British Journal of Social Psychology (2019), 58, 515–533

The British Psychological Society

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The experience of deprivation: Does relative more than absolute status predict hostility?

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The present research examined the causal effects of absolute and relative status on experienced deprivation and hostility. On the basis of the theory of relative deprivation, we reasoned that the subjective experience of being worse off than others is a better predictor for hostility than is the absolute level of how well-off people are. Indeed, three experiments showed that relative more than absolute status has an impact on aggressive affect. That is, even when objective resources were high, people were more hostile when their resources compared negatively to others' resources. Although no consistent direct effects were found for a measure of aggressive behaviour, mediation analyses suggest that relative but not absolute deprivation ultimately impacts aggressive behaviour via increased feelings of disadvantage and aggressive affect. The results emphasize the drastic consequences of the rising income inequality, irrespective of a nation's absolute wealth.

Individual absolute deprivation refers to the lack of capacity to afford one's basic physical needs such as food, whereas relative deprivation refers to a social phenomenon arising when individuals cannot afford what most others in their environment can (Bourguignon, 1999; Sen, 1983) combined with the perception that the own predicament is unjust and the resultant feelings of anger and/or resentment (Smith, Pettigrew, Pippin, & Bialosiewicz, 2012). Both individual absolute and relative deprivation are considered important indices of poverty and inequality (e.g., Ravallion, 1992). In the first half of the last decade, a number of developing countries (e.g., the BRICS states) had seen a notable reduction in absolute deprivation levels alongside large, growing economies. At first, this appeared to be a positive development implying potential reduction in poverty. Yet, at the same time these countries' economies were growing and absolute deprivation was declining, the levels of relative deprivation were rising (Anderson & Esposito, 2014), suggesting an unequal distribution of the rising wealth. From a psychological scientist's perspective, an obvious question arising from such societal trends pertains to what psychological consequences they have on the individual living in these societies (for a recent review, see Manstead, 2018). In the present research, we address the question of whether relative more than absolute deprivation causally affects people. To experimentally induce deprivation, participants were given (false) information regarding how they can fulfil their material resources and how their resources compare to similar others. For

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DOI:10.1111/bjso.12288

ease of presentation, in the following the first is labelled absolute status, whereas the latter is labelled relative status.

Previous correlational evidence (reviewed below) provides strong support for the notion that relative more than absolute status is associated with interpersonal hostility. In the present research, we present the first experimental work that manipulates both relative and absolute status to examine which has a stronger causal impact on people's aggressive affect and behaviour. Moreover, based on relative deprivation theory (Smith *et al.*, 2012), our studies provide a comprehensive test of the underlying mechanisms. It should be noted that the present studies focus on the impact of individual deprivation on interpersonal aggression. In General Discussion, we will address the possible effect of group-based deprivation on intergroup hostility.

The relationship between social status, deprivation, and hostility

When studying socio-economic effects, there are a number of distinct factors to consider. For one, there is people's objective SES, such as people's income, which relates to the level of absolute deprivation. People who score low on objective measures of social status (e.g., reduced access to material resources) are at greater risk to be exposed to levels of familial violence (Emery & Laumann-Billings, 1998) and crime within one's neighbourhood (Sampson, Raudenbush, & Earls, 1997). Perhaps as a consequence, there is a negative relationship between objective measures of social status (education and income) and hostile inclinations (for a review, see Gallo & Matthews, 2003). For example, a meta-analysis found a correlation of $r = .44$ between the percentage of households below the poverty line and the occurrence of violent crime rates in American metropolitan areas (Hsieh & Pugh, 1993).

Yet, objective measures of social status are only moderately related to how people perceive their social standing (Adler, Epel, Castellazzo, & Ickovics, 2000). Thus, a second factor to consider is people's subjective socio-economic status (SES). Importantly, subjective SES relates to feelings of relative deprivation (Greitemeyer & Sagioglou, 2016). Subjective feelings of being disadvantaged in turn appear to be associated with interpersonal hostility and violent crime. In fact, several findings showed that the experience of personal relative deprivation is related to antisocial conduct and criminal outcomes (e.g., Baron, 2003; DeCelles & Norton, 2016; Mishra & Novakowski, 2016). Experimental evidence suggests that personal relative deprivation causally increases aggressive behaviour and related affect (Greitemeyer & Sagioglou, 2017). Notably, relative deprivation seems to be a better predictor of delinquency than absolute poverty (Agnew, 2001; Crosby, 1976).

The theory of relative deprivation

That how individuals perceive their rank in society may be more important for their feelings than where they objectively stand was first observed by Stouffer, Suchman, DeVinney, Star, and Williams (1949). They found that Air Corps soldiers were more frustrated with their chances of promotion than were members of the military police, even though they were promoted at a quicker rate. Stouffer argues that the Air Corps members compared themselves to other Air Corps members of whom many had been promoted, whereas such a comparison was less upward for the military police. After this initial observation, abundant research has documented detrimental consequences of feeling at a disadvantage (for a theoretical model and meta-analysis, see Smith *et al.*, 2012).

According to the model, an individual responds with anger and resentment to an undeserved disadvantage, which is then followed by an increased likelihood that they behave aggressively towards the source of their deprivation. Importantly, if people believe that the disadvantage is deserved or can be changed (e.g., if people believe they live in a social system where they can climb up the social ladder; Sagioglou, Forstmann, & Greitemeyer, 2018), they should experience less anger and resentment. Again, Smith *et al.* (2012) confirmed that the subjective feeling of deprivation is a better predictor of people's attitudes and behaviour than are objective measures of deprivation. A direct empirical test of their model supported their conclusion. Specifically, Greitemeyer and Sagioglou (2016, 2018) found that low compared to high subjective SES increased aggression. Moreover, correlational evidence suggests that subjective more than objective SES predicts aggressive responding.

