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Original Article

Traditionally Advantaged Group Members' Affective and Physiological Responses to Social Change

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Abstract: Across four studies, we examined how traditionally advantaged group members respond to societal changes emotionally and in terms of collective action tendencies supporting the disadvantaged group. In two studies, we also used a novel technology to extract heart rate from webcam images as an index of participants' engagement while reflecting on social change or stability. When social change (vs. stability) was made salient, participants reported *less* distress and *less* negative self-focused emotions, which mediated lower collective action tendencies. There were also signs of lower physiological engagement under conditions of change (vs. stability). We conclude that social change does not always trigger threat among members of advantaged groups but that—ironically—this can also undermine their engagement in realizing (further) change.

Keywords: social change, emotions, collective action, majority groups, rPPG

Global social movements such as *Black Lives Matter* or *#MeToo* are just two examples of the unprecedented group-based societal changes the world currently faces. Although throughout the centuries societies have undergone continuous change, issues such as migration, globalization, or changing gender roles and identities are now happening at a faster pace than ever. The desire to have a more stable or changing social landscape has sparked intergroup conflicts. However, while these movements have clear implications for minority groups in terms of their strive for increased equality - what are the consequences of social change for those who are part of more traditionally advantaged groups? Despite the increasing interest in this topic (e.g., Kutlaca et al., 2020; Scheepers & Ellemers, 2018), there is still a need to more deeply understand the circumstances in which traditionally advantaged group members respond with more or less threat to social change, as well as the consequences this has for the support for further change. In four studies, we examine the emotional (distress, guilt, challenge) and physiological (engagement) responses of members of advantaged groups when confronted with changing (vs. stable) intergroup relations, as well as the downstream behavioral consequences of these responses for the willingness to engage in collective action to support the disadvantaged group.

Majority Group Members' Responses to Social Change

Advantaged group members may respond to their (changing) privileges in a variety of ways (Knowles et al., 2014). Previous research has found that advantaged group members often appraise social change as threatening (Scheepers & Ellemers, 2019). This threat of social change can take different forms and originate from different sources, for example, a (potential) loss of power, influence, status, identity, or even group existence (e.g., Wohl et al., 2010). Relatively irrespective of this source, however, such threats can make advantaged group members behave defensively by, for instance, claiming reversed discrimination, or expressing anger and offending behavior (Isom Scott & Stevens Andersen, 2020; Maass et al., 2003). As an example, research shows that communicating prodiversity messages led advantaged group members to express more concerns about being treated unfairly and becoming the victim of anti-White discrimination (Dover et al., 2016; Wilkins & Kaiser, 2014).

At the same time, reflecting on *current* privileges can also be threatening for members of advantaged groups, and elicit negative self-directed emotions, such as shame or guilt. For example, Branscombe (1998) showed that advantaged group members, in this case men, who thought

about their privileges, reported more negative feelings, such as guilt and lowered self-esteem, compared to disadvantaged group members (women) who thought about their privileges. Other research showed that highlighting racial or gender group-based advantages elicits guilt in members of dominant groups, which is especially the case when inequality is perceived as illegitimate and seen in terms of the advantages of the ingroup, rather than the disadvantages for the out-group (Doosje et al., 1998; Harth et al., 2008; Iyer et al., 2003; Miron et al., 2006). In turn, such negative self-directed emotions may motivate actions by members of advantaged groups to support the disadvantaged group (Eckerle et al., 2023; Gausel et al., 2012; Leach et al., 2006; Lowery et al., 2012).

In sum, research has shown on the one hand that reflecting on a *changing* privileged status can cause advantaged group members to be concerned and experience threat and defensiveness. However, reflecting on *current* privileges can cause advantaged group members to experience negative self-directed emotions like guilt. To the best of our knowledge, these different responses have been addressed in separate lines of research, and a first aim of the current research was to bring together these lines of work. Work on negative self-focused emotions among the privileged has typically focused on relatively static situations, like *looking back* at how these privileges came about (e.g., reflecting on colonialist past; Doosje et al., 1998). By contrast, work on the threat of social change among the privileged has looked at more dynamic situations, like the presence or absence of cues of hierarchical instability. In the current work, we wanted to make a theoretical contribution by combining these two lines of work to understand under which circumstances majority group members would perceive social changes as a threat or whether a focus on social change issues and privilege may provoke more negative emotional responses. To test this, we manipulated status stability to examine its influence on different emotional responses among the privileged. A second aim of the current work was to examine the motivational (physiological) processes associated with these different emotional responses, as well as their downstream consequences for the willingness among the more advantaged to engage in collective actions to support social change.

The Current Research

In the current research, we examined different types of affective responses (distress, shame/guilt, and positive challenge) that members of advantaged groups may show toward a *changing* versus *stable* status quo. Additionally, we examined physiological responses indicative of engagement, as well as behavioral tendencies among members of advantaged groups to engage in collective actions to support social change.

