



Status anxiety mediates the positive relationship between income inequality and sexualization

Khandis R. Blake^{a,b,1} and Robert C. Brooks^a

^aEvolution and Ecology Research Centre, UNSW Sydney, 2031 Australia; and ^bMelbourne School of Psychological Sciences, University of Melbourne, 3011 Australia

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Income inequality generates and amplifies incentives, particularly incentives for individuals to elevate or maintain their status, with important consequences for the individuals involved and aggregate outcomes for their societies [R. G. Wilkinson, K. E. Pickett, *Annu. Rev. Sociol.* 35, 493–511 (2009)]. Economically unequal environments intensify men's competition for status, respect, and, ultimately, mating opportunities, thus elevating aggregate rates of violent crime and homicide [M. Daly, M. Wilson, *Evolutionary Psychology and Motivation* (2001)]. Recent evidence shows that women are more likely to post "sexy selfies" on social media and that they spend more on beautification in places where inequality is high rather than low [K. R. Blake, B. Bastian, T. F. Denson, *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* 115, 8722–8727 (2018)]. Here we test experimentally for causal links between income inequality and individual self-sexualization and status-related competition. We show that manipulating income inequality in a role-playing task indirectly increases women's intentions to wear revealing clothing and that it does so by increasing women's anxiety about their place in the social hierarchy. The effects are not better accounted for by wealth/poverty than by inequality or by modeling anxiety about same-sex competitors in place of status anxiety. The results indicate that women's appearance enhancement is partly driven by status-related goals.

economic inequality | sexualization | status anxiety | self-objectification

A growing body of research indicates that the drive to gain and protect one's status intensifies alongside economic inequality (1). In an influential series of studies, Daly and Wilson document these effects in men, finding that risky status-seeking and status-protecting behaviors proliferate in economically unequal conditions (2). Much less is known about how income inequality affects intrasexual competition and status drives among women. In one exception, Blake et al. (3) analyzed "sexy selfie" social media posts across 113 nations, finding that sexy selfies, as well as beauty salon and women's clothing store expenditure in the United States, increase in areas of economic inequality. Findings were robust and replicated at 3 spatial scales, but the aggregate, associational data neither permitted causal inferences nor explicated the psychological pathways underlying the link between inequality and sexualization. Here we test those links experimentally, examining the causal relationship between income inequality and sexualization at the individual level.

Competition among men often entails physical aggression and violence, and young men in particular are the primary perpetrators and victims of violence, aggression, and crime across all known cultures (4). Although women can be aggressive and violent, reproductive competition among women is more often expressed in nonviolent domains, especially through the promotion of physical attractiveness (5, 6). Physical attractiveness confers status benefits by encouraging financial and prosocial biases toward attractive women (7) and by providing a fruitful strategy for them to maximize their social position by attracting high-status male partners (8). Physical attractiveness is an important quality that men seek in their romantic partners cross-culturally (9), and high-status men tend to use their power and social position to obtain the most desirable wives (10).

When considered in the context of economic history, the importance of physical attractiveness for female mobility, and as a tactic of female-female competition, is not surprising. Women have tended to occupy a lower position in the social hierarchy than men, and only recently have women gained the freedom or opportunity to support themselves economically. Even in contemporary times, that freedom does not extend to all women across all cultures and, to this day, many women still depend on marriage for survival and social mobility in even the most progressive societies. Obtaining essential resources by attracting male partners and outshining romantic competitors has thus, historically, been an important strategy—indeed, sometimes the only strategy—for female survival and social mobility.

Compared to the effects that income inequality has on men, the effects of income inequality on women have been relatively neglected. Recently, however, we drew attention to the role that income inequality plays in elevating incentives for female attractiveness (3). Women's investment in physical attractiveness, via sexy selfie social media posts across 113 nations as well as beauty salon and women's clothing store expenditure in the United States, increased in geographic areas of high income inequality. Although these findings were robust and replicated at 3 spatial scales (US cities, counties, and nations), the aggregate, associational data did not permit direct inferences that income inequality causes elevated female-female competition; nor did it test whether status anxiety or competitor derogation underpins this effect.