The present research

In sum, the current strand of research suggests that relative more than absolute deprivation has negative psychological consequences. For example, international survey results suggest that well-being is affected more by comparative concerns than by absolute standing (Corazzini, Esposito, & Majorano, 2012). Although the influence of relative standing declines once absolute resources become too low to fulfil one's basic needs, more than one third of participants still indicated willingness to trade off absolute for relative standing (Corazzini *et al.*, 2012). On the basis of these findings, we aim to investigate the causal effects of relative and absolute resources by experimentally manipulating both. We hypothesize that individuals are indeed more likely to experience deprivation when they compare less favourably to others, even when their absolute resources to fulfil their material needs are high. In turn, based on the model of relative deprivation (Smith *et al.*, 2012), this increase in deprivation is expected to evoke aggressive inclinations. To test these ideas, we expected the main effect of relative status to be more pronounced than the main effect of absolute status. As indicators of interpersonal hostility, we employed measures of aggressive affect and behaviour.

To examine our hypotheses, we carried out three experiments that manipulated social status with a false feedback method. In Experiment 1, participants learned that they could easily fulfil their material needs (high absolute status) or that they would encounter difficulties fulfilling their material needs (low absolute status). They also learned that they had more resources than similar others (high relative status) or less than similar others (low relative status) or received no information (control condition). In the second experiment, an absolute status control condition was added to the experimental design. In the third experiment, a comprehensive scale of state hostility was employed (Experiments 1 and 2 employed a short version), allowing us to examine the affective consequences of absolute and relative status in more detail. In Experiments 2 and 3, the order of the absolute and relative status manipulation was counterbalanced, to assure that any differences in effect sizes are not attributable to the recency of the manipulation.

Methodological concerns

In all experiments, all participants were run before any analyses were performed, and all data exclusions, experimental conditions, and variables assessed are reported. We aimed for about 100 participants per experimental condition. It was assured that each individual participated only once. Across experiments, there were some participant sex effects.

However, because participant sex did not systematically moderate any of the main findings, we abstain from reporting the analyses where participant sex was included in the experimental design. Results for these analyses are available from the authors upon request.

At the beginning of each experiment, participants read detailed instructions regarding ethical guidelines (e.g., that the data are analysed anonymously and that the submission of responses will be taken as permission to use these in research analysis and in resulting publications). For debriefing, in all experiments, participants received brief information about the faux nature of the social status feedback (i.e., participants learned that the feedback about their financial resources was randomly determined and not based on any of the data they had entered) and were then given an email address where they could get more information about the study.

Experiment 1

Experiment 1 provides a first test of our hypothesis that relative more than absolute status has a causal impact on interpersonal hostility. After participants were given (false) feedback in terms of their absolute and relative resources to fulfil their material needs, participants' aggressive affect and behaviour were assessed. It was predicted that the main effect of relative status was more pronounced than the main effect of absolute status. Moreover, by comparing to the control condition, we examined whether participants in the low-relative status condition would be more aggressive and/or participants in the high-relative status condition would be less aggressive.

Method

Participants

Participants were 601 individuals who were recruited on MTurk. They were randomly assigned to a 2 (absolute status: high vs. low) × 3 (relative status: high vs. low vs. control) between-subjects experimental design. We excluded 37 participants who failed an item attention check (cf. Oppenheimer, Meyvis, & Davidenko, 2009): 'To show that I am paying attention, I will leave this item unanswered'. The final sample consisted of thus 564 individuals (346 females, 218 males; mean age = 32.1 years, *SD* = 9.9). One participant reported to have less than a high school degree, 42 participants completed high school, 266 participants completed some college, 171 participants obtained a bachelor's degree, 73 participants had a master's degree, and 11 participants had a Ph.D. degree. The mean average monthly income was $4,198 (*SD* = 11,852).

Procedure and materials

To manipulate participants' absolute and relative status, we adapted a procedure from Callan, Shead, and Olson (2011) that has been successfully employed to manipulate participants' subjective SES in previous research (Brown-Iannuzzi, Lundberg, Kay, & Payne, 2015; Greitemeyer & Sagioglou, 2016, 2018). Participants were told that the study investigates people's financial beliefs and behaviours and the financial resources of MTurkers. They then responded to a series of questions, which included items assessing demographics, income and spending habits, financial conscientiousness, and the Big 5. Afterwards, participants learned that the computer would now calculate their financial

resources to fulfil their material needs and that the resources would be analysed in relation to the participants' needs. It was further stressed that good resources were not sufficient if needs are high. Conversely, if needs are low, even low resources could be sufficient.

In actuality, all participants received false feedback. In the high-absolute status condition, participants learned that 'Based on statistical analyses using both the information from your profile and the information in our database, you are likely to encounter little difficulties fulfilling your material needs. You are easily able to fulfill your everyday needs, and occasionally, you are able to afford certain luxuries'. In the low-absolute status condition, participants learned that they were likely to encounter difficulties fulfilling their material needs. They might be able to cover their basic expenses, but regarding luxuries, they would have to substantially constrain themselves. This was followed by a manipulation check, asking how participants would rate their financial resources to fulfil their material needs (1 = *very low* to 7 = *very high*). It was stressed that we were not interested in how participants compare to other MTurkers, but only their general financial resources to fulfil their material needs.

Afterwards, participants' relative status was manipulated. In the high-relative status condition, participants learned (the false feedback) that it had been calculated in what relation their resources stood to those of other MTurkers. Irrespective of the previous feedback about their financial resources to fulfil their material needs, analyses had shown that they had substantially more resources than the majority (91%) of MTurkers. That is, almost all MTurkers had allegedly less financial resources to cover their material needs than the participant. In the low-relative status condition, participants learned that analyses had shown that they had substantially less resources than the majority (91%) of MTurkers. That is, almost all MTurkers had allegedly more financial resources to cover their material needs than the participant. Participants were then asked to list at least three examples of how they experience that they have more (less) resources to fulfil their material needs than others. In the control condition, no test results were given. As a manipulation check, participants indicated how they would rate their financial resources to fulfil their material needs relative to other MTurkers (1 = *most MTurkers have more* to 7 = *most MTurkers have less*). Participants also learned that we were not interested in their general financial resources to fulfil their material needs, but only how they compare to other MTurkers in this regard.