There are several benefits to complementing self-report measures with physiological measures, such as that they can often be measured continuously, in real time, and in a covert and unobtrusive way (Johnston et al., 2023). Continuously measured physiological processes allow capturing responses as they unfold and develop over time, thereby also accounting for occurring variations that may happen over time. Moreover, measures obtained in real time capture responses that are not due to potential forecasting, post-task appraisal and do not require reflective abilities such as introspection. Finally, the covert nature of these measures is an advantage because even though participants likely know that they are being examined, they are not required to monitor and adjust responses. As a result, physiological measures allow to gain more information than what participants may be willing or able to tell through self-reports, especially when investigating socially sensitive topics or impression management.

In this study specifically, we aim to investigate motivation through measures of heart rate (HR) in the context of motivated performance situations, as following from conceptualizations as in the biopsychosocial model of threat and challenge (BPS-CT; Blascovich & Mendes, 2010) and motivational intensity theory (Richter et al., 2016). In such situations, measures of HR have been used in previous research to assess engagement during task performance (e.g., in learning environments; Bustos-Lopez et al., 2022). Despite the fact that in the context of motivated performance HR has been repeatedly used as an index of engagement, further more definitive interpretation of HR alone as a single physiological index should be done with caution (Richter et al., 2016). In the current context, these motivational processes are important for predicting when members of majority groups are most likely to support social change, beyond what they may tell about this through self-reports.

In Study 1, we investigated feelings of distress and negative self-directed emotions among White men under conditions of stability versus change. We initially preregistered and predicted for this first study that cues of social change (vs. stability) would lead to higher distress among white men. However, we found the exact opposite, as cues of social change (vs. stability) did not only lead to lower negative self-directed emotions (shame and guilt) but also to lower distress. We interpreted these lower negative feelings under conditions of change as a *relief of social change* effect, meaning that under conditions of social change, some members of privileged groups may actually also feel relatively relieved from concerns about their (illegitimate) privilege. After conducting this first

study, we realized that this finding was quite in line with previous research showing that members of dominant groups experience guilt when reflecting on their (stable) privilege (Branscombe, 1998; Doosje et al., 1998). Apparently, such negative self-directed emotions like guilt can also generalize to more general feelings of distress and possibly especially so in the case of a socially sensitive topic.

We sought to replicate and further study this effect with two additional pre-registered online studies and one study with visitors of a science festival as participants. In these studies, we pre-registered and tested the relief of social change hypothesis (i.e., cues of social change yielding lower levels of negative affect) among traditionally advantaged group members, focusing on three types of emotions: lower levels of distress, and negative self-directed emotions, and higher levels of (positive) challenge. In the two final studies, we also included an innovative physiological measure of engagement (Seery, 2011; van der Kooij & Naber, 2019) by extracting participants' heart rates from webcam images while they verbally reflected on social change (vs. stability). Moreover, we also measured behavioral tendencies, in the sense of the willingness to engage in collective action to improve the position of the (disadvantaged) outgroup. Finally, while in studies 1, 2, and 3, we measured responses to a stable versus changing status quo in white men only, in Study 4, we also included White women in our sample, as another relatively advantaged group.

Preregistrations for studies 1, 2, and 3, all materials, data, code, and further analysis for all four studies can be found here: https://osf.io/xq7ga/. We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

Methods

Across four studies we used similar procedures and measures. All studies were approved by the University's Ethical commission and were conducted in accordance with APA ethical standards. For a more detailed description of each study's specific design, methods, materials and pre-registration links, please see the supplementary materials (https://osf.io/xq7ga/).

Participants

In Study 1 (N = 200), Study 2 (N = 196), and Study 3 (N = 210), we recruited participants via the online platform Prolific Academic. G*Power was used to perform a power analysis aiming for a sample size that would allow for the detection of a medium to small effect (f = 0.2). A target sample of 200 was deemed appropriate to detect such effects using an ANOVA test for two groups with a power of .80 and an α level of .05. In Study 4 (N = 118), we recruited participants at a local science festival (being limited by time with regard to the number of participants recruited). In Studies 1–3, participants were of White ethnicity and male. The average age for Study 1 was 29.68 years (SD = 9.28), for Study 2 was 37.11 (SD = 12.91), and for Study 3 was 42.07 (SD = 14.85). In Study 4, we expanded recruitment to also include white females (M_{age} = 32.15; SD = 10.31), with 62% of the sample being female and 38% being male.