Significance

Research has revealed that female sexualization co-occurs with income inequality, with women investing more time and attention in elevating attractiveness when they live in economically unequal environments. We examine the psychological reasons for this phenomenon, showing experimentally that income inequality exacerbates sexualization because it raises anxiety about social status. We do not find support for the notion that sexualization manifests in response to impulses to derogate same-sex competitors. The findings show that social climbing and status competition are drivers of sexualization among women. They suggest that in times of economic threat, women may adopt strategies designed to set themselves above other women, including by aligning themselves with men who bring economic or status benefits to the partnership.

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¹To whom correspondence may be addressed. Email: khandis.blake@unimelb.edu.au.

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Here we adapt and extend a well-validated experimental paradigm of inequality (11) to clarify these mechanisms. Using a role-playing paradigm, we informed participants that they were starting a new life as a member of a virtual society, “Bimboola.” Participants read that, just like any other society, there were differences in income within Bimboola that were exemplified by Bimboola’s 3 income tiers. These tiers depicted the income of the richest 20% of society (tier 3), the poorest 20% of society (tier 1), and the middle 20% of society (tier 2). All participants were assigned to tier 2, where their income was always 50,000 Bimboola dollars (BD), and were told that this was the average income of their tier. Mean incomes in tier 1 and tier 3 were experimentally assigned to vary continuously, and independently of one another, between participants. The values were drawn from the distribution of 20th and 80th percentiles of income shares collected from 138 countries by the World Bank (12). We converted the 20th- and 80th-percentile incomes from Purchasing Power Parity per USD to Bimboolean dollars by calculating the ratio of the 20th and 80th percentiles to the 60th-percentile income share for each country, then multiplying the result by 50,000 and rounding to the nearest thousand BD. After conversion, the 20th-share percentiles ranged from 12,000BD to 40,000BD (tier 3) and the 80th-share percentiles ranged from 60,000BD to 423,000BD (tier 1). Participants were told that these assigned values respectively corresponded to the earnings of the poorest 20% and the richest 20% in society.

In addition to presenting this information about the income of the richest and poorest quintiles in Bimboola, as well as the participant’s own earnings, we also presented participants with the 80:20 ratio that corresponded to their assigned society (by dividing the 80th percentile by the 20th percentile). We explained that the ratio reflected the degree to which the income held by the richest 20% outweighed that held by the poorest 20%. Fig. 1 *A* and *B* presents the incomes of the 20th and 80th percentiles from World Bank (*A*) data and in our continuous manipulation of income inequality in Bimboola (*B*), as well as the corresponding 80:20 ratios in heat maps. At the national level, top- and bottom-quintile incomes were negatively correlated, limiting power to discern the effects of wealth/poverty and inequality. Our continuous income inequality manipulation overcame this limitation by providing greater coverage and independence of the 20th- and 80th-percentile values while ensuring that the 80:20 ratio resembled inequality in the world today (80:20_{WorldBank} ratios in the world today range from 3.4 to 28.0; in the Bimboola manipulations, 80:20 ratios ranged from 1.9 to 34.4).

Participants were then invited to start their new life in Bimboola by purchasing a house, car, and phone and choosing an annual vacation. To do so, participants were shown 3 average houses, then cars, then phones, then vacations for each of the 3 income tiers side by side and chose one for their new life. All participants saw the same houses, cars, phones, and vacations in their tier (tier 2) irrespective of the 80:20 ratio in their society. Houses, cars, phones, and vacations in tier 1 and tier 3, however, varied depending on whether their society was very unequal (an 80:20 ratio greater than 15) or not so unequal (an 80:20 ratio below 15). If participants were in very unequal societies, the richest items (tier 3) were very rich and the poorest items (tier 1) were very poor. If they were in less unequal societies, the richest items were moderately rich (yet clearly more expensive than items in tier 2) and the poorest items were moderately poor (yet clearly poorer than items in tier 2). Participants were instructed that they could only choose a house, car, phone, and vacation that they could afford (i.e., items from tier 2 or tier 1), even though they had to look at all options.