Then, we assessed participants' perception of disadvantage with three items. The items were 'How satisfied are you with your rank in society compared to other MTurkers (recoded)', 'To what extent do you feel like a winner compared to other MTurkers (recoded)', and 'To what extent do you feel worse off than other MTurkers'. These items were combined using the average (α = .83). To measure aggressive affect, participants completed a brief version of the State Hostility Scale (Anderson, Deuser, & DeNeve, 1995). In our version, the scale consisted of seven mood statements (e.g., 'I feel outraged' and 'I feel angry'), and participants were asked to indicate the extent to which they agree or disagree with each of the statements right now (1 = *strongly disagree* to 5 = *strongly agree*). There was no target of the emotions. Scale reliability was very good (α = .93). To measure aggressive behaviour, the voodoo doll task was employed (DeWall *et al.*, 2013). All participants viewed 20 images that show a doll with 0–19 pins placed into it. They learned that the doll represented the creator of the resource calculation program they completed earlier and they were asked to choose how many needles (up to 19) they would like to put in the doll to punish this person. These measures of perception of disadvantage, state hostility, and aggressive behaviour were successfully employed in previous research that examined the impact of subjective SES on aggression (Greitemeyer & Sagioglou,

2016). Finally, participants gave demographic information and stated what they thought this experiment was trying to study, but none of the participants noted our main hypothesis that relative deprivation would have a larger impact than absolute deprivation. A final survey page provided participants with a debriefing regarding the status manipulation. They were told that the feedback regarding their financial resources was entirely fictive, and we provided our email address, encouraging participants to contact us for any follow-up question.

Results

The manipulation checks were successful. First, participants in the high-absolute status condition rated their financial resources to fulfil their material needs as being higher (M = 4.92, SD = 1.49) than did participants in the low-absolute status condition (M = 3.43, SD = 1.64), $t(562) = 11.26$, $p < .001$, $d = 0.95$. Second, participants' ratings of their financial resources to fulfil their material needs relative to other MTurkers differed across the relative status conditions, $F(2, 561) = 100.03$, $p < .001$, $\eta^2 = .26$. Participants in the high-relative status condition reported higher levels of financial resources to fulfil their material needs relative to other MTurkers (M = 4.91, SD = 1.45) than did participants in the low-relative status condition (M = 2.61, SD = 1.52), $p < .001$, and the control condition (M = 4.02, SD = 1.59), $p < .001$. The low-relative status condition and the control condition also differed significantly, $p < .001$.

We then examined whether participants' objective SES moderated the impact of the absolute and relative status conditions, respectively, on the manipulation checks. We standardized both education level and average monthly income and averaged these scores into an overall objective SES index and used the PROCESS macro for SPSS (Hayes, 2013). However, two bootstrapping analyses (with 5,000 iterations) showed that the interactions were not significant. Taken together, it appears that both participants high or low in objective SES were influenced by the absolute and relative status manipulations. We are thus confident that our manipulations actually led participants to feel differently about their resources.

Ratings of perception of disadvantage were subjected to a 2 (absolute status: high vs. low) × 3 (relative status: high vs. low vs. control) ANOVA. Both the absolute status manipulation, $F(1, 558) = 10.39$, $p = .001$, $\eta^2 = .02$, and the relative status manipulation, $F(2, 558) = 14.52$, $p < .001$, $\eta^2 = .05$, influenced participants' perception of disadvantage. Participants in the low-absolute status condition perceived more disadvantage (M = 3.88, SD = 1.30) than did participants in the high-absolute status condition (M = 3.53, SD = 1.36). Moreover, participants in the low-relative status condition perceived more disadvantage (M = 4.15, SD = 1.54) than did participants in the high-relative status condition (M = 3.48, SD = 1.14), $p < .001$, and the control condition (M = 3.56, SD = 1.25), $p < .001$. The high-relative status condition and the control condition did not differ, $p = .801$. The interaction was not significant, $F(2, 558) = 0.55$, $p = .576$, $\eta^2 = .00$.

Next, we examined whether participants' state hostility differed as a function of the status feedback manipulations (Table 1). Whereas the absolute status feedback did not influence participants' level of state hostility, $F(1, 558) = 0.29$, $p = .591$, $\eta^2 = .00$, the relative status manipulation did, $F(2, 558) = 13.49$, $p < .001$, $\eta^2 = .05$. Participants in the low-relative status condition (M = 2.04, SD = 0.84) reported higher levels of state hostility than did participants in the high-relative status condition (M = 1.61, SD = 0.73), $p < .001$, and the control condition (M = 1.74, SD = 0.77), $p = .001$. The high-relative

Table 1. Means and standard deviations (in parentheses) of state hostility as a function of absolute and relative status (Experiment 1)

	Relative status		
Absolute status	High	Control	Low
High	1.56 (0.73)[a]	1.69 (0.77)[a]	2.08 (0.84)[b]
Low	1.66 (0.73)[a]	1.79 (0.78)[ab]	1.99 (0.84)[b]

Note. The same superscript denotes that the cells in each row do not significantly differ (Tukey post hoc).

status condition and the control condition did not differ, $p = .235$. That is, compared to participants in the relative status control condition, participants in the low-relative status condition were more aggressive, whereas participants in the high-relative status condition were *not* less aggressive. The interaction was not significant, $F(2, 558) = 0.85, p = .426$, $\eta^2 = .00$. State hostility was positively related to perception of disadvantage, $r(564) = .36, p < .001$.

Responses for our measure of aggressive behaviour (needles placed in the doll) severely violated the normal distribution, so these data were log-transformed. For ease of presentation, descriptive data based on the untransformed scores are presented in Table 2. None of the effects were significant, all ps > .281. Aggressive behaviour was positively related to perception of disadvantage, $r(564) = .10$, $p = .022$, and state hostility, $r(564) = .28, p < .001$.