In addition, in Study 2–4, we measured participant's ideological stance. In Study 2, political orientation was measured with a single item: "Politically, I would say I am…" with possible answers ranging from (1) *very liberal* to (6) *very conservative*. In this study, participants scored around the middle of the scale (M = 3.10; SD = 1.18). In Studies 3 and 4, we used the same item but on a seven-point scale ranging from (1) *liberal* to (7) *conservative*. In Study 3, participants scored again on average around the middle of the scale (M = 3.62; SD = 1.62), while in Study 4 participants placed themselves slightly more on the liberal side (M = 2.15; SD = 0.94).

Procedure and Design

In all four studies, participants were randomly assigned to one of the two social change conditions (Social Change vs. Social Stability).[1] After providing informed consent, participants were asked to answer a few demographic questions (e.g., age, socioeconomic status, political orientation). Thereafter, participants either read a text (Studies 1, 2, 3) or watched a video (Study 4) that contained our social change manipulation. In the social change condition, society was described as (1) constantly changing due to for instance globalization; (2) unstable and generally shifting in social relations (i.e. members of ethnic minority groups are taking up leadership positions in politics and business, and women play a role in areas that used to be male-focused, such as science and technology); (3) requiring adaptation in this insecure society from those who are part of more traditionally advantaged groups. In the social stability condition, society was depicted instead as (1) constantly strengthening its current reality even with globalization; (2) reinforcing its existing (hierarchical)

[1] In Studies 1 and 2, an additional task was included that asked participants to reflect on personal privileges.

social structures (i.e. only a few selected members of ethnic minority groups are taking up leadership positions in politics and business, and women do not play a role in areas that are still male-focused, such as science and technology); (3) requiring no adaptation in this secure society from those who are part of more traditionally advantaged groups. Following this, participants completed measures of emotions and collective action tendencies (see below) and were then thanked and debriefed.

In addition to, and following this general procedure, in Studies 3 and 4, we included speech tasks where participants' HR was measured, as an indicator of the participant's engagement when reflecting on and responding to social change (vs. stability). Both studies contained a baseline measurement (measured at the beginning of the study) during which participants either delivered a (webcam recorded) speech about a neutral topic (Study 3; active baseline) or watched a relaxing video clip (Study 4; passive baseline). Subsequently to viewing the manipulations, in both studies, participants completed speech tasks where they verbally reflected on social change versus stability more in general and about its implications for the participant's own roles, aims, and goals. In Study 3, participants were instructed to reflect on both of these two topics (social change generally and their own roles, aims, and goals) in a single speech (e.g., "For this speech task, we would like you to talk about how you see your role in the development of a society that continues to change. What is your personal aim when thinking about this development of our society? And how would you achieve this aim? You may for example think about the future and list your thoughts, concerns or concrete actions you intend to carry out."). However, because upon inspecting speech content data,[2] it appeared that participants in this study mainly talked about social change more generally and not about their own roles and aims, in Study 4 they were prompted to separately reflect in two separate but consecutive speeches on change (vs. stability) more generally (Speech 1), as well as on their own specific aims, goals, and roles regarding social change (vs. stability; Speech 2). Each speech task was timed to last 1.5 min. Participants in both Studies 3 and 4 were instructed to keep talking as long as possible. The study automatically continued once the speech time was over.

Measures

All self-report items were completed on seven-point Likert scales, ranging from *strongly disagree* (1) to *strongly agree* (7), unless specified otherwise.

Emotions

We asked participants to self-report on the emotions that they felt in relationship to the (in)equality text or video manipulation (e.g., "You have just read a text about the evolution of inequality [. . .] When you think back to this text what are your feelings? Please rate your feelings on a scale from 1 (completely disagree) to 7 (completely agree). When thinking about the text I just read I feel: . . ."). We measured threat-related emotions by distinguishing between distress emotions (*anxious, worried, irritated, distressed*; Study 1 α = .88; Study 2 α = .91; Study 3 α = .89; Study 4 α = .88) and negative self-directed emotions (*shame* and *guilt*; Study 1, r = .74; Study 2, r = .84; Study 3, r = .81; Study 4, r = .71). Moreover, to also measure the counterpart of threat, we also included positive challenge-related emotions: *determined, encouraged, confident, hopeful* (Study 1 α = .85; Study 2 α = .88; Study 3 α = .90; Study 4 α = .77).

Informal Action Tendencies Supporting the Disadvantaged Group

Informal collective action intentions were measured with three items (Study 1 α = .83; Study 2 α = .86; Study 3 = .88; Study 4 = .81), in which participants were asked how willing they would be to become involved in (1) discussing less-privileged groups members' issues with friends or colleagues; (2) reading articles, journals, or watching films about less privileged group members' issues; (3) talking to friends, family, and colleagues to increase awareness about the inequality issue (*very unwilling* (1); *very willing* (7); adapted from Subašić et al., 2018). Additional measures were taken, namely inequality beliefs, reversed unfairness, avoidance tendencies, and contrition (see supplementary materials).

