did not differ by face race or gender and that attractiveness ratings did not differ by face race (though ratings were slightly higher for women than men)[2]. We cropped all photos around the top of the head, bottom of the chin, and around the edges of the ears and then standardized all images in size. Finally, as 'Asian' is a heterogeneous group, we pre-tested the perceived ethnicity of the Asian stimuli, finding them to be perceived primarily as East or Southeast Asian (see Supplementary Material).

Participants

In each sample, we recruited 60 British participants from Prolific Academic, for an average of 30 participants categorising each face. We excluded the data of participants who reported trouble viewing the stimuli or responding without waiting for stimuli to load. Following these exclusions, across the three samples, there were 170 participants (M_{age} = 35.78 years, *SD* = 12.76; 101 female, 68 male, 1 transmasculine; 60 Asian, 57 Black, 49 White, 4 other or unspecified race – see Supplementary Material for detailed ethnicity reporting and demographics separated by sample).[3]

Together, our sample of faces and participants afforded 90% power to detect interaction effects of $r \geq .18$ in a cross-classified multilevel model (PANGEA; Westfall, 2016).

Procedure

Following written informed consent, we instructed participants that they would see images of faces and be asked to categorise each as *rich* or *poor*, based on their first impression. Participants then viewed a random subset of 120 faces (to minimize rating

[2] Happiness did not differ by face gender or race, all Fs $\leq .80$, ps $\geq .37$. Attractiveness differed by face gender, $F(1, 234) = 5.32$, $p = .02$, but not by race or the interaction between race and gender, Fs $\leq .15$, ps $\geq .86$.

[3] Because the Asian faces in our sample were primarily perceived as East or Southeast Asian, we recruited a sample of Asian perceivers who primarily identified as East or Southeast Asian, such that faces would be more likely to be perceived as ingroup members.

DOI: 10.1177/17470218241230469

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fatigue) one at a time and in random order, categorising each as *rich* or *poor* at their own pace (though we instructed them to not spend too much time on any one face). Following this, participants provided demographic information (age, gender, race/ethnicity, subjective social class), reported any trouble viewing the stimuli, and reported whether they provided any responses without waiting for stimuli to fully load, before debriefing.

Results

Face Gender and Race Predicting Perceived Social Class

We analysed the data, pooled across all three participant samples, using cross-classified multi-level models, treating both faces and participants as random (this analysis was not preregistered but enabled a direct comparison between our participant samples; see Supplementary Material for preregistered face-level ANOVAs separated by participant sample). We first entered face gender (effect coded with men as -0.5 and women as 0.5), face race (deviation coded with Black as the reference category coded as -1/3 and White and Asian as 2/3 in their respective contrasts), and their interaction as predictors of categorisation as *rich* (1) or *poor* (0). We included random slopes for face race, face gender, and their interaction and ran our analysis using the lme4 and lmerTest packages in R (Bates et al., 2015; Kuznetsova et al., 2017). This revealed main effects of both face gender and face race (both the Asian vs. Black and White vs. Black contrasts), but no interaction (see Table 1 and Figure 1; note that this and all figures in the manuscript display results at the level of faces, averaged across individual participants). Specifically, male faces (M = .44, SD = .17) were categorised as *rich* significantly more often than female faces (M = .35, SD = .19), and both Asian (M = .43, SD = .18) and White faces (M = .42, SD = .19) were categorised as *rich* significantly more often than Black faces (M = .34, SD = .17).

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Moderation by Participant Race

Next, we added participant race as an additional interaction term (deviation coded following the same pattern as for face race), testing whether participant race moderated any of the above results. We observed the same main effects of face gender and race as above, and an additional interaction between participant race (Asian vs. Black) and face race (White vs. Black; see Table 2). Specifically, the difference in categorisations between White and Black faces was greater among Asian than Black participants, driven by Asian participants categorising Black faces as *rich* (M = .30, SD = .17) less often than Black participants did (M = .36, SD = .19; see Figures 2 and S3).

--- Insert Table 2 about here ---

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We also tested participant gender and participant subjective SES as moderators in separate exploratory models, finding neither to moderate or alter the effects of face gender or face race (see OSF for model estimates). We did, however, observe a main effect of participant subjective SES, such that participants higher in subjective SES were less likely to categorise faces as rich, *odds ratio* = 0.90, SE = 0.04, 95% CI [0.82, 0.98], Z = -2.34, p = .02.

Social Class Cues

Finally, we tested whether the use of attractiveness/health and affect as cues informing social class categorisations differed by face race or gender, using the attractiveness and happiness norming data from the Chicago Face Database. We therefore ran a model in which faces' attractiveness and happiness interacted with their gender and race to predict their categorisations, treating both faces and participants as random. This revealed attractiveness, *odds ratio* = 2.76, SE = 0.32, 95% CI [2.19, 3.46], Z = 8.73, p < .001, and happiness, *odds ratio* = 1.36, SE = 0.14, 95% CI [1.11 – 1.67], Z = 2.97, p < .001, as significant predictors of *rich* categorisations, in line with previous work (Bjornsdottir, 2019;

DOI: 10.1177/17470218241230469

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Bjornsdottir & Rule, 2017). Faces' gender interacted with their attractiveness, *odds ratio* = 2.26, *SE* = 0.51, 95% CI [1.46 – 3.51], $Z = 3.64$, $p < .001$, however, such that attractiveness predicted categorisations of women's faces more strongly than of men's faces (see Figure S4). Face race interacted neither with attractiveness nor happiness, and face gender did not interact with happiness, $|Z|$s ≤ 1.14, ps $\geq .19$.

Discussion

Study 1 largely replicated previously documented biases in social class impressions according to race, with Black faces perceived as lower in social class than both Asian and White faces. The difference in perceived social class between Black and White faces, however, varied by participant race, such that this difference was smaller among Black than Asian participants—this was driven by Black participants' greater categorisation of Black faces as rich, compared to Asian participants. Therefore, although the overall pattern of results was consistent across participant race, there were nonetheless variations in the magnitude of this pattern.

It is also important to acknowledge the heterogeneity of the ethnicity of the Asian faces (and perceivers), which may have added noise to the data, as not all Asian ethnicities are necessarily perceived as similar in status (e.g., Kuo et al., 2020) or Asian prototypicality(Goh & McCue, 2021). Indeed, our Asian stimuli were primarily perceived as East and Southeast Asian as opposed to South Asian, the group seen by British perceivers as most prototypically Asian British (Goh & McCue, 2021). Nonetheless, a clear pattern of perceiving Asian faces as higher in class standing than Black faces emerged across perceiver samples. Altogether, then, the results of Study 1 suggest that members of three broad racial groups in the UK perceive White and Asian individuals as more likely to be of high class standing than Black individuals, in line with extant findings from the US (Dupree et al., 2021).