Finally, we performed a two-step mediation analysis. According to the model of relative deprivation, having low-relative status is related to increased deprivation, which in turn leads to aggressive affect, which then evokes aggressive action. To test the significance of the overall indirect effect of relative status on aggressive behaviour via the experience of disadvantage and state hostility, a bootstrapping analysis (with 5,000 iterations) was performed on the data (Hayes, 2013; Model 6). Participants in the control condition were excluded from this analysis. Results showed that the indirect effect was significantly different from zero, 95% confidence interval (CI) = [0.01, 0.03], suggesting that perception of disadvantage is the distal determinant of aggressive behaviour, whereas aggressive affect is the proximal determinant. The mediation model and the path coefficients are illustrated in Figure 1. The same analysis for absolute status revealed that the indirect effect was not significant, 95% confidence interval (CI) = [−0.00, 0.02].

Discussion

Experiment 1 suggests that people's relative social standing more than their absolute status has an impact on affective hostility. In fact, whereas the main effect of relative status

Table 2. Means and standard deviations (in parentheses) of aggressive behaviour as a function of absolute and relative status (Experiment 1)

	Relative status		
Absolute status	High	Control	Low
High	1.30 (3.78)	1.05 (2.49)	1.94 (3.85)
Low	1.72 (4.03)	1.60 (3.57)	1.60 (4.09)

Note. None of the cells in the rows differed significantly.

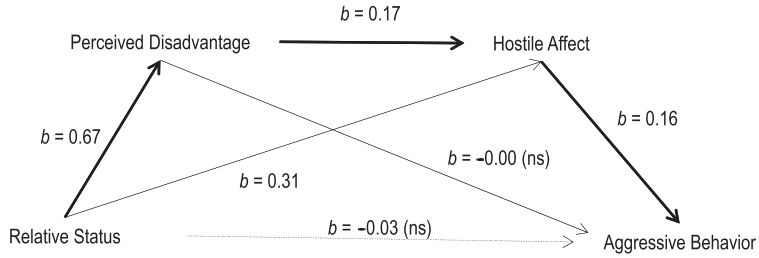

Figure 1. Influence of relative status on aggressive behaviour, sequentially mediated by perceived disadvantage and hostile affect (Experiment 1). Unstandardized coefficients are displayed. All paths are significant unless otherwise noted. (High relative status coded 1, low relative status coded 2).

was significant, the main effect of absolute status was not. Notably, even participants who learned of having high absolute status were more hostile if they had low relative status than those participants in the high-relative status condition and the control condition (Table 1). This suggests that although absolute resources increase, when simultaneous disadvantaged comparisons to a similar other occur, individuals feel more hostile. Moreover, compared to the control condition, participants of low relative status were more aggressive rather than participants of high relative status being less aggressive. It should be noted, however, that this pattern only occurred for our measure of aggressive affect. With regard to actual aggressive behaviour, there were no significant effects.

Experiment 1 also sheds some light on why relative status is associated with aggressive affect. As the model of relative deprivation proposes, participants who had low rather than high relative status perceived more disadvantage, which in turn accounted for their increased hostile affect. Also in line with the model, aggressive behaviour was directly elicited by participants' aggressive affect rather than their experience of disadvantage. That is, although relative status did not reveal a reliable direct effect on aggressive behaviour, there was evidence for the indirect effect. Notably, the same indirect effect of absolute status on aggressive behaviour via the experience of disadvantage and aggressive affect was not reliable. We will return to this point in General Discussion.

Overall, Experiment 1 suggests that relative more than absolute status has an impact on the experience of aggressive affect. Note, however, that the relative status manipulation may be more impactful than the absolute status manipulation because the relative status manipulation required active elaboration (i.e., coming up with three examples), whereas the absolute status manipulation did not. Hence, in the second experiment, participants in the absolute status conditions were also asked to provide some examples. Please also note that the order of the status manipulations was fixed (i.e., absolute status was manipulated before the relative status was manipulated). Moreover, the absolute status manipulation in Experiment 1 did not include a control condition. These issues were also addressed in Experiment 2.

Experiment 2

Method

Participants

Participants were 899 individuals who were recruited on MTurk. They were randomly assigned to a 3 (absolute status: high vs. low vs. control) × 3 (relative status: high vs. low

vs. control) × 2 (order of feedback: absolute–relative vs. relative–absolute) between-subjects experimental design. We excluded 53 participants who failed an item attention check: 'To show that I am paying attention, I will select strongly agree for this item'. The final sample consisted of thus 846 individuals (443 females, 403 males; mean age = 35.7 years, *SD* = 11.4). Three participants reported to have less than a high school degree, 80 participants completed high school, 248 participants completed some college, 159 participants had a college degree, 265 participants obtained a bachelor's degree, 76 participants had a master's degree, and 15 participants had a Ph.D. degree. We gave participants eight categories to estimate their annual household's income (Piff, Kraus, Côté, Cheng, & Keltner, 2010). The categories were (1) <15,000, (2) $15,001–$25,000, (3) $25,001–$35,000, (4) $35,001–$50,000, (5) $50,001–$75,000, (6) $75,001–$100,000, (7) $100,001–$150,000, and (8) >$150,000. Participants reported a median annual family income between $35,001 and $50,000.

Procedure and materials

Participants' absolute status and relative status were manipulated as in Experiment 1, with the following modifications. Participants in the high-absolute status and low-absolute status conditions were asked to list at least three examples of how they experience (little) difficulties fulfilling their material and luxury needs. An additional absolute status control condition was added (no test results were given). Order of whether the absolute or relative status manipulation came first was varied, but did not moderate any of the main findings and is thus not considered further. The same applies to Experiment 3. Participants' perception of disadvantage (α = .83), aggressive affect (α = .93), and aggressive behaviour were assessed as in Experiment 1.