We examined whether income inequality increases status anxiety and whether status anxiety mediates the effect of inequality on women’s intentions to wear revealing clothing for their first night out in Bimboola. Consistent with recent work in economics, psychology,

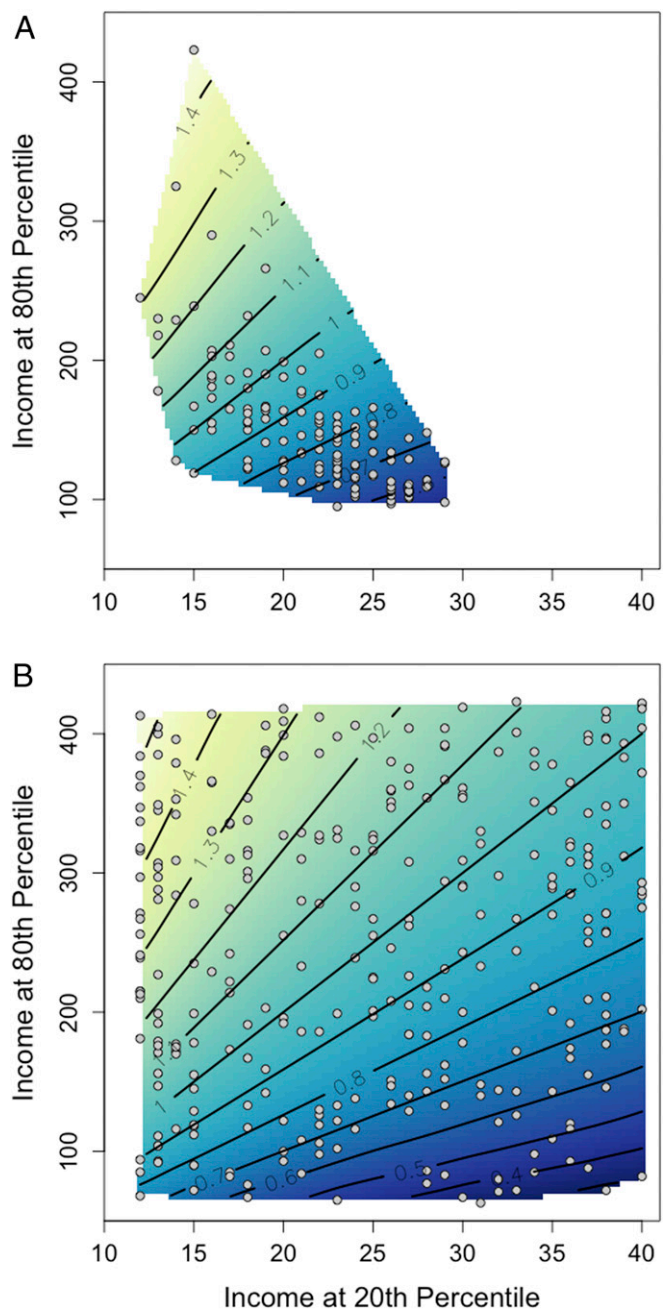


Fig. 1. Surface plot of the distribution of income in Bimboolean dollars of the 20th and 80th percentiles, showing the 80:20 ratio in color and contours. Data is from the World Bank (*A*; 12) and our experimental Bimboola replicates (*B*). Colors represent income inequality, with lighter color indicating higher inequality. Contours are log-transformed scores for income inequality. The World Bank percentile incomes (*A*) have been rescaled from PPP per US dollars to Bimboolean dollars. Our continuous Bimboola manipulation (*B*) provided greater coverage and independence of the 20th- and 80th-percentile values compared to those from the World Bank, while ensuring that the experimental 80:20 ratio resembled inequality in the world today.

and sociology (1, 13, 14), we operationalized status anxiety by measuring an individual’s preoccupation with status seeking. Empirical investigations demonstrate that excessive status seeking is an expression of anxiety and stress (15), and that concerns over one’s social position often elicit biological stress responses (16). We averaged responses for how important it was for participants that in Bimboola they were respected by others, admired for what

they did, successful, recognized for their achievements, and able to show their abilities, and that people did what they said, with high scores reflecting greater status anxiety (1 = not at all, 7 = very; α [Cronbach's alpha] = 0.85, M [mean] = 4.88, SD [standard deviation] = 0.94). To partition concerns about status from concerns about reproductive competitors, we also tested whether the relationship between inequality and revealing clothing was mediated by the derogation of other women. Competitor derogation is a common tactic of female-female competition (6), and we aimed to determine whether revealing clothing was strategically enacted in response to anxieties about status generally or was specific to anxieties about one's place in the reproductive hierarchy relative to other women.

