Adaptive Human Behavior and Physiology (2022) 8:461–488
https://doi.org/10.1007/s40750-022-00199-3

ORIGINAL ARTICLE

Two Routes to Status, One Route to Health: Trait Dominance and Prestige Differentially Associate with Self-reported Stress and Health in Two US University Populations

Erik L. Knight[1]

Received: 15 March 2022 / Revised: 25 July 2022 / Accepted: 1 August 2022 / Published online: 23 August 2022

Abstract

Objective Social status has been extensively linked to stress and health outcomes. However, two routes by which status can be earned – dominance and prestige – may not uniformly relate to lower stress and better health because of inherent behavioral and stress-exposure differences in these two routes.

Methods In one exploratory and two preregistered studies, participants (total N = 978) self-reported their trait dominance and prestige and self-reported several stress and health outcomes.

Results The meta-effects evident across the three studies indicate that higher trait dominance was associated with worse outcomes – higher stress, poorer physical and mental health, poorer behavioral health, poorer life satisfaction, higher negative affect (range of absolute values of non-zero correlations, $|r| = [0.074, 0.315]$, $ps < 0.021$) – and higher trait prestige was associated with better outcomes – lower stress, better physical and mental health, better behavioral health, better life satisfaction, higher positive and lower negative mood ($|r| = [0.134, 0.478]$, $ps < 0.001$). These effects remained evident (with few exceptions) after controlling for socioeconomic status, other status-relevant traits, or self-enhancing motives; associations with behavior relevant to the COVID19 pandemic generally were not robust.

Conclusions This work indicates that evolved traits related to the preferred route by which status is earned likely impact self-reported stress and health outcomes. Future research is necessary to examine physiological and other objective indicators of stress and health in more diverse populations.

Keywords Dominance · Prestige · Stress · Self-reported health · Affect

✉ Erik L. Knight
erik.knight@colorado.edu

[1] Department of Psychology and Neuroscience, University of Colorado Boulder, Muenzinger D244, 345 UCB, Boulder, CO 80309-0345, USA

Introduction

Social status has been extensively linked to stress and health outcomes: Having higher rank within a social hierarchy is linked to reduced stress exposure and increased control over the stressors experienced (Dohrenwend, 1973; Turner & Avison, 2003); better health behaviors (Nandi et al., 2014); better physical and mental health (Adler & Ostrove, 1999; Sapolsky, 2004, 2005); heightened well-being (Tan et al., 2020); and improved life expectancy (Gallo & Matthews, 2003; Imami et al., 2022). These differences occur in all societies, even those with access to universal healthcare (Adler et al., 1993). The subjective perception of one's own social status has also been linked to reduced stress and improved health, controlling for objective indicators like income or education (Adler et al., 1994).

The association of perceived status with stress and health – even among groups with access to universal healthcare – points to the critical role of the psychology of status in determining stress and health outcomes, rather than objective aspects of status *per se*. Seminal work by Sapolsky (1990, 1991) indicated that the physiological and health benefits of higher rank – in this case, endocrine stress responses in wild olive baboons – were actually correlates of a style of rank attainment, marked by social skill, affiliation, and having social control and outlets for frustration. This work also delineated other psychological facets of social hierarchies – specifically, the stability of a hierarchy and other social contextual factors – that contribute to inconsistent status-health relationships in primate hierarchies (Sapolsky, 2004, 2005). However, research on human hierarchies has generally lagged in examining traits that may influence or underly the link between social rank and outcomes related to stress and health.

Examining dominance and prestige, two routes by which social rank can be earned in human groups (Henrich & Gil-White, 2001), may provide insight on the evolved links between status and health in human hierarchies, due to how these routes differ in the reliance on more forceful versus more pro-social tendencies to earn social status. Dominance is defined by the use of force, fear, or intimidation to take high-status positions. Prestige relies on the free conferral of status to individuals deemed competent, cooperative, and who foster goodwill among group members. These two routes are not mutually exclusive – both dominance and prestige have been linked to earned rank in human groups (Cheng et al., 2021; McClanahan et al., 2021). Dominance and prestige likely evolved as complementary, alternative means of differentiating rank that reflect humans' reliance on both conflict-determined (dominance) and conferred (prestige) status (Cheng et al., 2013; Van Vugt & Smith, 2019). Two corresponding personality types – trait dominance and trait prestige – relate to the preference for the use of dominance or prestige to earn status within a group (Cheng et al., 2010).