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Participants also judged men's faces as high in social class more often than women's faces, in line with stereotypes. This finding is, however, not consistent with some previous findings in person perception (Bjornsdottir, 2019; Ghavami & Mistry, 2019), possibly explained by the lack of substantial gender differences in faces' attractiveness and affect in the present study. Unexpectedly, there was no interaction between race and gender in predicting social class impressions. This stands in some contrast to previous research highlighting the importance of considering the intersection between gender and race (e.g., Ghavami & Peplau, 2013). This may simply be because of the relative strength of stereotypes associating race and gender with social class, compared to more specific intersectional stereotypes.

Finally, across face race and gender, attractiveness and affect similarly predicted social class impressions, though attractiveness was a stronger predictor of perceptions of women's, compared to men's, social class. This is consistent with previous research revealing the importance of women's appearance in predicting first impressions (Xie et al., 2019) and is also in line with findings highlighting the value of attractiveness in perceptions of women (e.g., their humanness; Alaei et al., 2022). We experimentally tested how manipulating facial cues that elicit impressions of affect and attractiveness/health *within* face identities may shift social class impressions in Studies 2 and 3.

Study 2: Manipulating Social Class Impressions with Emotion Expressions

We next examined how faces' race and gender interact with other stereotypes to shift impressions of social class. Previous research shows that people perceive faces expressing positive emotion as higher in social class and faces expressing negative emotion as lower in social class, compared to neutral faces (Bjornsdottir & Rule, 2020), in line with valenced stereotypes of social class (e.g., Aknin et al., 2009). In Study 2, we sought to expand upon this and test whether these patterns vary by faces' race or gender. To this end, we tested

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social class impressions of Black and White women's and men's faces displaying neutral, happy, or angry expressions. Similar to Study 1, we also tested the role of perceivers' race by recruiting two samples: we first ran the study with a primarily White British sample (preregistered: https://osf.io/qtpr7/) and then replicated the study with a Black British sample (preregistered: https://osf.io/w57qg/). We again report the studies together for brevity.

For our initial sample, we expected faces expressing happiness to be categorised as *rich* more often than neutral faces, and faces expressing anger to be categorised as *rich* less often than neutral faces (in line with previous findings; Bjornsdottir & Rule, 2020). We furthermore anticipated Black faces to be categorised as *rich* less often than White faces, and men to be categorised as *rich* more often than women, following the results of Study 1.[4] We also expected an interaction between emotion expression and race and/or between emotion expression and gender but did not hypothesise a direction.

The social class stereotypes associated with emotion expressions and with race could interact in various ways. Emotion expression may interact with race, such that angry expressions lead to lower social class impressions more often and happy expressions to higher class impressions less often for Black than White faces (i.e., an additive effect). Alternatively, the opposite pattern may emerge, whereby angry expressions lead to lower social class impressions more often for White than Black faces and happy expressions lead to higher social class impressions more often for Black than White faces (i.e., a contrast effect). We anticipated that perceiver race could possibly moderate an interaction between face race and emotion expression, with Black perceivers perhaps not showing such an interaction.

[4] In our preregistration, we stated that we expected women to be categorised as *rich* more often than men (based on previous findings; e.g., Ghavami & Mistry, 2019), but this was generated before running Study 1. We therefore amended this hypothesis in line with the results of Study 1.

DOI: 10.1177/17470218241230469

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Similar patterns could be predicted for emotion expressions interacting with gender. Angry expressions may lead to lower social class impressions more often and happy expressions to higher class impressions less often for men's than women's faces (additive effect). Alternatively, angry expressions may lead to lower social class impression more often for women than men and happy expressions lead to higher social class impressions more often for men than women (contrast effect).

Method

Stimuli

We collected photographs of Black and White women and men who had neutral, happy,[5] and angry expressions available in the Chicago Face Database (Ma et al., 2015). We selected 36 faces of each gender/race, for a total of 144 faces or individual face identities (with three expressions per face, this totalled 430 photos, as two faces did not have angry expressions available). We ensured that the attractiveness and happiness ratings provided in the database norming data did not differ by faces' gender or race, as in Study 1.[6]

In this study, we used only Black and White faces, due to the lack of availability of Asian faces with different emotion expressions in the Chicago Face Database. Although other databases include emotionally-variable Asian faces, we did not wish to introduce additional noise to the study by including stimuli from multiple databases. We also included a reduced number of faces compared to Study 1 to ensure no significant gender differences in attractiveness and to enable participants to categorise all faces (vs. a subsample of the faces) without fatigue.

Participants

[5] We selected closed-mouth happy expressions for all but five faces, who only had open-mouth happy expressions available.
[6] Attractiveness: all Fs ≤ 3.78, ps $\geq .05$. Happiness: all Fs ≤ 1.71, ps $\geq .19$.

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We first piloted the study with a convenience sample recruited by undergraduates (see Supplementary Material). For the main study, we then recruited two samples of 90 British participants via Prolific Academic, such that 30 participants categorised each expression of each face in each sample. As in Study 1, we excluded the data of participants who reported issues with the stimuli loading or having provided their responses before stimuli loaded, leaving a total of 174 participants (M_{age} = 35.68 years, SD = 12.96; 117 female, 56 male, 1 nonbinary, 1 unreported gender; 91 Black, 68 White, 15 other or unreported race – see Supplementary Material for detailed ethnicity reporting and demographics separated by sample).

This sample of faces and participants afforded 90% power to detect interaction effects of $r \geq .10$ in a cross-classified multilevel model (PANGEA; Westfall, 2016).

Procedure

Following written informed consent, participants viewed the 144 faces one at a time in random order and categorised each as *rich* or *poor*, based on their first impression. Each participant viewed only one emotion expression (i.e., one photo) per face, with each face's emotion expression counterbalanced across three conditions (to which we randomly assigned participants). After categorising all faces, participants provided demographic information (gender, age, race/ethnicity, nationality) and reported trouble viewing the stimuli and whether they provided any responses without waiting for stimuli to fully load, before debriefing.

Results

Face Emotion Expression, Gender, and Race Predicting Perceived Social Class

As in Study 1, we conducted a cross-classified multilevel analysis across both participant samples, treating faces and participants as random (see Supplementary Material for preregistered face-level ANOVAs separated by participant sample). We entered face emotion expression (deviation coded with neutral as the reference category coded as -1/3 and

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happy and angry as 2/3 in their respective contrasts), face gender (effect coded with men = -0.5 and women = 0.5), face race (effect coded with White = -0.5 and Black = 0.5), and their interaction as predictors of categorisations (rich = 1, poor = 0). This revealed main effects of face emotion expression, qualified by interactions with face race, and with face gender and face race (the latter only for the happy vs. neutral contrast; see Table 3).