To measure competitor derogation, we presented participants with 3 images of other women who lived in Bimboola and asked them to rate each woman's attractiveness, intelligence, humor and quick-wittedness, warmth, and the likelihood that they would hire them as a colleague (1 = not at all likely, 7 = very likely). Derogation was operationalized as low scores on these variables (6), which we reverse-scored and averaged so higher scores equaled more derogation ($\alpha = 0.88$, $M = 2.22$, $SD = 0.67$). Participants then chose an outfit to wear for their first night out in Bimboola. We presented them with 2 similar outfits that differed in how revealing they were (see *Methods*), and they dragged a slider from the midpoint toward the outfit they would be most likely to wear, repeating this task with 5 outfits total. The anchoring of revealing and nonrevealing outfits was counter-balanced and the scale ranged from 0 to 100. Reliability was good and items were aggregated, so higher scores equaled greater intentions to wear revealing clothing ($\alpha = 0.75$, $M = 200.51$, $SD = 102.05$).

A parallel mediation model showed that income inequality indirectly increased intentions to wear revealing clothing via status anxiety, effect = 0.02, CI_{95} [0.001, 0.04], but not via competitor derogation, effect = -0.005, CI_{95} [-0.03, 0.004]. As shown in Fig. 2, as income inequality increased the women's anxiety about their

status, they were more likely to wear revealing clothing for their first night out in Bimboola. We included age as a covariate in all analyses, as wearing revealing clothing is more common among younger women, but we note that the effects reported here remained when age was excluded from the model.

To explore whether it was inequality or some other element of the economy that was driving these effects, we used structural equation modeling to examine the direct and indirect effects of the income of rich and poor on status anxiety, competitor derogation, and intentions to wear revealing clothing. All parameter estimates are provided in the *SI Appendix*, Table S1 and Fig. S1 (a diagram of the results). We found that when the income of the poor increased, the women were more likely to derogate other women, β (standardized beta coefficient) = 0.14, CI_{95} [-0.02, -0.26], $P = 0.019$, but no more or less likely to experience status anxiety ($P = 0.099$). The income of the rich did not affect status anxiety or competitor derogation (P s > 0.612), although as before status anxiety increased the women's intentions to wear revealing clothing, $\beta = 0.21$, CI_{95} [0.05, 0.34], $P = 0.002$, which were more prevalent among young women, $\beta = -0.22$, CI_{95} [-0.09, -0.34], $P = 0.001$. Indirect effects of the income of the poor and the rich on intentions to wear revealing clothing were not significant, (P s > 0.189), indicating that the effects of the economy on revealing clothing are specific to the degree of inequality in society.

According to the spirit level theory of income inequality (14), the societal ills that covary with income inequality—increased mortality, reduced well-being, worse health, more homicide and teen pregnancy—are due not to any underlying societal dysfunction but instead to the high levels of status competition that result from living in an economically unequal environment. Inequality-induced status competition manifests in a range of risky status-seeking and status-protecting behaviors among men (2, 17), although few investigations have examined comparable effects in women. Adapting and extending a well-validated paradigm, our role-playing experiment showed that economic inequality