One might expect trait dominance to be associated with increased stress and worse health based on several key features of the dominance construct. For example, trait dominance has been associated with heightened behavioral responses indicative of being more sensitive to socially-threatening stimuli (Case

& Maner, 2014; Mead & Maner, 2012). Trait dominance is also associated with hostility – a characteristic negative and oppositional attitude toward others with a tendency to inflict harm (Smith et al., 2004) – and hostility is a key affective state that predicts poor cardiovascular health (Miller et al., 1996; Siegman et al., 2000). Hence, having higher trait dominance is associated with heightened sensitivity to threat and may result in increased conflict with competitors and colleagues.

Several physiological aspects of trait dominance may also impact stress and health outcomes. Trait dominance is associated with heightened and unhabituating cardiovascular responses to stressors and other social interactions (Lee & Hughes, 2014; Newton & Bane, 2001). Trait dominance, when coupled with exogenously elevated testosterone levels, is also linked with heightened cortisol and negative affect responses to acute stress (Knight et al., 2017). This evidence of rapid and robust responses to stress suggests a physiological profile that evolved to provide relatively quick and sustained physiological responses to support trait dominant behaviors (i.e., related to hostility and aggression). However, over the course of a lifetime of increased exposure and heightened reactivity to stressors, this physiology that supports dominance behavior could contribute to allostatic load and longer-term health consequences.

An individual who is higher in trait prestige may instead rely on sociability and building social relationships to earn status (Cheng et al., 2010), and such psychosocial processes are linked to better health outcomes (Cacioppo & Hawkley, 2003; Cohen, 2004; Hawkley et al., 2008; Holt-Lunstad, 2021; Holt-Lunstad et al., 2017; Uchino et al., 1996). Since prestige-based status acquisition relies on free conferral from group members, trait prestige is less likely to be associated with the contentious, stressful contests associated with dominance. Further, prior evidence indicates that prestige (and not dominance) is associated with higher subjective well-being and that experimentally-induced downward comparisons of one's prestige increased subjective well-being compared to upward comparisons in an online task (Anderson et al., 2012)[1].

However, a strong theoretical connection between trait prestige and health is hampered by a lack of work examining physiological correlates of prestige. In one experiment, trait prestige, on its own or in an interaction with exogenous testosterone, did not predict cortisol responses to social evaluative stress in men, although trait prestige did correlate with reduced negative affect in this experiment[2] (Knight et al., 2017). Considering other physiological systems, some theorizing suggests the evolution of the parasympathetic nervous system may have been critical for the development of socially-binding behaviors inherent to human prestige hierarchies,

[1] In this prior work, the authors investigated "sociometric status," which, when defined as respect and admiration within one's group, is a good proxy for prestige.

[2] In Knight and colleagues' (Knight et al., 2017) publication, an interaction between trait prestige and a quadratic effect of time on negative affect was evident in a model that contained higher-order interactions with testosterone treatment and with a random linear effect of time. In follow-up analyses performed after the initial publication, the strength of this effect depended on how it was modeled, suggesting the effect was not robust. The simple association of trait prestige with lower negative affect (i.e., controlling for the effects of time, however modeled) was always evident and robust in these analyses.

such as social engagement and emotional and behavioral regulation (Lenfesty & Morgan, 2019; Porges, 2001, 2007). Robust parasympathetic nervous system activity has, in turn, been associated with extensive health benefits (Kemp & Quintana, 2013; O'Connor et al., 2021; Thayer et al., 2012; Williams et al., 2019). Further, anthropological work indicates that maintaining a prestigious position within a hunter-gatherer group (e.g., holding niche knowledge on hunting grounds) confers health benefits (Sugiyama & Sugiyama, 2003). In combination with evidence of the pro-sociality of trait prestige, this work hints at a possible relationship between trait prestige and better health outcomes.