Replicating extant findings, faces were categorised as *rich* more often when expressing happiness (M = .55, SD = .19) and less often when expressing anger (M = .32, SD = .16), compared to when neutral (M = .41, SD = .20). The interaction with face race showed this pattern to be stronger for Black than White faces (see Figures 3 and S8). The interaction with face gender and face race for the happy versus neutral contrast revealed that the interaction between face race and emotion expression (happy vs. neutral) held only among men's faces, *odds ratio* = 1.37, SE = .14, 95% CI [1.11, 1.68], Z = 2.96, p = .003, such that happy expressions boosted *rich* categorisations more for Black men than White men (indeed, happy Black men's faces, M = .59, SD = .13, were categorised as rich more often than happy White men's faces, M = .51, SD = .20; see Figures 4 and S9).

--- Insert Table 3 about here ---

--- Insert Figure 3 about here ---

--- Insert Figure 4 about here ---

Moderation by Participant Race

Next, we added participant race as an additional interaction term to the model. This revealed an interaction between participant race and face emotion expression (happy vs. neutral), *odds ratio* = 0.75, SE = 0.10, 95% CI [0.58, 0.97], Z = -2.22, p = .03, such that White participants categorised faces with happy expressions as *rich* more often, compared to Black participants (see Figure S10). Participant race did not moderate any other effects, $|Zs| \leq$

DOI: 10.1177/17470218241230469

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1.71, *p*s ≥ .09 (see Table S6 for full model estimates). A second exploratory model testing participant gender as a moderator revealed no moderation by participant gender (see OSF for model estimates).

Discussion

Here we replicated the effects of emotion expression on social class impressions demonstrated in previous work (Bjornsdottir & Rule, 2020): The same individual faces were perceived as rich more often when expressing happiness and less often when expressing anger, compared to neutral. This pattern did not significantly vary by faces' gender but was stronger among Black faces, compared to White faces. Specifically, we observed an additive effect of stereotypes linking Blackness and low social class, Blackness and anger, and negative emotion and low social class, such that angry expressions shifted social class impressions of Black faces more than White faces. Among men's faces, happy expressions also shifted social class impressions of Black faces more White faces, suggesting a contrast effect similar to the 'teddy bear effect' observed in extant research (e.g., Livingston & Pearce, 2009). We did not find evidence of participant race moderating these patterns. White participants, however, did categorise faces with happy expressions as *rich* more often than Black participants did, suggesting a stronger association between happiness or positive affect and higher social class among White British than Black British participants.

Finally, in contrast to Study 1, we found no evidence of main effects of faces' gender or race on social class impressions, suggesting that the presence of other salient cues (e.g., emotion expression) may reduce the effects of gender and race on social class impressions.

Study 3: Manipulating Social Class Impressions with Facial Complexion

In line with stereotypes (e.g., Charlesworth et al., 2022; Dion et al., 1972) and actual social class differences in health (e.g., Adler et al., 1994; Marmot, 2003; Singh-Manoux et al., 2003) faces judged as healthier and more attractive are also perceived as higher in social

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class (Bjornsdottir & Rule, 2017, Bjornsdottir, 2019). Previous research shows that skin complexion affects perceptions of attractiveness and health, such that increased carotenoid colouration (yellower/redder complexion) is perceived as healthier and more attractive than decreased carotenoid colouration (bluer/greener complexion; e.g., Ip et al., 2019; Lefevre et al., 2015; Re et al., 2011). Study 3 tested whether manipulating faces' carotenoid colouration affects impressions of social class, and whether this is consistent across race and gender.

We hypothesised that increased carotenoid colouration would be associated with higher social class standing (and decreased carotenoid colouration with lower social class standing), and we explored whether the magnitude of this pattern varied by faces' race or gender. Because we observed race and gender differences in the efficacy of the carotenoid colouration manipulation when we validated the perceived attractiveness and health of the stimuli (see below and Supplementary Material), we anticipated that we might observe a similar interaction pattern for social class impressions, though perhaps only among White perceivers (preregistered: https://osf.io/bwcqe/).

Method

Stimuli

We collected neutral-expression photographs of Asian, Black, and White women and men from the Chicago Face Database (Ma et al., 2015). We selected 30 faces of each gender/race (for a total of 180 faces), ensuring that the attractiveness and happiness ratings provided in the database norming data did not differ by gender or race, as in the above studies.[7] We then created two versions of each face, varying skin complexion by (1) increasing carotenoid colouration and (2) decreasing carotenoid colouration, manipulating skin yellowness, redness, and lightness in MATLAB in line with Lefevre et al. (2013) and Ip

[7] Attractiveness: all Fs ≤ 2.19, ps $\geq .14$. Happiness: all Fs ≤ 0.51, ps $\geq .60$.

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et al. (2019). We then pre-tested these stimuli, ensuring that the increased carotenoid manipulation appeared healthier and more attractive than the decreased carotenoid manipulation, finding this across face race and gender (though varying in magnitude; see Supplementary Material). We used only the manipulated images, and not the original images, to maximise the complexion differences between stimuli (note that another pre-test showed that asking participants to judge between one manipulated image and the original image did not consistently validate – e.g., although decreased carotenoid colouration versions looked less attractive than the unmanipulated images, increased carotenoid colouration was not consistently perceived as more attractive than the unmanipulated images).

Participants

We first piloted the study with a convenience sample (see Supplementary Material). We then recruited two samples of perceivers, one White British and one Black British, via Prolific Academic. We did not recruit Asian perceivers here, due to the heterogeneity of the Asian faces. We recruited 70 participants per sample (though 71 completed the study for the Black British sample), for a minimum of 30 participants viewing each face in one of two conditions and anticipating some data exclusions. After excluding the data of participants who reported issues with stimuli loading or having provided responses without waiting for stimuli to load, the final sample consisted of 130 participants (M_{age} = 37.95 years, SD = 12.94; 106 female, 23 male, 1 nonbinary; 66 Black, 64 White – see Supplementary Material for demographics separated by sample). All participants self-reported normal colour vision.

This sample of faces and participants afforded 90% power to detect interaction effects of $r \geq .15$ in a cross-classified multilevel model (PANGEA; Westfall, 2016).

Procedure

Following written informed consent, we randomly assigned participants to one of two conditions: (1) judging which face image looked richer or (2) judging which face image

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looked poorer. On each trial, participants saw a pair of face images. Each pair showed the two colour manipulated versions (increased carotenoid colouration and decreased carotenoid colouration) of the same face identity. For each pair, participants chose which of the two looked richer or poorer (depending on condition), based on their first impression. Participants did this for all 180 faces in random order, with the side of the screen each colour manipulated version appeared on counterbalanced. Following this, participants provided demographic information (age, ethnicity, gender, nationality, subjective SES). Participants finally reported any trouble experienced viewing the stimuli and whether they provided any responses without waiting for stimuli to fully load, before debriefing.