Heart Rate

For the speech tasks that were included in studies 3 and 4 to examine HR responses (see above), participants were instructed to sit as still as possible, look straight into the computer camera such that video recordings of their faces could be taken. Mean HR values were measured during baseline tasks and participant speech tasks via the novel technique of remote photoplethysmography (rPPG; van der Kooij & Naber, 2019). Because heartbeat induces changes in blood perfusion in skin surfaces, this can be detected by measuring changes in both diffuse light reflection off and transmission through body parts. The detection of these changes can be done remotely, via a digital camera that records the variations in light reflected from skin tissue. Participants in our studies thus were

[2] Speech content was overall inspected, but not systematically coded.

simply requested to record a video through the webcam of the computer in front of them. Instructions were available on how to optimize these recordings in terms of lighting and position. Participants were asked to sit as still as possible and were guided to keep themselves positioned in the middle of the video frame by means of example pictures. Heart rate analyses of the videos were conducted in MATLAB using the Di Lernia et al. (2024) update of the open-source code by van der Kooij and Naber (2019). It is important to note that this algorithm was benchmarked in more *noisy* field settings and online conditions without head movement constrictions, as well as with different webcam specifications and lighting conditions; under all of these conditions, the algorithm performed very well (Di Lernia et al., 2024). As a consequence of this process, HR values were extracted for each participant.

Results

Below, we report the results of four studies addressing advantaged group members' affective and physiological responses to cues of social change (vs. stability) and their associated behavioral tendencies. First, in all studies, we examined feelings of distress, negative self-directed emotion (shame and guilt), and challenge, for which we present a meta-analytic integration of their results. Physiological responses (HR) were measured in Study 3 and Study 4 and thus analyzed separately. Finally, we present a meta-analytic view of single study mediation direct and indirect effects in which we examine the relationship between social change, emotions, and behavioral tendencies.

Emotional Responses to (Changing) Privilege

In the meta-analyses, we estimated the overall effect size using a random-effects model, with 95% confidence intervals (CI), allowing the true effect to vary across studies. We used Cohen's d value as the measure of standardized effect size. We report the variation of the distribution in the effect sizes by inspecting heterogeneity of variance (I^2, T^2 and Q).

Distress

Providing consistent evidence for a relief of social change effect, across all four studies we found that stability led to more distress than social change, with a mean effect size of −0.45, 95% CI [−0.83; −0.08], and heterogeneity of variance represented by $I^2 = 0.84$, $T^2 = 0.12$, $Q = 15.31$ (see Figure 1).

Negative Self-Directed Emotions

Furthermore, in the stability condition, participants reported more negative self-directed emotions (shame and guilt) than in the social change condition, with a mean effect size of −0.50, 95% CI [−0.71; −0.30], and heterogeneity of variance represented by $I^2 = 0.47$, $T^2 = 0.02$, $Q = 5.76$ (see Figure 2).

Challenge

Across the four studies, feelings of challenge resulting from social change or stability showed a more mixed picture. In only two studies, participants experienced more challenge under social change compared to stability; the overall effect across studies was not significant, however with a mean effect size of 0.27, 95% CI [−0.05; 0.59], and

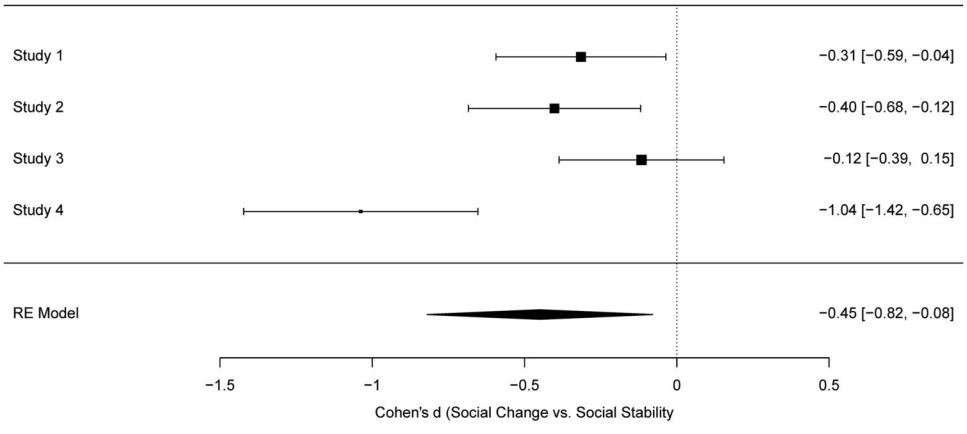

Figure 1. Forest plot with meta-analytic result for the effects of stability versus change on distress emotions. A negative relationship indicates less distress emotions resulting from signs of social change.