In sum, prior research suggests social status predicts stress and health outcomes, but the routes by which status is earned could be linked to stress and health outcomes as well. As a first step in examining these routes and their potential relation to stress and health outcomes, the present study examined the differential associations of trait dominance and trait prestige with an array of self-reported stress and health outcomes across one exploratory and two confirmatory samples. By examining status-stress and status-health associations across the multiple routes by which social status can be earned, this work can inform and improve theoretical frameworks linking social status to stress and health. Any evidence that integrates individual differences and social context factors may stimulate the critical work needed to understand and perhaps improve individual health outcomes across societal hierarchies.

Method

This study's approach consisted of a cross-sectional, self-report design across three studies. Initially, an exploratory study (Study 1) was conducted that included examination of relationships between trait dominance and prestige and outcomes related to stress and health. Study 1 also consisted of exploratory follow-up analyses exploring other dominance- and status-relevant self-report measures as potentially confounding covariates. This exploratory phase was followed by a pre-registered study (Study 2) that attempted to replicate the exploratory phase findings related to stress and health outcomes and included a pre-registered exploration of trait self-enhancement as a possible explanation for trait prestige's links with stress and health. A third pre-registered study (Study 3) then attempted to replicate and extend the findings to attitudes and behaviors relevant to a global pandemic. Since the main goal of this report is to examine stress and health relationships with trait dominance and prestige, the principal results reported are the meta-analyses across all three studies rather than individual, study-specific results in a fashion that corresponds to this study timeline. Equivalence testing is used to provide insights on study-by-study similarities and differences and individual study results are reported in supplemental tables.

Self-reported stress and health outcomes were examined due to their ease of collection and because prior work has demonstrated strong associations between self-reports and biomarkers of physical health across age groups (Bauldry et al., 2012; Idler & Benyamini, 1997; Lekander et al., 2004; Okun & George, 1984; Tomten & Høstmark, 2007; Undén et al., 2007; Wasylkiw & Fekken, 2002). The order of presentation of

Table 1 Descriptive statistics [mean (SD) or percent of study sample] of key variables

	Study 1 (n = 181)	Study 2 (n = 509)	Study 3 (n = 288)
Age	21.19 (2.94)	19.73 (1.53)	19.80 (2.16)
Gender (% Female)	64.1	69.5	64.6
Ethnicity (% POC)	35.4	35.2	36.1
Trait Dominance	3.46 (1.04)	3.29 (0.97)	3.26 (1.04)
Trait Prestige	5.02 (0.81)	5.00 (0.81)	5.19 (0.79)
Perceived Stress Scale (PSS)	1.94 (0.59)	1.91 (0.64)	1.98 (0.67)
SF36 – Physical*	-0.007 (1.55)	-0.000 (1.84)	-0.000 (1.43)
SF36 – Mental*	-0.006 (2.65)	-0.000 (2.34)	-0.000 (2.46)
SF35 – Change in health	55.86 (24.13)	57.20 (24.62)	60.31 (25.19)
Lifestyles and Habits Questionnaire – Brief (total score)*	-0.002 (0.58)	0.000 (0.57)	0.000 (0.57)
MIDUS – Health*	0.001 (0.70)	-0.000 (0.70)	-0.000 (0.68)
MIDUS – Life Satisfaction*	-0.001 (0.71)	0.000 (0.71)	0.000 (0.70)
MIDUS – Comparison	3.12 (1.07)	3.79 (0.61)	3.69 (0.82)
MIDUS – Control	5.50 (0.86)	5.56 (0.77)	5.57 (0.72)
MIDUS – Symptoms	2.44 (0.90)	2.43 (0.87)	--
MIDUS – Sleep	2.77 (0.86)	2.87 (0.84)	--
Positive Affect	2.11 (0.70)	3.21 (0.71)	2.54 (0.87)
Negative Affect	1.52 (0.58)	2.28 (0.76)	1.80 (0.75)

Note: *These measures consist of composites of z-scored items (normalized within study) and, as such, are expected to have mean values at or near zero. See "Method" Section for individual survey details and citations

the online questionnaires was randomized. All data, materials, and pre-registrations are available on the Open Science Framework (https://osf.io/xc8h3/).