Results

Face Gender and Race Predicting the Effect of Complexion on Perceived Social Class

For each response, we noted whether the chosen face matched the hypothesized choice (e.g., if the increased carotenoid colouration version was chosen as appearing richer) or not (e.g., if the decreased carotenoid colouration version was chosen as appearing richer), respectively coding them as 1 and 0. We analysed the data pooled across participant samples using a cross-classified multi-level model (see Supplementary Material for preregistered face-level ANOVAs split by participant sample). We treated participants and faces as random and included face gender (effect coded: men = -0.5, women = 0.5), face race (deviation coded: reference category Black = -1/3, White and Asian = 2/3 in their respective contrasts), and their interaction as predictors. The model intercept was significant and positive, indicating that the hypothesized response was made significantly more often than chance (i.e., higher carotenoid colouration was perceived as higher in social class). There was a significant main effect of face race (White vs. Black contrast), qualified by an interaction between face gender and face race (both White vs. Black and Asian vs. Black contrasts; see Table 4). This interaction showed that face race affected responses for men's (but not women's) faces, such

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that participants responded to White men's faces (M = .88, SD = .05) as hypothesized more than Black men's faces (M = .82, SD = .04), and Black men's faces more than Asian men's faces (M = .75, SD = .06; see Figure S17).

--- Insert Table 4 about here ---

Moderation by Participant Race

Next, we added participant race (effect coded: Black = -0.5, White = 0.5) as an additional interaction term to the model. This revealed significant interactions between face race and participant race (see Table 5), such that Black participants showed the hypothesized response similarly often for Black (M = .83, SD = .05) and White faces (M = .84, SD = .06), but more for Black faces than Asian faces (M = .74, SD = .07). White participants, in contrast, showed the hypothesized response more for White (M = .88, SD = .05) than Black faces (M = .79, SD = .05), but similarly often for Black and Asian faces (M = .80, SD = .08; see Figures 5 and S18). Additional exploratory models with participant gender and participant subjective SES as moderators revealed no significant moderation (see OSF for model estimates).

--- Insert Table 5 about here ---

--- Insert Figure 5 about here ---

Discussion

The results of Study 3 show that carotenoid colouration successfully manipulates social class impressions, in line with attractiveness and health perception. That is, increased (vs. decreased) carotenoid colouration is associated with higher (vs. lower) perceived social class, aligning with recent data-driven findings showing that yellower and redder complexions contribute to perceptions of higher social class standing (Bjornsdottir et al., in

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press). This pattern appeared across face gender and race, but we observed some differences in the magnitude of this relation, and this furthermore varied by participant race. Among White perceivers, the effect was stronger for White compared to Black faces and similarly strong for Black and Asian faces, whereas among Black perceivers, the effect was similarly strong for Black and White faces, and stronger for Black compared to Asian faces. This pattern may be explained by perceptual expertise: Both perceiver groups are familiar with faces of their own racial ingroup and with the majority racial group in the UK (White), perhaps enabling perceivers to better detect variations in complexion among these groups.

General Discussion

Across three studies, we demonstrated various ways in which stereotypes affect first impressions of social class from faces. Namely, we found evidence of race and gender biases (Study 1) and showed how both emotion expression (Study 2) and skin complexion (Study 3) can successfully manipulate social class impressions across race and gender. Crucially, we observed some variation in patterns by perceiver race, highlighting the importance of considering the group memberships of both perceivers and stimuli in social perception research. Altogether, our findings demonstrate that stereotypes consistently bias social class impressions and can be used to manipulate these impressions.

In Study 1, we largely replicated the race and gender associations with social class demonstrated in extant research. Perceivers categorised White and Asian faces, significantly more often than Black faces, as high in social class. This parallels stereotypes of racial status and aligns with existing findings in the person perception literature (e.g., Freeman et al., 2011; Lei & Bodenhausen, 2017; Zou & Cheryan, 2017). This effect was somewhat tempered among Black British perceivers, who categorised Black faces as rich more often than Asian British perceivers did.

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We also observed gender biases in line with stereotypes associating women with lower status (e.g., Heilman et al., 2015). Perceivers categorised men's faces as high in social class significantly more often than they did women's faces. Finally, we found that although judgments of faces' attractiveness and happiness positively predicted impressions of their social class across race and gender (replicating previous work; Bjornsdottir, 2019; Bjornsdottir & Rule, 2017), the relation between attractiveness and perceived social class was stronger for women's than men's faces. This finding is in line with research showing that women's, compared to men's, facial appearance more strongly predicts judgments of them (Xie et al., 2019).

Next, we explored two ways in which stereotypes could be used to manipulate social class perception. In Study 2, we focused on emotion expression, due to valenced stereotypes of social class. Replicating and extending extant findings (Bjornsdottir & Rule, 2020), we found that the same face was perceived as high in social class significantly more often when expressing happiness and significantly less often when expressing anger, compared to a neutral expression. This pattern held across faces' race and gender but was stronger for Black faces than White faces. Additionally, the salient presence of emotion expressions also eliminated the main effects of gender and race observed in Study 1.

Finally, in Study 3 we manipulated faces' complexion, specifically carotenoid colouration, due to its robust association with perceptions of health and attractiveness and stereotypes associating greater health and attractiveness with higher social class. This too successfully manipulated social class impressions, such that the same face appeared higher in social class with increased (vs. decreased) carotenoid colouration, converging with recent data-driven findings (Bjornsdottir et al., in press). This effect held across face race and gender but was stronger for faces that perceivers may have more perceptual expertise with:

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White faces for White British perceivers, and Black and White faces for Black British perceivers.

Taken together, these results highlight the strong role that stereotyping plays in impressions of social class from facial appearance. This complements recent findings showing that impressions of social class and of stereotypically-related traits (e.g., competence, warmth) are driven by a shared set of facial features (i.e., facial morphology and complexion features; Bjornsdottir et al., in press) and aligns with theory proposing that stereotypes explain the relation between facial appearance and judgments of group memberships that are not perceptually obvious, such as social class (Bin Meshar et al., 2021). It is important to highlight that although the emotion expression and complexion results certainly indicate some degree of halo effect in social class judgments, social class stereotypes and perceptions cannot simply be reduced to valence—for example, faces perceived as high in social class share features with both dominant and submissive faces (Bjornsdottir et al, in press), and stereotype content regarding social class can be ambivalent (Durante & Fiske, 2017; Fiske et al., 2002). These studies thus represent an important extension of findings in both the stereotyping and person perception literature, novelly considering both face and perceiver group memberships, examining the interaction between gender and race, and recruiting diverse samples.