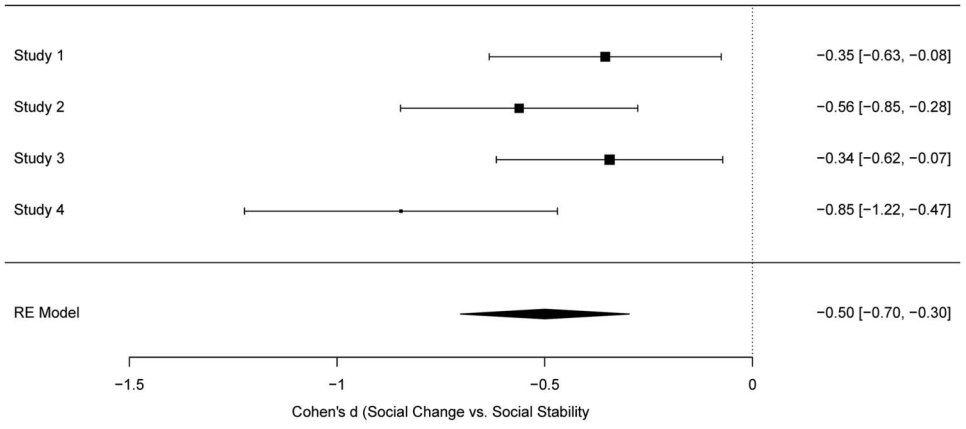

Figure 2. Forest plot with meta-analytic result for the effects of stability versus change on negative self-directed emotions. A negative relationship indicates less negative self-directed emotions resulting from signs of social change.

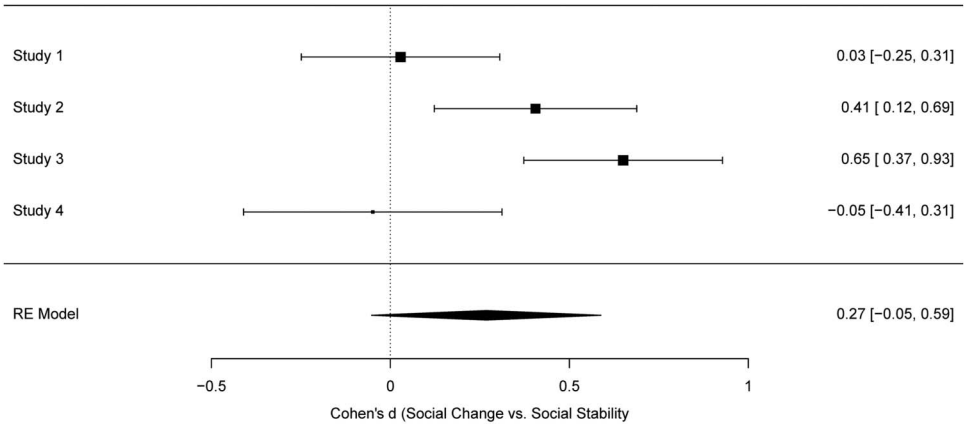

Figure 3. Forest plot with meta-analytic result for the effects of stability versus change on challenge emotions. A positive relationship indicates more challenge emotions resulting from signs of social change.

heterogeneity of variance represented by, $I^2 = 0.79$, $T^2 = 0.08$, $Q = 14.03$ (see Figure 3).[3]

Heart Rate Responses to (Changing) Privilege

Additionally to self-reported emotions, in Study 3 and Study 4, we examined HR reactivity as an indicator of engagement while verbally responding to the text about social change (vs. stability) in front of their own computer webcam. We examined HR reactivity (speech task–baseline) across the social change versus stability condition, controlling for quality of recording by using signal-to-noise ratio values as a covariate in the analyses. Outliers, defined as reactivity values higher/lower than 3 *SD* from the mean, were winsorized, in line with the standard procedures in our lab and elsewhere (e.g., Seery, 2011).

For Study 3, where participants mainly reflected on social change more generally, more so than on their specific role in it, an ANCOVA (controlling for signal-to-noise-ratio) showed no significant differences in HR between the social change and the stability condition, $F(1, 194) = 0.25$, $p = .618$, $\eta_{partial}^2 = .001$. In Study 4, a MANCOVA (controlling for signal-to-noise ratio) on HR reactivity during Speech 1 and Speech 2 revealed a marginally significant effect for condition, $F(2, 111) = 2.52$, $p = .085$, $\eta_{partial}^2 = .04$. The univariate effects showed, similar to Study 3, no significant difference during the first speech where participants reflected on social change more

[3] When checking for the influence of Study 4 in the meta-analysis on challenge emotions, results show that when leaving this study out the total effect on challenge becomes stronger and significant, 0.36, 95% CI [0.01; 0.72]. This may indicate that the sample characteristics such as including women in the sample of Study 4, may have an influence on whether social change indeed leads to lower reports of challenge emotions compared to social change.