Participants

Participants consisted of university students from the human research pools of two universities who provided informed consent and then completed a series of online questionnaires for class credit. Across all studies, a total of N = 1032 participants completed the study. In Study 1, n = 40 participants completed a version of the survey that was missing all demographic questionnaires (i.e., age, sex, and race/ethnicity). An additional n = 14 had sporadically missing data across all three studies. Hence, this left a total sample size with usable data of N = 978 (67.1% women, 35.4% people of color; see Table 1 for demographics and descriptive statistics of all measures in each study).

Measures

Dominance and Prestige Scale

Trait dominance and prestige was determined from the Dominance and Prestige Scale (Cheng et al., 2013). This scale consists of 17 items that measure the extent

to which an individual obtains social status via force, fear, and intimidation (e.g., "I try to control others rather than permit them to control me." Cronbach's $\alpha = 0.804$) versus appearing competent, using adept social skills, or via respect (e.g., "Members of my peer group respect and admire me." Cronbach's $\alpha = 0.807$) on a scale from 1 (not at all) to 7 (very much).

Self-reported Stress and Health Outcomes

Perceived Stress Scale The Perceived Stress Scale was used to gauge participant's stress experienced in the past month. Participants responded to ten questions (e.g., "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?") on a 0 (never) to 4 (very often) scale, which was averaged into a single score (Cronbach's $\alpha = 0.853$).

SF-36 The SF36 is a standardized, self-report measure of physical and mental health. The measure's 35 questions produce eight subscales (a 36th question relates to change in health and is not included in a subscale) that can be aggregated into a summary physical health (subscales: physical functioning[3], role limitations due to physical health, bodily pain, and general health) and mental health (subscales: vitality, social functioning, role limitations due to emotional problems, emotional well-being) component summary scores. The physical and mental health component summary scores (PCS and MCS, respectively) were calculated as follows: A factor analysis of the eight subscale scores with oblique ("promax") rotation[4] produced estimated weights for two factors. The estimated weights for each factor were multiplied by the z-score for each of the eight subscales and summed to produce the PCS and MCS for each participant (Farivar et al., 2007). See Table S1 for factor loadings.

Health and Life Satisfaction Items from the Midlife in the United States Study Several self-reported health and well-being items found in the Midlife in the United States (MIDUS) study were used in the present study (Radler & Barry, 2014; Turiano et al., 2012). These items included individual questions related to the participant's past, present, and future health and life satisfaction on a 0 (worst possible health/life) to 10 (best possible health/life); how much control the participant feels they have over their health and their life on a 0 (no control at all) to 10 (very much control) scale; and how much thought and effort they put into their health and life on a 0 (no thought or effort) to 10 (very much thought and effort) scale. The responses to these sets of questions were averaged into separate indices of overall self-reported health (Cronbach's $\alpha = 0.762$) and life satisfaction (Cronbach's $\alpha = 0.722$).

[3] In Study 3, the physical functioning checklist was unintentionally left out of the survey. Due to this missingness, factor loadings from Study 1 were used to calculate the SF36 physical and mental composites in Study 3.

[4] The original manual for the SF36 recommended orthogonal rotation (Ware & Gandek, 1994). However, physical and mental health are correlated and later work recommended an oblique rotation to allow the factors to correlate (Farivar et al., 2007).

The present study also included MIDUS' self-reported comparison of the participants' overall health, memory, vision, and hearing to other people their own age on a 1 (excellent) to 5 (poor) scale. Values were reverse coded so that higher values indicated better health compared to peers and were averaged into a single measure of relative health (Cronbach's $\alpha = 0.719$).

Participants were also asked to report their sense of control over their health across six items (e.g., "Keeping healthy depends on things that I can do.") rated on a 1 (agree strongly) to 7 (disagree strongly) scale. These values were reverse-coded so that higher values indicated greater control over one's health and averaged into a single measure (Cronbach's $\alpha = 0.592$).

Participants self-reported the extent to which they experienced a list of physical symptoms (e.g., headaches, backaches, pain or aches in the extremities, etc.) in the past 30 days on a 1 (not at all) to 6 (almost every day) scale. The average response across all items was calculated (Cronbach's $\alpha = 0.813$).

Finally, participants responded to four questions related to how often they experience sleep problems (e.g., "have trouble falling asleep"). These questions were answered on a 1 [never (0 times)] to 5 [almost always (4 or more times per week)] scale and were averaged into a single item (Cronbach's $\alpha = 0.732$).