Studies 2 and 3 also importantly highlight the variability and malleability of social class impressions—which can have impactful downstream consequences, such as judgments of employment suitability (e.g., Bjornsdottir & Rule, 2017; Kraus et al., 2019). Their results suggest that individuals may have some power over the social class impressions others may form of them, with a photo of the individual with a smiling expression and healthier complexion more likely to elicit judgments of higher class standing (compared to a photo

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with a neutral expression or less healthy complexion), and perhaps combat disadvantageous gender or race stereotypes.

This research furthermore adds to the growing literature going beyond using only White face stimuli and only majority group perceivers (as many researchers have recently called for, see Cook & Over, 2021; Dupree et al., 2021; Sutherland & Young, 2023) and examining intersecting identities in person perception (e.g., Ghavami & Mistry, 2019; Goff et al., 2008). Our results therefore contribute to the growing movement of increasing the generalisability of first impressions research beyond White samples.

There are, of course, various ways in which the current research could be improved and built upon and questions that remain for future research to address. For example, the effects of complexion could be tested in a more ecologically valid manner, as perceivers do not encounter two versions of the same face in real life. Future research could obtain social class ratings or categorisations of individual stimuli to better estimate the magnitude of carotenoid colouration's effect on social class judgments. Additionally, although emotion expression and complexion both clearly influence social class impressions, the relative strength of each remains unclear. To understand this, future research could cross different emotion expressions with increased or decreased carotenoid colouration and evaluate social class impressions. To better inform advice on how individuals may most advantageously self-present, future research could also use interactive preference tasks rather than forced-choice designs. For example, perceivers could be asked to manipulate a face's emotion expression and/or complexion until it looks *highest* or *lowest* in social class (similar to the approach used by Perrett et al., 1998, for sexual dimorphism).

Although our studies had diverse samples of faces and perceivers, further improvements can be made. For example, our samples of Asian stimuli and perceivers had substantial heterogeneity, and future work may wish to test how specific Asian ethnicities are

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perceived (similar to Kuo et al.'s, 2020, investigation of perceptions of the Asian-White wealth gap) and recruit balanced samples of perceivers from these specific ethnic groups. In the UK context, it may be especially important to specifically test impressions of South Asian individuals (e.g., using stimuli from the India Face Set; Lakshmi et al., 2021) and recruit South Asian participants, as South Asians are viewed as the most prototypical Asian group in the UK (Goh & McCue, 2021). Our findings should also be replicated in other (non-Western) cultures to test their generalisability. We anticipate that culturally-specific social class stereotypes (e.g., Grigoryan et al., 2020) could lead to different patterns than those observed here.

Some of the mechanisms we proposed should also be directly tested. For example, future research can ask perceivers about their degree of race/social class stereotype endorsement to test whether differences in this can explain the different patterns we observed between Black and Asian perceivers in Study 1. Similarly, a perceptual expertise account should be directly tested as an explanation for our Study 3 findings.

Altogether, the current findings importantly extend understanding of first impressions of social class from facial appearance, demonstrating the strength of stereotypes in informing and manipulating these impressions.

Supplementary Material: The Supplementary Material is available at: qjep.sagepub.com

Data Accessibility Statement: The data from the present experiment are publicly available at the Open Science Framework website: https://osf.io/zcxtp/

Acknowledgements: Thanks to Shahmir Akram, Ula Fydrych, and Shreena Patel for their assistance in stimulus preparation and piloting.

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DOI: 10.1177/17470218241230469

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Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Declaration of Conflicting Interests: The Authors declare that there is no conflict of interest.

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Figure Captions

Figure 1. *(A) Face Race and (B) Face Gender Predicting Categorisation of Faces as Rich (vs. Poor) in Study 1*

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

Figure 2. *Face Race and Participant Race Predicting Categorisation of Faces as Rich (vs. Poor) in Study 1*

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

Figure 3. *Face Emotion Expression and Race Predicting Categorisation of Faces as Rich (vs. Poor) in Study 2*

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

Figure 4. *Face Gender, Emotion Expression, and Race Predicting Categorisation of Faces as Rich (vs. Poor) in Study 2*

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

Figure 5. *Face Race and Participant Race Predicting Hypothesized Responses (Increased Carotenoid Colouration = Richer) in Study 3*

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DOI: 10.1177/17470218241230469

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Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants making the hypothesized response. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

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DOI: 10.1177/17470218241230469

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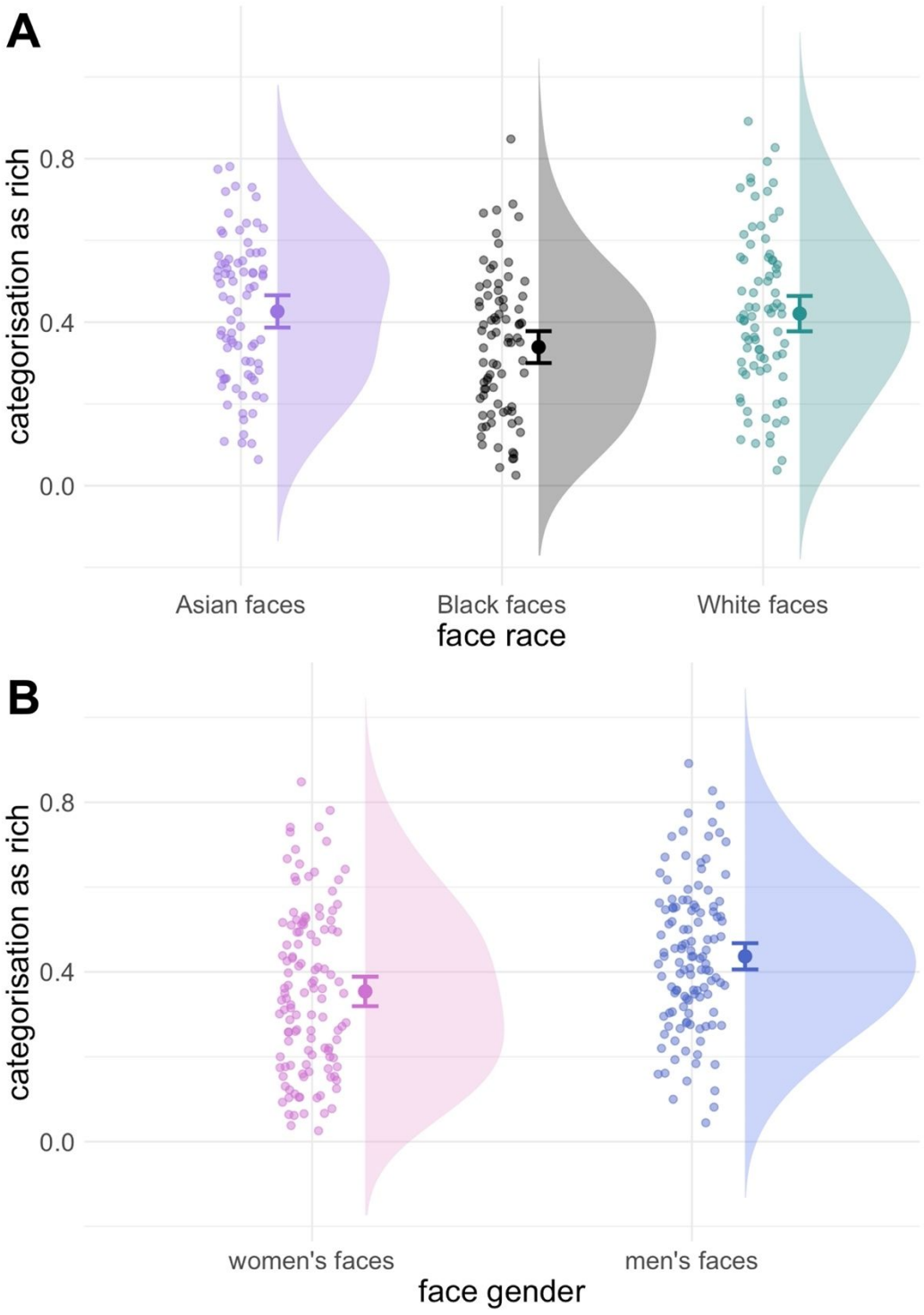