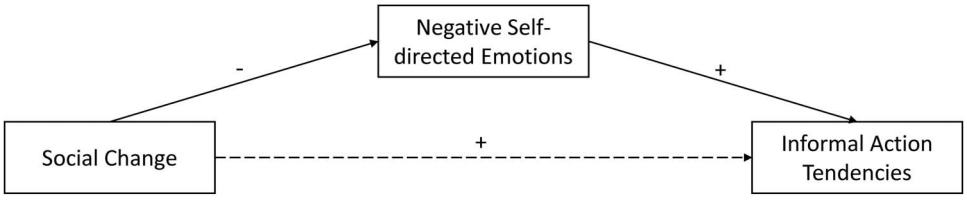

Figure 4. Mediation model of negative self-directed emotions in predicting informal action tendencies.

generally, $F(1, 112) = 2.37$, $p = .126$, $\eta_{partial}^2 = .02$. However, when participants were specifically instructed to reflect on their own specific aims, goals, and roles, there was a significant difference between the social change and stability condition, $F(1, 112) = 4.82$, $p = .030$, $\eta_{partial}^2 = .04$. The latter effect indicated that the slightly decreased HR (compared to baseline) in the social Change condition ($M = -1.66$; $SE = 1.31$) differed significantly from the somewhat increased HR (compared with baseline) in the social stability condition ($M = 2.37$; $SE = 1.27$). Thus, participants in the stability condition were somewhat more engaged when talking about their aims and role in social change than participants in the social change condition.

Informal Action Tendencies Supporting the Disadvantaged Group

Finally, to inspect the mediating role of emotions and HR in the relationship between condition and downstream behavioral tendencies in the form of informal collective action tendencies we conducted a multivariate meta-analysis on the four single study direct and indirect mediation effects (see Figure 4). In each separate study, additional mediation models were originally also tested for inequality beliefs, reversed unfairness, avoidance tendencies, and contrition[4].

Across all four studies, we found that cues of ongoing social change led to lower informal action tendencies, by lowering negative self-directed emotions. More specifically, the indirect effect was significant with a standardized mean effect size of −0.04, 95% CI [−0.06; −0.02] and heterogeneity of variance represented by, $I^2 = 0.43$, $QE = 10.62$ and $QM = 13.51$. The overall direct effect was not significant across studies, with a mean effect size of 0.06, 95% CI [−0.01; 0.13]. See Figure 5 for meta-analytic view of direct and indirect effects. We did not find this pattern for distress emotions nor challenge emotions. All in all, these results suggest that while cues of social change may reduce feelings of shame and guilt among the more

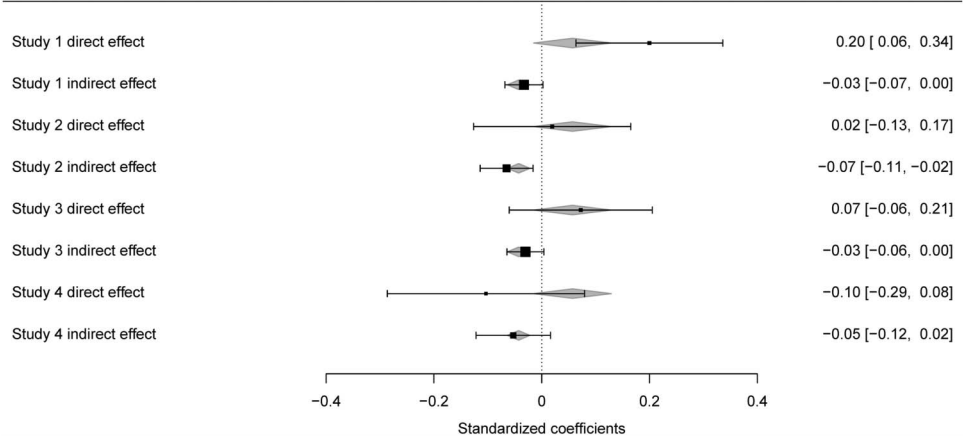

Figure 5. Forest plot with meta-analytic result for the mediation of negative self-directed emotions of the effect of social change on informal action tendencies.

[4] Although in none of the studies social change predicted differences in inequality beliefs, reversed unfairness, avoidance tendencies, and contrition, in some studies, distress and negative self-directed emotions mediated the relationship between social change and these variables (e.g., social change was related to lower inequality beliefs through diminished negative self-directed emotions). See supplementary materials for specific results of mediation models in Studies 1 and 2.

advantaged, this may in turn also undermine their willingness to engage in informal actions to (further) improve the position of the disadvantaged group.