Results

The manipulation checks were successful. First, there was a main effect of absolute status on participants' ratings of their financial resources to fulfil their material needs, $F(2, 843) = 17.93$, $p < .001$, $\eta^2 = .04$. Participants in the high-absolute status condition reported higher levels of financial resources to fulfil their material needs ($M = 4.45$, $SD = 1.48$) than did participants in the control condition ($M = 3.90$, $SD = 1.68$), $p < .001$, and the low-absolute status condition ($M = 3.64$, $SD = 1.75$), $p < .001$. The control condition and the low-absolute status condition did not differ significantly, $p = .152$. Second, for participants' ratings of their financial resources to fulfil their material needs relative to other MTurkers, the main effect of relative status was significant, $F(2, 843) = 69.12$, $p < .001$, $\eta^2 = .14$. Participants in the high-relative status condition reported higher levels of financial resources to fulfil their material needs relative to other MTurkers ($M = 4.74$, $SD = 1.45$) than did participants in the control condition ($M = 4.20$, $SD = 1.50$), $p < .001$, and the low-relative status condition ($M = 3.28$, $SD = 1.52$), $p < .001$. The control condition and the low-relative status condition also differed significantly, $p < .001$.

As in Experiment 1, we examined whether participants' objective SES moderated the impact of the absolute and relative status conditions, respectively, on the respective manipulation checks. For the absolute status manipulation, the interaction was significant. The impact of the absolute status manipulation was most pronounced for participants with low objective SES, followed by participants with medium and high objective SES. However, for all groups, the effect of the absolute status manipulation was

significant. Overall, it appears that both participants high or low in objective SES were influenced by the status manipulations.

Both the absolute status manipulation, $F(2, 837) = 6.71$, $p = .001$, $\eta^2 = .02$, and the relative status manipulation, $F(2, 837) = 66.27$, $p < .001$, $\eta^2 = .14$, influenced participants' perception of disadvantage. Participants in the low-absolute status condition perceived more disadvantage ($M = 4.17$, $SD = 1.59$) than did participants in the high-absolute status condition ($M = 3.79$, $SD = 1.43$), $p = .005$. The control condition ($M = 3.90$, $SD = 1.59$) did not differ from the high-absolute status condition, $p = .661$, and the low-absolute status condition, $p = .062$. Moreover, participants in the low-relative status condition perceived more disadvantage ($M = 4.70$, $SD = 1.57$) than did participants in the high-relative status condition ($M = 3.46$, $SD = 1.38$), $p < .001$, and the control condition ($M = 3.62$, $SD = 1.36$), $p < .001$. The high-relative status condition and the control condition did not differ, $p = .377$. The interaction was also significant, $F(4, 837) = 4.20$, $p = .002$, $\eta^2 = .02$, but was small in its effect size.

We then examined whether participants' state hostility differed as a function of the status feedback manipulations (Table 3). Both the absolute status manipulation, $F(2, 837) = 6.13$, $p = .002$, $\eta^2 = .01$, and the relative status manipulation, $F(2, 837) = 38.88$, $p < .001$, $\eta^2 = .09$, influenced participants' level of state hostility. Participants in the low-absolute status condition ($M = 1.86$, $SD = 0.92$) reported higher levels of state hostility than did participants in the high-absolute status condition ($M = 1.63$, $SD = 0.85$), $p = .004$. The control condition ($M = 1.73$, $SD = 0.89$) did not differ from the high-absolute status condition, $p = .379$, and the low-absolute status condition, $p = .159$. Participants in the low-relative status condition ($M = 2.08$, $SD = 0.95$) reported higher levels of state hostility than did participants in the high-relative status condition ($M = 1.59$, $SD = 0.86$), $p < .001$, and the control condition ($M = 1.52$, $SD = 0.74$), $p < .001$. The high-relative status condition and the control condition did not differ, $p = .561$. The interaction was not significant, $F(4, 837) = 1.52$, $p = .193$, $\eta^2 = .01$. State hostility was positively related to perception of disadvantage, $r(846) = .48$, $p < .001$.

As in Experiment 1, responses for the measure of aggressive behaviour violated the normal distribution. We log-transformed these data, but descriptive data based on the untransformed scores are presented in Table 4. Whereas the main effect of absolute status was significant, $F(2, 837) = 3.58$, $p = .028$, $\eta^2 = .01$, the relative status main effect was not, $F(2, 837) = 1.66$, $p = .191$, $\eta^2 = .00$. Participants in the low-absolute status condition ($M = 0.32$, $SD = 0.46$) tended to place a greater number of pins in the doll than did participants in the high-absolute status condition ($M = 0.24$, $SD = 0.41$), $p = .094$, and the control condition ($M = 0.23$, $SD = 0.39$), $p = .057$. The high-absolute status condition and the control condition did not differ, $p = .974$. The interaction was

Table 3. Means and standard deviations (in parentheses) of state hostility as a function of absolute and relative status (Experiment 2)

	Relative status		
Absolute status	High	Control	Low
High	1.64 (0.79)^{ab}	1.44 (0.80)^{a}	1.92 (0.94)^{b}
Control	1.59 (0.90)^{a}	1.54 (0.70)^{a}	2.12 (0.93)^{b}
Low	1.62 (0.86)^{a}	1.72 (0.87)^{a}	2.26 (0.93)^{b}

Note. The same superscript denotes that the cells in each row do not significantly differ (Tukey post hoc).

Table 4. Means and standard deviations (in parentheses) of aggressive behaviour as a function of absolute and relative status (Experiment 2)

	Relative status		
Absolute status	High	Control	Low
High	1.83 (4.37)	1.96 (4.47)	3.27 (5.47)
Control	2.37 (4.79)	2.06 (4.34)	2.25 (5.04)
Low	3.61 (6.25)	2.73 (5.05)	3.14 (5.84)

Note. None of the cells in the rows differed significantly.

not significant, $F(4, 837) = 0.85, p = .494, \eta^2 = .00$. Aggressive behaviour was positively related to perception of disadvantage, $r(846) = .08$, $p = .015$, and state hostility, $r(846) = .35, p < .001$.