Lifestyles and Habits Questionnaire – Brief The Lifestyles and Habits Questionnaire - Brief (LHQB) is a survey developed to examine self-reported physical, mental, and behavioral health in a young adult population (Dinzeo et al., 2014). The questionnaire consists of 42 statements across 8 subscales (exercise and physical health; psychological health; substance use; nutritional health; environmental health; social health; accident prevention; sense of purpose), answered on a scale from 1 (strongly disagree) to 5 (strongly agree). For the purposes of reducing multiple tests in this study, each mean subscale score was averaged into a single measure of young-adult health (mean subscale scores, Cronbach's $\alpha = 0.708$; see Supplemental Materials for analyses of individual subscales).

Positive and Negative Affect Affect has been extensively linked to health outcomes, with higher positive affect and lower negative affect each independently predicting better health outcomes (Blazer & Hybels, 2004; Ostir et al., 2000, 2001; Steptoe et al., 2009). Participants reported their current positive and negative affect via the Positive and Negative Affect Schedule - Extended form. The general negative (Cronbach's $\alpha = 0.928$) and general positive subscales (Cronbach's $\alpha = 0.909$) consist of ten items each on a 1 (very slightly or not at all) to 5 (extremely) scale. The hostility subscale, encompassing six items (Cronbach's $\alpha = 0.857$), was also explored because of its association with trait dominance and negative health outcomes.

COVID-19 Measures Study 3 aimed to replicate the initial effects evident in Studies 1 and 2 and, in pre-registered exploratory analyses, extend the findings to health behaviors relevant to the COVID-19 pandemic. Whereas the self-reported stress and health measures mostly deal in generalities, the COVID-19 questions were specific to the participant's behavior during the global pandemic (specifically, in Fall 2020).

Hence, Study 3 provided an opportunity to examine the association of trait dominance and prestige with specific health behaviors and attitudes with known consequences for morbidity.

COVID-19 specific attitudes and behaviors were measured using the surveys developed for the Understanding COVID-19 in America study (Kapteyn et al., 2020). This set of questions consisted of a set of yes/no responses to a checklist of risky and preventative behaviors; ratings of how effective and how safe certain behaviors were (e.g., how effective is wearing a mask, how safe is attending a gathering of 100 people); whether an individual had been exposed to or developed COVID-19; and the self-reported percent likelihood that an individual felt they would develop COVID-19. Indices of effectiveness (Cronbach's $\alpha = 0.799$) and safeness (Cronbach's $\alpha = 0.801$) were calculated by averaging individual ratings. Per previous approaches (Kim & Crimmins, 2020), sets of the most preventative and riskiest behaviors within the set of full questions were examined. Pre-registered hypotheses included an expectation that trait prestige would relate to better health behaviors during the pandemic (e.g., stronger ratings of effectiveness of prophylactic measures) and an exploratory aim of examining the association of trait prestige and dominance with self-reported COVID19 morbidity without an *a priori* hypothesis of direction of effect.

Covariates

Principal Covariates All models contained participant's age, gender (0 = woman; 1 = man), and race/ethnicity (1 = person of color, 0 = white) as covariates. These variables were chosen due to their relevance to stress and health.

Exploratory Covariates

In specific follow-up models, sets of exploratory variables were added to control for and attempt to rule out confounding concepts or alternative explanations. These groups of conceptually related variables were chosen for reasons described below.

Objective and Subjective Indices of Socioeconomic Status Prior work linking social status to stress and health has mostly relied on objective and subjective indices of socioeconomic status. Similar measures were included here to examine links between dominance, prestige, stress, and health, controlling for these previously known associations with socioeconomic status. To index objective socioeconomic status, participants self-reported their mother's education (chosen to match prior work that has traditionally ignored paternal education) on a scale from 1 (some high school or less) to 7 (Ph.D. or professional degree) and their mother and father's annual income on a roughly logarithmic scale. Participants also responded to two versions of the MacArthur ladder scale of subjective socioeconomic status (Adler et al., 1994). In one version, participants reported their position on the ladder in relation to the United States and, in the other, participants reported their position in relation to their community. Scores on each ladder scale were mean averaged into a single value.