Figure 1
(A) Face Race and (B) Face Gender Predicting Categorisation of Faces as Rich (vs. Poor) in Study 1

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

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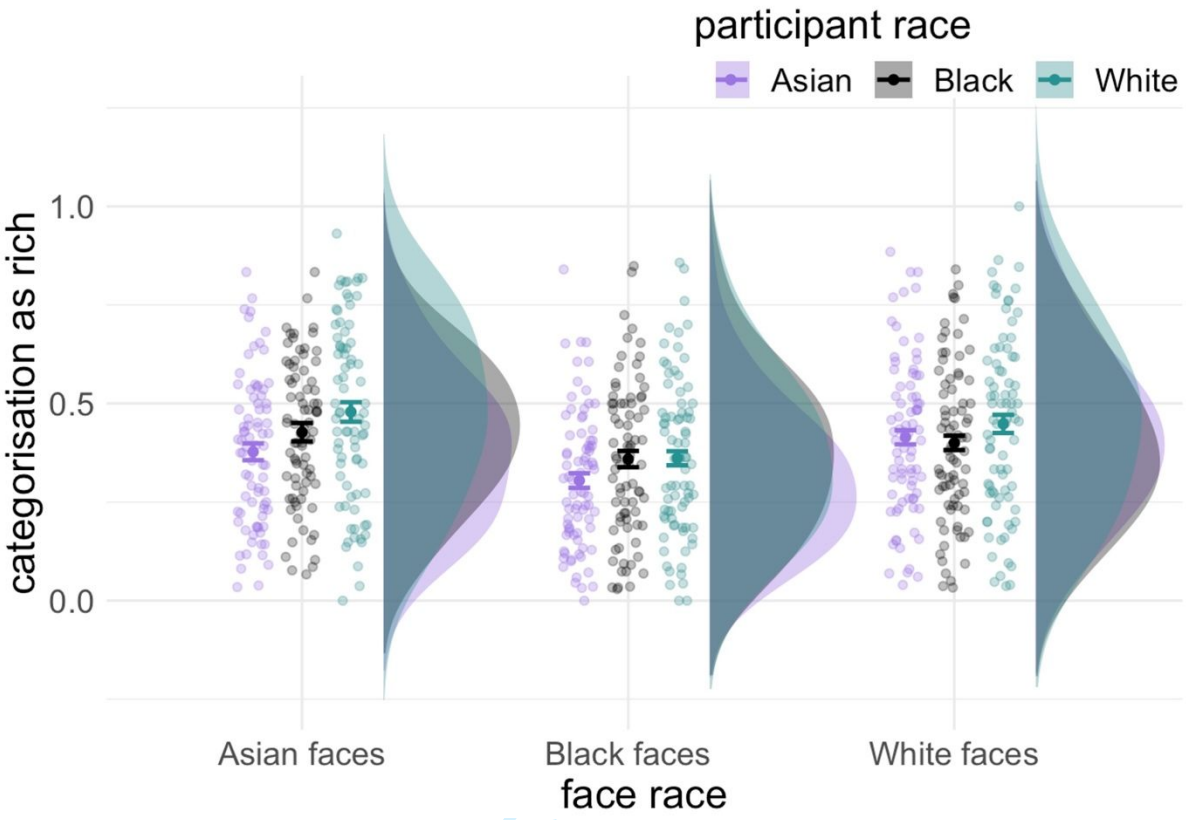

Figure 2

Face Race and Participant Race Predicting Categorisation of Faces as Rich (vs. Poor) in Study 1

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

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Figure 3

Face Emotion Expression and Race Predicting Categorisation of Faces as Rich (vs. Poor) in Study 2

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

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DOI: 10.1177/17470218241230469