Finally, we performed the same mediation analysis as in Experiment 1 (Figure 2). Replicating the first experiment, the bootstrapping analysis showed that the indirect effect of relative status on aggressive behaviour via the experience of disadvantage and state hostility was significantly different from zero (95% CI = [−0.04, −0.02]). As in Experiment 1, the indirect effect for absolute status was not significant, 95% confidence interval (CI) = [−0.01, 0.01].

Discussion

Experiment 2 replicated most of the findings from Experiment 1, but there were two important differences. First, whereas absolute status had no significant impact on aggressive affect in Experiment 1, participants in the low-absolute status condition were more hostile than were participants in the high-absolute status condition in Experiment 2. As in Experiment 1, however, the effect of the relative status manipulation on state hostility ($\eta^2 = .09$) was more pronounced than the effect of the absolute status manipulation ($\eta^2 = .01$). With regard to actual aggressive behaviour, there were no significant effects in Experiment 1. In Experiment 2, the only significant effect was that participants in the low-absolute status condition tended to be more aggressive than participants in the high-absolute status condition and the control condition, respectively. That is, if anything, absolute more than relative status influenced aggressive behaviour. We will come back to this point in the discussion of Experiment 3.

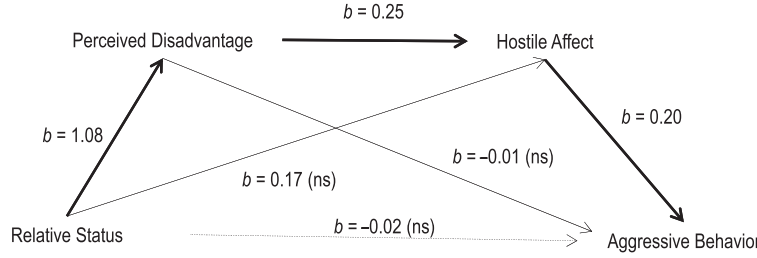

Figure 2. Influence of relative status on aggressive behaviour, sequentially mediated by perceived disadvantage and hostile affect (Experiment 2). Unstandardized coefficients are displayed. All paths are significant unless otherwise noted. (High relative status coded 1, low relative status coded 2).

Experiment 3

Experiment 3 provided a further test of our main hypothesis that relative more than absolute status predicts hostility. Extending Experiments 1 and 2, Experiment 3 examined whether our status manipulations did not only have an impact on aggressive affect, but also elicited a lack of positive social emotions. If our reasoning is correct, having less than others should have a stronger effect on aggressive affect compared to a lack of positive emotionality. Moreover, the former more than the latter should instigate aggressive action. A second modification to our previous experiments is that Experiment 3 assessed aggressive behaviour towards someone who was *not* the source for participants' experienced disadvantage, whereas in Experiments 1 and 2 the target of participants' aggression was the messenger of having low status.

Method

Participants

Participants were 407 individuals who were recruited on MTurk. They were randomly assigned to a 2 (absolute status: high vs. low) × 2 (relative status: high vs. low) × 2 (order of feedback: absolute–relative vs. relative–absolute) between-subjects experimental design. We excluded 50 participants who failed the same item attention check as in Experiment 2. The final sample consisted of thus 357 individuals (171 females, 186 males; mean age = 37.6 years, *SD* = 12.4). Two participants reported to have less than a high school degree, 40 participants completed high school, 86 participants completed some college, 52 participants had a college degree, 109 participants obtained a bachelor's degree, 62 participants had a master's degree, and six participants had a Ph.D. degree. We provided participants with the same eight categories to estimate their annual household's income as in Experiment 2. Participants reported a median annual family income between $50,001 and $75,000.

Procedure and materials

Participants' absolute status and relative status were manipulated as in Experiment 2, but no control conditions were employed. Participants' perception of disadvantage (α = .71) was assessed as in Experiments 1 and 2. To measure aggressive affect, participants completed the entire State Hostility Scale (Anderson *et al.*, 1995), which consists of 35 mood statements. Anderson and Carnagey (2009) showed that the scale can be usefully split into four subscales. The subscale 'feeling unsociable' contains three items (sample items: unsociable, wilful, α = .53), the subscale 'feeling mean' contains 14 items (sample items: mean, like yelling at somebody, α = .97), the subscale 'lack of positive feelings' contains ten items (sample items [reverse scored]: friendly, understanding, α = .89), and the subscale 'aggravation' contains seven items (sample items: aggravated, discontented, α = .93). Saleem, Anderson, and Gentile (2012) reported that the unsociable subscale was not sufficiently reliable, and they did not employ this subscale for further analyses. As this subscale was also less reliable in our sample, we also excluded it from the analyses. Aggressive behaviour was assessed as in Experiments 1 and 2. However, participants did not learn which person the doll represents, but rather that the doll represents another person. Instead of punishing that person, participants were asked to choose how many needles they would like to put in the doll to hurt that person.

Results

Both manipulation checks were successful. Participants in the high-absolute status condition rated their financial resources to fulfil their material needs as being higher ($M = 4.54$, $SD = 1.58$) than did participants in the low-absolute status condition ($M = 3.82$, $SD = 1.63$), $t(355) = 4.24$, $p < .001$, $d = 0.45$. Moreover, participants in the high-relative status condition reported higher levels of financial resources to fulfil their material needs relative to other MTurkers ($M = 4.88$, $SD = 1.29$) than did participants in the low-relative status condition ($M = 3.68$, $SD = 1.85$), $t(355) = 7.26$, $p < .001$, $d = 0.75$. Participants' objective SES did not significantly moderate the impact of the absolute and relative status conditions on the respective manipulation checks.