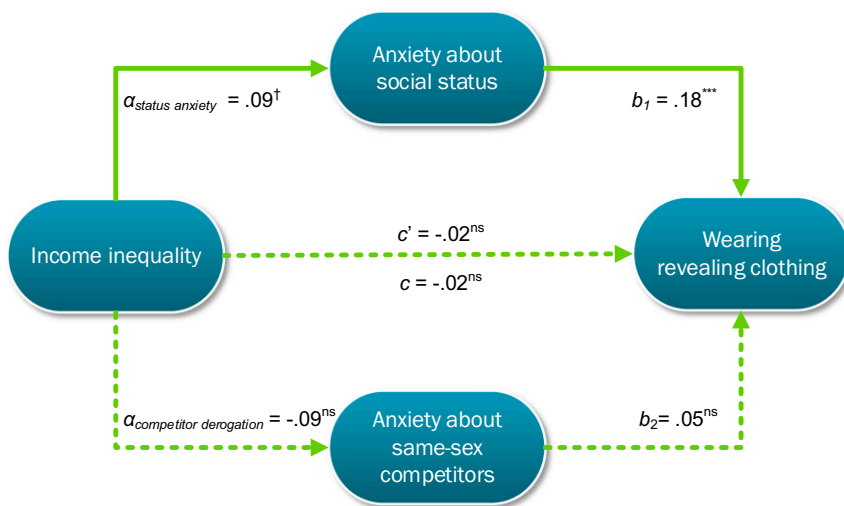


Fig. 2. Mediation model examining indirect effects of income inequality on revealing clothing, through status anxiety and competitor derogation, controlling for age. $***P < 0.001$, $^\dagger P < 0.10$. Significant indirect path is boldface; dashed lines are not significant (ns). The model controls for the effect of age on revealing clothing and both mediators. Zero-order effect of income inequality on sexualization (c path): $t(300) = -0.36$, $\beta = -0.02$, $P = 0.718$, CI_{95} [-0.15, 0.10]. Effect of income inequality on status anxiety ($a_{\text{status anxiety}}$ path): $t(300) = 1.78$, $\beta = 0.09$, $P = 0.076$, CI_{95} [-0.01, 0.20]; and competitor derogation ($a_{\text{competitor derogation}}$ path): $t(300) = -1.47$, $\beta = -0.09$, $P = 0.143$, CI_{95} [-0.20, 0.03]. Effect of age on status anxiety: $t(300) = -1.92$, $\beta = 0.12$, $P = 0.056$, CI_{95} [-0.24, 0.003]; and competitor derogation: $t(300) = -1.23$, $P = 0.221$. Effect of status anxiety on sexualization (b_1 path), controlling for age, competitor derogation, and income inequality: $t(298) = 3.23$, $\beta = 0.18$, $P = 0.001$, CI_{95} [0.07, 0.29]. Effect of competitor derogation on sexualization (b_2 path), controlling for age, status anxiety, and income inequality: $t(298) = 0.91$, $P = 0.364$. Direct effect of income inequality on revealing clothing (c' path), controlling for status anxiety, competitor derogation, and age: $t(298) = -0.36$, $P = 0.718$. Effect of age on revealing clothing, controlling for income inequality, sexualization, and competitor derogation: $t(298) = 5.32$, $\beta = -0.29$, $P < 0.001$, CI_{95} [-0.40, -0.18].

indirectly increases competition among women in a way that is comparable to inequality's effects on men. Specifically, we showed that women's intentions to wear revealing clothing are partly driven by inequality-induced concerns about social status.

Recent work indicates that the investment of time and attention in enhancing physical attractiveness can be driven by status-related goals, especially for women (18). Economic inequality is also known to exacerbate social comparisons, leading in turn to the consumption of positional, appearance-related goods that give the impression of high status (19). It is possible that our findings are consistent with a kind of conspicuous consumption, with women wearing revealing clothing to signal high status in environments preoccupied with social rank. One observation that stands counter to this interpretation, however, is that women in revealing and sexualized clothing are often perceived to *lack* not only status (20) but also other mental characteristics essential to being highly thought of, such as competence, prestige, and warmth (21, 22).

One way to make sense of this paradox is to consider the reproductive function of revealing clothing—in other words, *how* revealing clothing may alleviate concerns about status. The reasons that women wear revealing clothing are both complex and varied, but many women engage in these behaviors to attract the attention of men (23). Our findings may indicate that in times of economic threat—such as when incomes are unequal—women adjust their behavior by adopting strategies designed to attract and align themselves with men who have greater economic potential than themselves. Doing so may elevate women's position in the social hierarchy and alleviate concerns about status, in addition to potentially enhancing their long-term fitness prospects by attracting economically prosperous men. Attracting high-quality romantic partners, or at least sexual interest from high-quality men who may become important allies (7), might allow women to *achieve* higher status.