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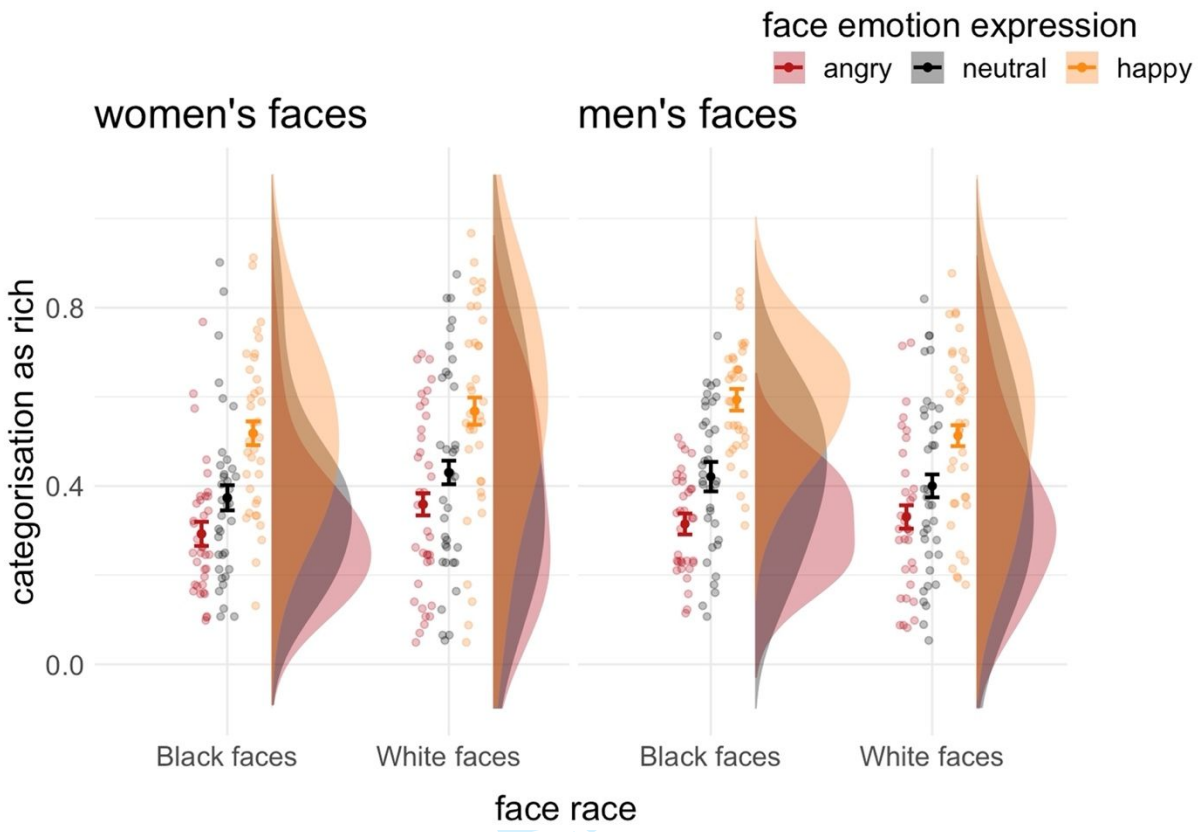

Figure 4

Face Gender, Emotion Expression, and Race Predicting Categorisation of Faces as Rich (vs. Poor) in Study 2

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants categorising each face as 'rich'. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

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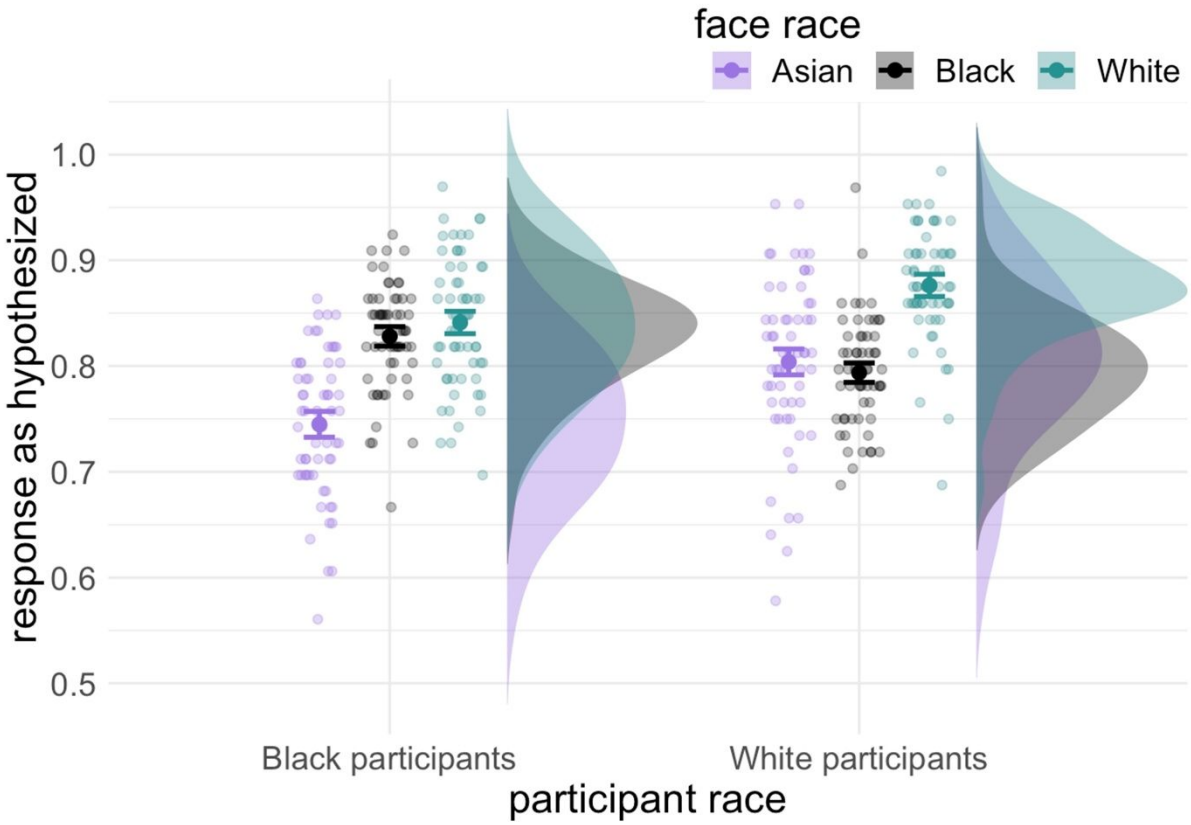

Figure 5

Face Race and Participant Race Predicting Hypothesized Responses (Increased Carotenoid Colouration = Richer) in Study 3

Note. Data shown at the level of faces, averaged across participants – i.e., data show the proportion of participants making the hypothesized response. Smaller points to the left of the distributions represent individual faces. Larger points with error bars show means with 95% CIs.

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DOI: 10.1177/17470218241230469

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Table 1

Model Estimates for Face Gender and Race Predicting Categorisation as Rich vs. Poor in Study 1

Predictor	Odds Ratio	*SE*	95% *CI*	*Z*	*p*
Intercept	0.54	0.05	0.45 – 0.65	-6.43	**<.001**
face gender	0.60	0.08	0.46 – 0.79	-3.66	**<.001**
face race (White vs. Black)	1.68	0.29	1.19 – 2.37	2.96	**.003**
face race (Asian vs. Black)	1.69	0.29	1.21 – 2.36	3.05	**.002**
face gender × face race (White vs. Black)	0.71	0.23	0.37 – 1.34	-1.07	.29
face gender × face race (Asian vs. Black)	0.76	0.25	0.40 – 1.44	-0.84	.40

Note. Face gender: men = -0.5, women = 0.5; Face race: Black = -1/3, White or Asian = 2/3 in respective contrasts.