Ratings of perception of disadvantage were subjected to a 2 (absolute status: high vs. low) × 2 (relative status: high vs. low) ANOVA. Whereas the relative status manipulation influenced participants' perception of disadvantage, $F(1, 353) = 44.99$, $p < .001$, $\eta^2 = .11$, the absolute status manipulation did not, $F(1, 353) = 2.53$, $p = .113$, $\eta^2 = .01$. Participants in the low-relative status condition perceived more disadvantage ($M = 4.37$, $SD = 1.53$) than did participants in the high-relative status condition ($M = 3.39$, $SD = 1.18$). Ratings in the absolute status conditions were relatively similar (low absolute status: $M = 3.97$, $SD = 1.48$; high-absolute status condition: $M = 3.69$, $SD = 1.37$). The interaction was not significant, $F(1, 353) = 0.00$, $p = .970$, $\eta^2 = .00$.

We then examined whether the subscales of the state hostility scale differed as a function of the status feedback manipulations (Table 5). To this end, a MANOVA was performed on the data, with absolute status and relative status as independent variables and ratings of feeling mean, lack of positive feelings, and aggravation as dependent variables. The effect of the relative status manipulation was significant, multivariate $F(3, 351) = 9.80$, $p < .001$, $\eta^2 = .08$. Follow-up univariate F tests revealed significant differences between the experimental conditions on ratings of feeling mean, $F(1, 353) = 17.86$, $p < .001$, $\eta^2 = .05$, lack of positive feelings, $F(1, 353) = 4.61$, $p = .033$, $\eta^2 = .01$, and aggravation, $F(1, 353) = 27.12$, $p < .001$, $\eta^2 = .07$. In contrast, the absolute status manipulation showed no significant effects, multivariate $F(3, 351) = 0.81$, $p = .488$, $\eta^2 = .01$, all univariate Fs < 1.78, all ps > .183, all $\eta^2 < .01$. The interaction was not significant either, multivariate $F(3, 351) = 0.64$, $p = .590$, $\eta^2 = .01$, all univariate Fs < 0.91, all ps > .340, all $\eta^2 < .01$. Ratings of feeling mean, $r(357) = .11$, $p = .037$, lack of positive feelings, $r(357) = .34$, $p < .001$, and aggravation, $r(357) = .28$, $p < .001$, were positively related to perception of disadvantage.

As in Experiments 1 and 2, responses for the measure of aggressive behaviour violated the normal distribution and were thus log-transformed (descriptive data based on the

Table 5. Means and standard deviations (in parentheses) of the subscales of state hostility as a function of absolute and relative status (Experiment 3)

	AS high		AS low	
	RS high	RS low	RS high	RS high
Feeling mean	1.50 (0.89)[a]	1.82 (0.96)[ab]	1.51 (0.73)[a]	2.01 (1.09)[b]
Lack of positive feelings	2.46 (0.78)[a]	2.57 (0.75)[a]	2.47 (0.75)[a]	2.73 (0.91)[a]
Aggravation	1.58 (0.88)[a]	2.05 (1.05)[b]	1.65 (0.80)[a]	2.26 (1.14)[b]

Notes. AS = absolute status; RS = relative status.
The same superscript denotes that the cells in each row do not significantly differ (Tukey post hoc).

untransformed scores are presented in Table 6). As in Experiment 1, none of the effects were significant, all *p*s > .357. Aggressive behaviour was not significantly related to the perception of disadvantage, $r(357) = -.08$, $p = .155$, and lack of positive feelings, $r(357) = -.05$, $p = .355$, whereas it was positively related to ratings of feeling mean, $r(357) = .63$, $p < .001$, and aggravation, $r(357) = .52$, $p < .001$.

Finally, we performed the same mediation analysis as in Experiments 1 and 2 (Figure 3). For this analysis, we combined the feeling mean and aggravation subscales into one overall state hostility scale. As before, the bootstrapping analysis showed that the indirect effect of relative status on aggressive behaviour via the experience of disadvantage and state hostility was significantly different from zero (95% CI = [0.00, 0.04]). In contrast, lack of positive emotions did not mediate (95% CI = [−0.00, 0.02]). Again, the indirect effect for absolute status was not significant, 95% confidence interval (CI) = [−0.02, 0.00].

Discussion

Experiment 3 was mostly in line with Experiments 1 and 2. As in the previous experiments, the effect of the relative status manipulation on state hostility was more pronounced than the absolute status manipulation. As in Experiment 1, both the absolute and relative status manipulations had no impact on aggressive behaviour. Given that the finding from Experiment 2 that participants in the high-absolute status condition tended to be less aggressive than participants in the low-absolute status condition could not be replicated in Experiments 1 and 3, we believe it is fair to conclude that relative more than absolute status has an impact on aggressive affect, whereas both absolute and relative status had little effect on aggressive action.

Table 6. Means and standard deviations (in parentheses) of aggressive behaviour as a function of absolute and relative status (Experiment 3)

	Relative status	
Absolute status	High	Low
High	1.89 (4.65)	1.94 (4.64)
Low	2.52 (5.99)	2.64 (5.39)

Note. None of the cells in the rows differed significantly.

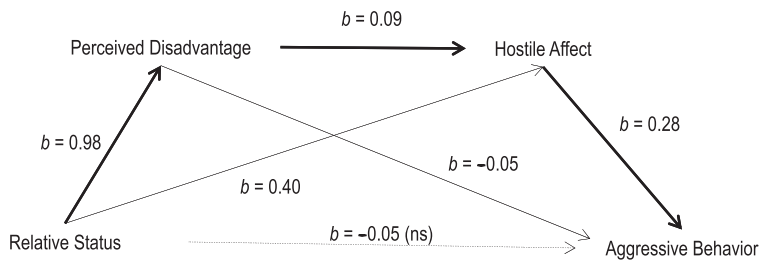

Figure 3. Influence of relative status on aggressive behaviour, sequentially mediated by perceived disadvantage and hostile affect (Experiment 3). Unstandardized coefficients are displayed. All paths are significant unless otherwise noted. (High relative status coded 1, low relative status coded 2).