The Role of Ideology

Finally, we examined the role of ideology in the effects reported above. A question that needs to be addressed is to what extent the effects on, for instance, the emotions would be merely due to participants' ideology. Moreover, could it be that the threat of social change that we did not find across studies would actually emerge for a subgroup of relatively more conservative participants? To examine these questions, we investigated, in a more explorative fashion, the interaction between political ideology and condition on the different emotion scales (distress, shame/guilt, challenge) by carrying out univariate tests for Studies 2, 3, and 4 where political orientation was measured. Further, we additionally assessed the role of legitimacy as measured in Studies 1, 2, and 3 by carrying out univariate tests again on the different emotion scales and examining the interaction between legitimacy and condition.

We found only limited evidence that the effects found across our different studies are fully contingent on ideology or perceived legitimacy. Specifically, in Study 2, an interaction between political ideology and condition was found on distress, $F(3, 192) = 7.77$, $p = .006$, indicating that, as could be expected, the relief of social change effect was somewhat stronger for liberals than for conservatives, who overall scored relatively low on distress across conditions. In Study 3, a significant interaction was only found for challenge, $F(3, 206) = 5.61$, $p = .019$, indicating that it was only the relatively more liberal participants who displayed increased challenge under conditions of salient social change. It is noteworthy, however, that, as reported above, the effect of condition on challenge emotions was not reliable across studies. Finally, no interaction effect was found for Study 4 (all $Fs < 1.35$, all $ps > .248$). It is important to note that most of the main effects of condition remained strongly significant when controlling for ideology.

With regard to perceived legitimacy, for all three studies, the interaction between legitimacy and condition was significant for challenge and distress (Study 1: challenge, $F(1, 196) = 9.94$, $p = .002$, and distress, $F(1, 196) = 7.66$, $p = .006$; Study 2: $F(1, 192) = 5.61$, $p = .019$, and distress, $F(1, 192) = 16.60$, $p < .001$; Study 3: challenge, $F(1, 206) = 5.97$, $p = .015$, and distress, $F(1, 206) = 16.47$, $p < .001$). The interactions indicated that higher perceived legitimacy predicted lower distress and higher challenge under stability and higher distress and lower challenge under social change. This result is generally in line with social identity theory (Tajfel & Turner, 1979), and the threat of social change hypothesis, although it only emerged under condition where members of relatively privileged groups saw the status quo as legitimate. For negative self-directed emotions instead, the interaction was not significant (Study 1: $F(1, 196) = 1.30$, $p = .256$; Study 2: $F(1, 192) = 3.29$, $p = .071$; Study 3: $F(1, 206) = 0.89$, $p = .347$). Importantly, however, when controlling for legitimacy and its interaction with condition, the main effect of condition remained significant for challenge, distress, and negative self-directed affect.

All in all, this indicates that despite some (theoretically informative) influence of political ideology and legitimacy as moderators, the relief of social change effect seems more generic than just a reflection of a more liberal sample, such that even amongst those who perceive the current hierarchy to be relatively legitimacy, under social stability one can still feel unease through emotions such as shame and guilt.

Discussion

Through a meta-analytic approach, we examined the effects of a changing versus stable social landscape on advantaged group members' emotional, physiological, and behavioral responses. Across four different studies, we consistently found that under social change participants reported lower distress and negative self-directed emotions compared to under social stability. The results on reported (positive) challenge-related emotions were less consistent, with only two studies showing that these increased under social change (vs. stability). These results show that social change is not necessarily threatening to advantaged group members (Scheepers & Ellemers, 2018). Nevertheless, current results on emotions are in line with previous literature highlighting the important role of negative self-directed emotions such as guilt, in advantaged group members who reflect on inequality (Branscombe, 1998; Doosje et al., 1998; Iyer et al., 2003; Leach et al., 2006; Miron et al., 2006). We also move beyond this previous work in showing the more specific role of social change framing. That is, we see that it is particularly when a *stable* status quo is salient that advantaged group members experience guilt. At the same time, reflecting on advantages does not always lead to guilt among the privileged, as salient (and relieving) cues of societal changes contribute toward diminishing guilt and distress among members of advantaged groups.

The current findings contribute to theory illustrating the complexity of responses among members of advantaged groups, moving beyond the stereotypical *angry White man*

response (i.e., threat and defensiveness in response to change). Rather, under social stability, advantaged group members may instead experience negative emotions. Conversely, our results also show that social change can elicit positive feelings among majority group members. This may illustrate that although social change may constitute a potential loss of power and resources among the privileged, it may result in a moral gain, or at least counter the more moral threat of a stable (and illegitimate) status quo.

Nevertheless, our results also point to a caveat of the positive affective consequences of social change. That is, we showed that although there are positive consequences for those who reflect on a changing society, this may at the same time still undermine advantaged group members' motivations to actually establish (further) social change. Although the effects on the physiological responses were modest, there was a slight indication that people's engagement in the topic of social change may – ironically – be lower when social change is already going on, possibly because it suggests that less effort is still needed to establish change.