Status seeking is a fundamental psychological drive, and the level of status that an individual is accorded by others affects their self-esteem, health, and well-being (24). Although the importance of status has been observed across cultures, genders, and ages, evolutionary research tends to belabor the importance of status to men at the expense of understanding the importance of status to women. From a functional perspective, status can be important for female reproductive success just as it is important for male reproductive success, especially in terms of infant survival and obtaining resources crucial to reproduction (25). Studies among children also show that girls are highly preoccupied with social status, even more so than boys (26). Although the expression of status between the sexes can differ, high status can confer reproductive benefits on men and women alike. Future research examining the effects of status on women's reproductive success would contribute greatly to evolutionary theorizing and to understanding differences and similarities in how individuals of both sexes seek and enact status.

We measured competitor derogation as an alternative mediator to status anxiety, aiming to determine whether revealing clothing strategically quelled anxieties about same-sex competitors in addition to those concerning social status more generally. The relationship between inequality and revealing clothing was not mediated by the desire to derogate same-sex competitors, which suggests that intentions to wear revealing clothing reflect a mindset preoccupied with a form of status seeking that extends beyond one's position relative to particular attractive women. These null effects suggest that competitor derogation is used in circumstances different from those that arose in the current experiment, and that revealing clothing may function to attract mates more so than diminish the appeal of other women. We did find that women were more likely to derogate other women when the poor quintile were relatively well off, compared to other treatment combinations, which suggests that women may be more likely to derogate competitors when they feel their position is

threatened by those below them. Future research would benefit from clarifying these possible relationships and extending them to determine whether income inequality and status anxiety exacerbate other competitive behaviors among women, including female-female aggression (22).

Effect sizes in our analyses were modest, and they highlight that other variables not measured in the current experiment likely play a role in women's tendency to self-sexualize, derogate competitors, and experience status anxiety. The small and non-significant direct effect of income inequality on sexualization also suggests that aggregate-level effects (3) have complex, context-dependent underpinnings. An individual's social context is likely to be important, and other degrees of inequality not captured here, including inequality in structural power between men and women, may account for some variability in our effects. Consistent with the theory of low-status compensation (27), the degree to which women have strong social capital and social networks may likewise buffer against inequality-induced status anxiety and resultant levels of sexualization. A further limitation of our results is that sexualized clothing was the only avenue we provided women to seek or express status in Bimboola. There are many goal-directed activities that people engage in to manage their status (24), and there remain opportunities to test whether the response we observed is specific to sexualization or part of a general status-seeking response. It remains possible that the provision of alternative routes to status management could diminish inequality-induced sexualization for some women.

Wealthy, educated nations have made progress in recent decades toward women having opportunities equal to those of men, including opportunities to achieve their goals without having to rely on their physical attractiveness. Even so, many women still find that their physical attractiveness is one of the most valuable resources they have, and they disproportionately value their own physical characteristics above their other qualities (28). Given the positive correlation between wearing revealing clothing and self-objectification (29), we expect that self-objectification—and other forms of problematic female appearance enhancement—may likewise be motivated by status anxiety. Insights into these relationships, and investigations that consider functional accounts of self-objectification and sexualization more generally, would form an important contribution to future work aiming to understand female behavior and psychology and, in particular, the profound consequences of economic inequality for individuals and societies.

Methods

Income share data from the World Bank were based on primary household survey data obtained from government statistical agencies and World Bank country departments. Due to missing data between countries, we computed averages within countries for each income quintile gathered between 2010 and 2017 for 135 countries. Guided by research indicating that samples of 200 to 300 provide adequate statistical power when multivariate experimental manipulations are continuous (30), we set our a priori sample size to 300 participants. We recruited 350 women ($M_{\text{age}} = 27.24$, $SD = 6.90$) from Prolific Academic to participate in a study on society and attitudes for GB£1.10, expecting a 15% withdrawal rate. Prolific Academic is one of the world's largest crowdsourcing platforms, where individuals participate in academic research for a cash payment. All participants provided written informed consent, and IRB approval was obtained from UNSW Sydney (HC16933). Because female-female competition via physical attractiveness is more common among women who are young, single, and heterosexual, prescreening criteria included ages 18 to 45, majority sexual attraction to men, and unmarried relationship status. We additionally prescreened for device compatibility, excluding participants who completed the study on a mobile device, which affected the display of scale anchors.