Other Status-Relevant Traits The Dominance and Prestige scale was the principal scale of interest due its ability to capture the two, evolved routes by which status can be earned in human groups. However, other scales exist that measure traits relevant to earning status. Two scales were included as covariates to explore the specificity of any stress and health outcomes to dominance and prestige. The Sense of Power (SOP) scale measures the feeling of possessing the ability to control outcomes in one's social relationships (Anderson et al., 2012a). The scale consists of ten items (e.g., "In my relationships with others… I think I have a great deal of power.") answered on a 1 (disagree strongly) to 7 (agree strongly) scale (Cronbach's $\alpha = 0.836$). The Personality Research Form (PRF) Dominance scale (Jackson, 1984) consists of sixteen true or false questions (Cronbach's $\alpha = 0.807$) that infer dominance by estimating one's desire to hold high-ranking, powerful positions (e.g., "I would like to be a judge.") and one's ability to lead and sway others (e.g., "I am quite effective in getting others to agree with me.").

Self-enhancement (Study 2) The prestige route to status depends on conferral of respect from group members for an individual being competent and well-liked (Cheng et al., 2013). Individuals who are more motivated to seek positive appraisals from others (i.e., individuals high in trait prestige) may also respond to questionnaires in a desirable rather than accurate manner. Using data from Study 2, links between dominance, prestige, stress, and health were examined while covarying for self-reported, self-enhancing tendencies.

Self-enhancing tendencies were indexed in Study 2 via two measures: The Balanced Inventory of Desired Responding (BIDR; (Paulhus, 1984) and the Health Behavior Self-Enhancement scale (HBSE; (Christian, 2017). The BIDR consists of twenty questions on a scale from 1 (not true) to 7 (very true) that relate to some common self-focused attributes (e.g., "My first impressions of people usually turn out to be right."). For the purposes of exploring self-enhancement within these models, the total score calculated from the mean averaged across all items was examined (Cronbach's $\alpha = 0.810$).

The HBSE consists of a list of six healthy and six unhealthy foods and supplements (e.g., "Vitamin C" and "fried foods"). Participants reported how often they consumed these items compared to an average person of their same age and gender on a scale from -5 (very much less) to $+5$ (very much more). The responses to unhealthy items were recoded so that higher values indicated much less usage of the item. Higher scores were then taken to indicate higher levels of self-enhancement related to these health behaviors. All responses were mean averaged to form a single scale (Cronbach's $\alpha = 0.796$).

Analyses

The main approach for analyzing the data in each study was to construct linear regression models with a given self-reported stress or health outcome regressed on trait dominance, trait prestige, and the covariates age, gender, and race/ethnicity.

For example, a model examining the effects of dominance and prestige on perceived stress was constructed as follows:

$$PSS_i = b_0 + b_1 Dominance_i + b_2 Prestige_i + b_3 Age_i + b_4 Gender_i + b_5 Race_i + e_i \quad (1)$$

All variables (with the exception of gender and race/ethnicity) were z-score normalized within each study.

Meta-Analyses

Because the approach was equivalent across studies (i.e., using the same questionnaires), the principal results reported are meta-analyses of each individual regression model across the three studies. To examine the meta-effects, individual regression coefficients for the effects of trait dominance and trait prestige were extracted, converted to Pearson's *r* correlations, and then to Fisher's Z. Restricted maximum-likelihood meta-analyses with random effects by study were run for each set of Fisher Z coefficients linking trait dominance or trait prestige to a stress and health outcome. A 95% confidence interval (95%CI) that does not contain zero was considered evidence that a meta-effect was non-zero. Reported results were converted back to Pearson's *r* for ease of interpretation.

Equivalence Testing

To examine the replicability of the results from the exploratory to the confirmatory phase, equivalence testing was performed for the associations between trait dominance or prestige and each of the stress or health outcomes using Anderson and Hauck's (1983) approach for regression coefficients. This approach produces a single p-value, which indicates whether two regression coefficients can be considered statistically equivalent within some determined effect size (Counsell & Cribbie, 2015). Specifically, if a given association in Study 2 was found to be within a small-moderate effect size ($\delta = 0.5$) of the same association found in Study 1, the effect was deemed equivalent. For Study 3, the equivalent testing comparison was made between effects found in Study 3 data and the effects evident from all available, prior data (i.e., the effects evident when using data collected in Study 1 and Study 2).