The ironic way in which signs of social change may lower the motivation to work for social change was also apparent from participants' own self-reported collective action intentions. This is in line with previous work showing that group-based guilt resulted in a stronger willingness to engage in informal collective action (Doosje et al., 1998). However, the current work moves beyond this previous work by showing that the willingness to engage in collective action was undermined in the context of ongoing social change. Thus, even for people welcoming social change, the actual occurrence of social change may ironically undermine people's motivation to act and further contribute to this change. In this way, this effect may also relate to what has been referred to as the *irony of harmony* effect (Saguy et al., 2009). Namely, during intergroup conflict, the focus on maintaining harmony through positive intergroup contact, counterintuitively allowed for heightened perceptions of equality. Through the construction of false perceptions of equality and fairness, group members also show decreased support for social change. Similarly, as evident from the results on behavior intentions and physiological responses in the current work, we have indications that cues of ongoing social change may undermine the motivation to further support change among the more advantaged.

Of course, it also needs to be stressed that the other side of the coin was actually a stronger tendency toward engagement among advantaged group members under conditions of social stability. Indeed, under stable conditions, HR – as an index of engagement – increased from baseline levels when people reflected on the status quo. Interestingly, this effect only emerged when participants reflected on their own aims, goals, and roles rather than when more generally presenting their overall opinion about the changes that are happening across society. A practical implication of this may be that when you want to evoke advantaged group members to actively engage in social change initiatives, you should *put them on the spot* and ask them to explicitly reflect on their own role in social change (which advantaged group members may be less likely to do by default).

To investigate engagement, we used an innovative methodology as a way to unobtrusively gain physiological information from participants. Currently, we support the notion that employing rPPG to measure HR is an accurate and effective manner to collect physiological data from participants (Di Lernia et al., 2024). With its noninvasive nature, it successfully allows the collection of continuous physiological data at a distance and without interfering with participants' experiences. Additional information collected during tasks in which participants are requested to elaborate on self-relevant goals and their intended behavior can give insights into arousal and effort responses. The results of this study show that measures such as rPPG are helpful in providing easily-measured physiological information to support and expand information gained with self-reported data. Nevertheless, it is also necessarily to mention the limitations of using simple indices such as HR, which may not account for clear interpretations of motivation or emotional specificity compared to cardiovascular measures such as PEP (pre-ejection period), CO (cardiac output) or TPR (total peripheral resistance) which are overall reliable noninvasive indicators of sympathetic impact on the heart (Richter et al., 2016). Future research should address this issue by including such specific measures of physiology to allow for more precise interpretation of intergroup threat responses.

The current results also reveal the diverse effects of experiencing different negative emotions such as shame and guilt versus distress emotions (e.g., anxiety and worry). In fact, although both types of emotions are negative in valence compared to more positive challenge-related emotions (e.g., hope and confidence), negative self-directed emotions and distress have a different influence on advantaged group members' motivation. In line with research by Iyer et al. (2003), experiencing negative self-directed emotions such as shame and guilt seems to motivate people to take actions that can repair the situation which is cause of such feelings. This is in contrast with more general distress emotions that did not appear to carry such effects.

Further, although our samples consisted of relatively progressive participants, the effects we found on emotions were not merely explained by people's ideology nor perceived legitimacy. That is, the effects that we find did not merely occur among more liberal participants and hold when controlling for participants' political orientation.

This supports the notion that the current effect is not only driven by a more liberal sample, who may be more welcoming of different types of social change – but that it also applies to those with a more moderate or even low progressive ideology or relatively higher perceived legitimacy. The fact that some of the found patterns hold relatively irrespective of people's ideology or perceived legitimacy may be guided by a general desire to preserve societal harmony, a perspective that even members of traditionally advantaged groups may hold (Radke et al., 2020). This may suggest that even when differences are perceived as relatively legitimate, especially under social stability, people can still feel unease such as shame or guilt emotions. However, the modest role of ideology may also be due to people crossing the ideological spectrum, as they may be motivated to promote a more desirable self or group image (Gausel et al., 2012).

In sum, although a changing status quo may be relieving in terms of negative emotions for advantaged group members, this may also undermine the actual establishment of social change towards more equality. Put differently, even though negative emotions such as shame and guilt may be occasionally uncomfortable, they are at times necessary to invoke efforts to participate in supporting the fight against existing social inequalities. Through this series of studies, we have shed light on how traditionally advantaged group members respond to a changing versus stable status quo, highlighting affective, physiological, and behavioral consequences. These results may provide important insights into the state of privilege awareness and show that an unstable status quo is not always threatening, but that instead a *stable* status might sometimes be rather threatening. Moreover, our results may also help to explain why social change eventually goes so slowly, as signs of change may undermine motivation to actually establish (more) change among advantaged group members.

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