Thirty people (8.6%) were withdrawn for failing the comprehension check explained below, 9 were eliminated for using a cell phone device, 4 were eliminated for reporting English-language comprehension difficulties, 3 were eliminated for extensive missing data, and 1 was eliminated for later reporting no sexual attraction to men, leaving $n = 303$ ($M_{\text{age}} = 27.15$, $SD = 6.98$). The majority of participants were Caucasian (66.7%), 9.2% were

African American, 5.3% were Hispanic, and the remainder were of mixed descent (5.0%), Indian, Pakistani, Nepalese (4.6%), East Asian (3.6%), Southeast Asian (3.0%), other (1.7%), or Middle Eastern (<1%). In total, 40.7% of participants were citizens of North America; 26.7%, Northern Europe; 8%, Southern Europe; 4.7%, Eastern Europe; and 14%, Oceania, Western Europe, South America, Asia, or North Africa; 10.6% did not provide their nationality. Forty percent of participants were primarily students, 38.1% were primarily employed in full- or part-time work, and 6.5% were unemployed and job seeking. The majority of the sample were attracted only to men (55.4%), 1.3% were equally attracted to men and women, and the remainder were mainly attracted to men but somewhat attracted to women (43.2%).

After choosing their house, car, phone, and vacation, participants completed a manipulation check and a comprehension check. For the manipulation check, participants indicated their agreement with the statements "my group is poor" and "my group is rich" on a 7-point scale (1 = strongly disagree, 7 = strongly agree; ref. 11). Inequality was not correlated with the degree to which participants felt that their group was either rich or poor; r_s (302) ranged from -0.05 to -0.03 , $P_s > 0.349$, indicating that the manipulation did not change their feelings about their own group's wealth. After this, we again reminded participants of the income tiers in their society and contextualized the meaning of their society's 80:20 ratio. Participants then recalled the 80:20 ratio in their society, indicating how much more the very rich earned compared to the poor (range 1 to 7 in bins of 5, such that 1 = 1–5 times more and 7 = 30+ times more). As noted, all participants recalling the incorrect bin for their 80:20 ratio were disqualified (8.6%).

The parallel mediation model [Process version 2.16 Model 4; (31)] was generated with 10,000 bias-corrected bootstrapped samples adjusted for heteroskedastic SEs, and predictors were standardized for analysis. Indirect effects were significant if the 95% bias-corrected bootstrapped CIs for

indirect effects did not include zero (31). To test the effects of the income of the rich versus the poor on revealing clothing, we used structural equation modeling in AMOS version 24 because it allows the assessment of relations between latent constructs with multiple indicators, provides indices of goodness of fit, and controls for measurement error (32). Status anxiety was represented by a latent construct consisting of the 6 status questions, which were moderately and significantly correlated, $r_s = 0.30$ – 0.60 . Competitor derogation was represented by mean scores on the attractive, likely to hire, warm, intelligent, and quick-witted ratings of the 3 citizens from the competitor derogation task, which were moderately and significantly correlated, $r_s = 0.35$ – 0.67 . The desire to wear revealing clothing was represented by a latent construct consisting of participants' scores on the 5 revealing clothing questions ($r_s = 0.20$ – 0.69).

Bootstrapped SEs were used to account for nonnormal distributions, and models were estimated using maximum likelihood estimation. An inspection of modification indices showed that 3 revealing-clothing error terms substantially covaried (parameter changes ranged from 90.85 to 240.15), so we added these covariances to the model. Model fit was assessed using χ^2 /degrees of freedom < 3.0 , comparative fit index (CFI) ≥ 0.90 , and root-mean-square error of approximation ≤ 0.08 thresholds, and models that satisfied all thresholds were considered to provide an acceptable fit (32). Although the raw chi-squared statistic and significance was reported, it was not used for model fit due to its extreme sensitivity to sample size. Indirect effects were significant if the 95% bias-corrected bootstrapped CIs for the indirect effect did not include zero.

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