Exploratory Covariates

In exploratory follow-up analyses, covariates were added – that is, SES and other status-relevant traits in Study 1 and self-enhancement in Study 2 – to examine the effects of trait dominance and prestige, controlling for these other relevant constructs. Each set of covariates (i.e., SES, the status-relevant traits, or the self-enhancement variables) was added simultaneously for each given model. For example, the model exploring the association of trait dominance and prestige with perceived stress while controlling for other status-relevant traits was constructed as follows:

$$\begin{aligned} PSS_i = {} & b_0 + b_1 Dominance_i + b_2 Prestige_i + b_3 Age_i \\ & + b_4 Gender_i + b_5 Race_i + b_6 SOP_i + b_7 PRF_i + e_i \end{aligned} \quad (2)$$

Results are reported with a focus on the difference in strength and significance of the result with and without controlling for the exploratory covariates.

Moderation by Gender

In post-hoc analyses, gender was explored as a moderator of the effects of dominance and prestige on each of the stress and health outcomes. Prior work indicates that the criteria for earning social status differ for men and women, with evidence suggesting men tend to rely on and be rewarded for behaviors related to dominance more so than women do (Buss et al., 2020; Hays, 2013). It is unclear if this gender difference impacts dominance and prestige's associations with stress and health. Thus, moderation by gender was explored via meta-analyses with all available data to maximize power. Each outcome variable was regressed on the interactions of gender with trait dominance and prestige and the main effects of age and race/ethnicity as covariates. The meta-analyses were run as described previously but relied on extracting the coefficients representing the interaction terms.

Multiple Comparisons Correction

To correct for multiple comparisons, the Benjamini-Hochberg false discovery rate (FDR) correction was applied to each study's set of principal results. Specifically, tests linking trait dominance and trait prestige to the array of stress- and health-relevant variables within a study were included in three sets of FDR correction. A conservative cutoff of $q < 0.05$ was taken as evidence of a non-zero effect when considering the multiple tests performed within each study. Because the principal analyses are focused on the meta-effects, the FDR correction results for each study are reported in the supplemental materials (Table S23).

Results

The results are organized by first reporting the meta-effects across the three studies. Next, the equivalence testing is reported, followed by the exploratory covariate analyses related to socioeconomic status and other status-relevant traits (Study 1), and then exploratory covariate analyses related to self-enhancement (Study 2). The COVID-specific outcomes are then reported (Study 3), followed by *post-hoc* exploratory analyses of moderation by gender.

Meta-Effects of Trait Dominance and Prestige

Self-Reported Stress

Based on meta-analyses of linear regression models that controlled for age, sex, and race/ethnicity, trait prestige was negatively associated with perceived stress (Pearson's $r = 0.299$, 95%CI[-0.374, -0.221], $p < 0.001$) while trait dominance was positively associated with perceived stress ($r = 0.126$, [0.054, 0.196], $p < 0.001$; Fig. 1; see Table S2 for models from each individual study).