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Table 2

Model Estimates for Face Gender, Face Race, and Participant Race Predicting Categorisation as Rich vs. Poor in Study 1

Predictor	Odds Ratio	*SE*	95% *CI*	*Z*	*p*
Intercept	0.55	0.05	0.46 – 0.66	-6.33	**<.001**
face gender	0.60	0.08	0.45 – 0.79	-3.69	**<.001**
face race (White vs. Black)	1.66	0.29	1.18 – 2.34	2.92	**.004**
face race (Asian vs. Black)	1.67	0.29	1.20 – 2.34	3.03	**.002**
participant race (White vs. Black)	1.23	0.22	0.87 – 1.73	1.19	.23
participant race (Asian vs. Black)	0.82	0.14	0.59 – 1.13	-1.20	.23
face gender × face race (White vs. Black)	0.70	0.23	0.37 – 1.32	-1.11	.27
face gender × face race (Asian vs. Black)	0.76	0.25	0.40 – 1.45	-0.82	.41
face gender × participant race (White vs. Black)	1.08	0.15	0.82 – 1.42	0.53	.60
face gender × participant race (Asian vs. Black)	1.30	0.18	0.99 – 1.70	1.91	.056
face race (White vs. Black) × participant race (White vs. Black)	1.21	0.23	0.83 – 1.77	0.97	.33
face race (White vs. Black) × participant race (Asian vs. Black)	1.47	0.27	1.02 – 2.12	2.07	**.039**
face race (Asian vs. Black) × participant race (White vs. Black)	1.24	0.21	0.89 – 1.74	1.27	.20
face race (Asian vs. Black) × participant race (Asian vs. Black)	1.02	0.17	0.74 – 1.41	0.11	.91
face gender × face race (White vs. Black) × participant race (White vs. Black)	0.73	0.16	0.48 – 1.13	-1.42	.16
face gender × face race (White vs. Black) ×	0.84	0.18	0.55 – 1.28	-0.81	.42

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participant race (Asian vs. Black)					
face gender × face race (Asian vs. Black) × participant race (White vs. Black)	0.81	0.20	0.50 – 1.32	-0.85	.40
face gender × face race (Asian vs. Black) × participant race (Asian vs. Black)	1.02	0.25	0.63 – 1.64	0.07	.94

Note. Face gender: men = -0.5, women = 0.5; Face and participant race: Black = -1/3, White or Asian = 2/3 in respective contrasts.

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DOI: 10.1177/17470218241230469

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Table 3

Model Estimates for Face Emotion Expression, Face Gender, and Face Race Predicting Categorisation as Rich vs. Poor in Study 2

Predictor	Odds Ratio	*SE*	95% *CI*	*Z*	*p*
Intercept	0.62	0.07	0.50 – 0.77	-4.28	**<.001**
face gender	0.97	0.17	0.69 – 1.38	-0.15	.88
face race	0.91	0.17	0.62 – 1.32	-0.51	.61
face emotion expression (angry vs. neutral)	0.55	0.04	0.47 – 0.64	-7.56	**<.001**
face emotion expression (happy vs. neutral)	2.27	0.14	2.01 – 2.57	13.25	**<.001**
face gender × face race	0.62	0.21	0.31 – 1.22	-1.39	.16
face gender × face emotion expression (angry vs. neutral)	1.07	0.08	0.92 – 1.24	0.84	.40
face gender × face emotion expression (happy vs. neutral)	1.02	0.08	0.88 – 1.19	0.30	.77
face race × face emotion expression (angry vs. neutral)	0.82	0.06	0.71 – 0.96	-2.46	**.014**
face race × face emotion expression (happy vs. neutral)	1.16	0.09	1.00 – 1.35	1.98	**.047**
face gender × face race × face emotion expression (angry vs. neutral)	0.97	0.15	0.71 – 1.31	-0.23	.82
face gender × face race × face emotion expression (happy vs. neutral)	0.73	0.11	0.54 – 0.98	-2.09	**.036**

Note. Face gender: men = -0.5, women = 0.5; Face race: White = -0.5, Black = 0.5; Face emotion expression: neutral = -1/3, happy or angry = 2/3 in respective contrasts.

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DOI: 10.1177/17470218241230469

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Table 4

Model Estimates for Face Gender and Race Predicting Hypothesized Responses (Increased Carotenoid Colouration = Richer) in Study 3

Predictor	Odds Ratio	*SE*	95% *CI*	*Z*	*p*
Intercept	28.48	7.72	16.74 – 48.44	12.36	**<.001**
face gender	1.10	0.13	0.88 – 1.38	0.86	.39
face race (White vs. Black)	1.60	0.36	1.02 – 2.50	2.07	**.039**
face race (Asian vs. Black)	0.74	0.16	0.48 – 1.14	-1.38	.17
face gender × face race (White vs. Black)	0.65	0.14	0.43 – 0.99	-2.02	**.044**
face gender × face race (Asian vs. Black)	1.98	0.41	1.32 – 2.98	3.29	**.001**

Note. Face gender: men = -0.5, women = 0.5; Face race: Black = -1/3, White or Asian = 2/3 in respective contrasts.

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Table 5

Model Estimates for Face Gender, Face Race, and Participant Race Predicting Hypothesized Responses (Increased Carotenoid Colouration = Richer) in Study 3

Predictor	Odds Ratio	*SE*	95% *CI*	*Z*	*p*
Intercept	28.65	7.79	16.81 – 48.83	12.33	**<.001**
face gender	1.11	0.13	0.88 – 1.39	0.88	.38
face race (White vs. Black)	1.59	0.36	1.02 – 2.47	2.05	**.040**
face race (Asian vs. Black)	0.73	0.16	0.48 – 1.11	-1.46	.15
participant race	1.00	0.53	0.35 – 2.85	0.00	.99
face gender × face race (White vs. Black)	0.65	0.14	0.43 – 0.99	-2.01	**.044**
face gender × face race (Asian vs. Black)	1.99	0.42	1.32 – 2.99	3.28	**.001**
face gender × participant race	1.12	0.12	0.90 – 1.38	1.03	.30
face race (White vs. Black) × participant race	2.22	0.74	1.16 – 4.27	2.40	**.016**
face race (Asian vs. Black) × participant race	2.66	0.87	1.40 – 5.05	2.98	**.003**
face gender × face race (White vs. Black) × participant race	1.13	0.28	0.69 – 1.83	0.48	.63
face gender × face race (Asian vs. Black) × participant race	1.22	0.29	0.77 – 1.95	0.85	.39

Note. Face gender: men = -0.5, women = 0.5; Face race: Black = -1/3, White or Asian = 2/3 in respective contrasts. Participant race: Black = -0.5, White = 0.5.

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