Extending Experiments 1 and 2, Experiment 3 showed that the relative status manipulation had significant effects on different facets of state hostility. Notably, however, the impact was more pronounced for the subscales feeling mean and aggravation than for lack of positive feelings. Moreover, whereas the former were positively related to the measure of aggressive behaviour, the latter showed no significant relationship. Overall, it appears that having less than others has an impact on negative emotionality that distinctly instigates aggressive action. Note that we only assessed different subscales within a hostility measure, rather than employing a measure of a broad set of negative affective responses. Hence, it remains unknown to what extent the experience of deprivation has a distinct impact on interpersonal hostility or whether it may also evoke more passive affective states such as depression. This would be an important avenue for future research.

General discussion

Individuals appear to be more frustrated when they have sufficient resources to fulfil their material needs but are aware that most others are better off compared to when their resources are insufficient but most others are worse off. This finding is in line with relative deprivation theory (Smith *et al.*, 2012), according to which subjective more than objective social standing predicts feelings and behaviour. So far, there has been correlational evidence that subjective more than objective SES is associated with aggressive responding (Greitemeyer & Sagioglou, 2016). To the best of our knowledge, the present studies are the first that experimentally manipulate both relative and absolute status. Our main finding that the main effect of relative status was more pronounced than the main effect of absolute status provides key support for relative deprivation theory's assumption that subjective more than objective circumstances influence people's hostile responses. As also proposed by the model, all experiments found support for the sequential process from the experience of low relative status to the experience of disadvantage to hostile affect to aggressive action. Importantly, the same sequential process from the experience of low absolute status to aggressive behaviour was not significant in either of our experiments. It thus seems that having less than others instigates a distinct process that results in increased interpersonal hostility. It should be noted that most of the effect sizes were rather small. Nevertheless, the present research finds support for crucial predictions derived from the theory of relative deprivation of how the experience of relative deprivation leads to aggressive responding.

Note, however, that even though the sequential process was reliable, we did not find that having low relative social status was associated with increased aggressive behaviour. The impact of having low absolute status on aggressive behaviour was not significant either, although Experiment 2 showed a tendency that participants in the high-absolute status condition were less aggressive than participants in the low-absolute status condition. Overall, the impact of relative status on aggressive behaviour was *not* more pronounced than was the impact of absolute status. According to relative deprivation theory (Smith *et al.*, 2012), aggressive behaviour only follows the deprivation experience when the action can redress the deprivation. In all of the present experiments, the target of the participants' aggressive responding was not the real source of their deprivation, but, rather, either the messenger of the unwelcome news (i.e., the individual who created the social status test) or an unspecified person. It may well be that being worse off than others leads to aggression towards the actual source of being at a disadvantage.

Please also note that all experiments employed the same measure of aggressive behaviour. Future research assessing aggressive behaviour differently would be welcome. Likewise, all experiments relied on the same method to induce a sense of absolute and relative status. To increase generalizability, future experiments may employ other manipulations (see, e.g., Bratanova, Loughnan, Klein, Claassen, & Wood, 2016a; Bratanova, Loughnan, Klein, & Wood, 2016b). Finally, it is noteworthy that our measure of perceived disadvantage asked participants to compare themselves with other MTurkers, which makes it little surprising that the manipulation of relative status had stronger effects on this measure compared to the manipulation of absolute status.

In any case, the present research shows clear causal evidence that individuals respond with more aggressive affectivity when they have less than others even when they are absolutely well-off. It is important to note that the manipulations of both absolute and relative status apparently worked in that the manipulation checks were successful. Moreover, both participants high or low in objective SES were influenced by the manipulations. It thus appears that the greater influence of relative compared to absolute status is *not* due to the absolute status manipulation being less convincing than the relative status manipulation.

That many individuals are concerned not only about their absolute outcome but also about their relative share has also been documented in economics experiments. For example, in an ultimatum game, one player (the proposer) is allocated a sum of money and proposes to a responder how to divide the money between the proposer and the responder (Güth, Schmittberger, & Schwarze, 1982). The responder can either accept or reject the proposal. If the responder accepts, the money is divided according to the proposal. If the responder rejects, both players do not receive any money. Although rejection of any offer above zero is not consistent with the principle of utility maximization, responders frequently reject offers where the money is not split equally (Camerer, 2003). Likewise, inequality aversion theorists (Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999) posit that individuals care about their own material pay-offs but also about their relative share and, thus, they are willing to give up some material pay-off if it decreases the difference between their share and the outcome for others (cf. Corazzini *et al.*, 2012).

In our experiments, aggressive affect accounted for the impact of our status manipulations on aggressive behaviour. It should be noted, however, that multiple operating mechanisms might be at work. For example, it has been shown (Osborne, Smith, & Huo, 2012) that the experience of relative deprivation can lead to different emotional reactions (e.g., anger and fear), which then evoke different outcomes (voice and exit, respectively). Other research (Osborne, Sibley, & Sengupta, 2015) suggests that absolute deprivation increases group identification via perceptions of group-based deprivation. Future research may thus employ other measures that could account for the impact of absolute and relative status on aggressive action.

In the present research, we examined the impact of individual deprivation on aggression. However, according to the model of relative deprivation (Smith *et al.*, 2012), individuals may feel deprived not only when they are worse off than others, but also when their own social group is at a disadvantage compared to other groups. Individual deprivation has been shown to predict individual-focused behaviour, whereas group deprivation is mainly a predictor of group-focused behaviour. Future research may address whether relative deprivation has a stronger causal impact on group-based aggression than does absolute deprivation when other groups are the comparison level.

To conclude, even though the mean absolute level of income is increasing in many societies in the last decades, this does not necessarily have a positive impact on people's emotionality. In fact, because wealth and income inequality are also rising, there is the risk that although people are increasingly able to fulfil their material needs, experiencing that others have even more still leads to frustration.

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Received 16 April 2018; revised version received 19 September 2018