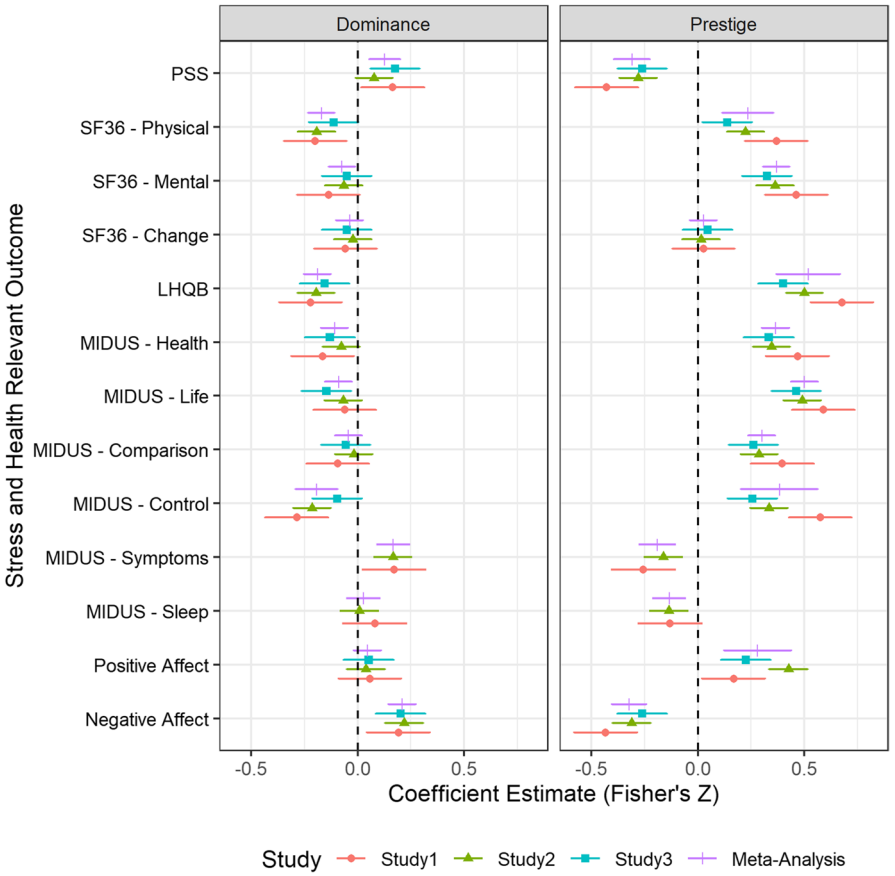

Fig. 1 The effects of trait dominance and prestige on self-reported stress and health outcomes. Note: Effects plotted here are Fisher's z; results reported in text are converted to Pearson's *r*. PSS = Perceived Stress Scale; LHQB = Lifestyles and Habits Questionnaire – Brief

Self-Reported Health

SF-36 Examining the physical and mental health composites from the SF-36, trait prestige was linked with better physical ($r=0.232$, [0.115, 0.342], $p<0.001$) and mental health ($r=0.353$, [0.297, 0.407], $p<0.001$), controlling for sex, age, and race/ethnicity (Tables S3 and S4). In the same models, trait dominance was significantly linked with poorer physical health ($r = -0.168$, [-0.229, -0.107], $p<0.001$) and poorer mental health ($r = -0.074$, [-0.136, -0.011], $p=0.021$). Neither trait dominance ($r=0.037$, [-0.100, 0.025], $p=0.243$) nor prestige ($r=0.026$, [-0.037, 0.089], $p=0.414$) were associated with self-reported change in health (for better or worse) in the past year (Table S5).

MIDUS Questionnaires The health and life questionnaires from the MIDUS study revealed similar patterns as the SF-36: Higher trait prestige was associated with

better self-reported physical health (r = 0.350, [0.293, 0.404], p < 0.001), higher life satisfaction (r = 0.463, [0.412, 0.511], p < 0.001), better health compared to others (r = 0.292, [0.233, 0.348], p < 0.001), lower symptoms reported (r = -0.187, [-0.266, -0.107], p < 0.001), fewer sleep problems (r = -0.134, [-0.206, -0.059], p < 0.001), and greater reported control over one's health (r = 0.365, [0.200, 0.511], p < 0.001; Tables S6-S11). Trait dominance was associated with poorer physical health (r = -0.109, [-0.170, -0.046], p < 0.001), poorer life satisfaction (r = -0.089, [-0.151, -0.027], p = 0.005), more symptoms reported (r = 0.166, [0.092, 0.237], p < 0.001), and less control over one's health (r = -0.191, [-0.285, -0.094], p < 0.001); trait dominance was not associated comparative health (r = -0.044, [-0.106, 0.019], p = 0.174) or sleep problems (r = 0.027, [-0.048, 0.102], p = 0.474).

LHQB Similar patterns were evident when health was measured via the young-adult-focused health measures (Table S12). Specifically, after controlling for sex, age, and race/ethnicity, trait prestige was associated with better young-adult health (r=0.478, [0.355, 0.584], p<0.001) and trait dominance was associated with poorer young-adult health (r=0.478, [0.355, 0.584], p<0.001).

Affect Trait prestige was associated with higher positive affect (r=0.273, [0.123, 0.412], p<0.001) and lower negative affect (r = -0.312, [-0.382, -0.238], p<0.001), controlling for sex, age, and race/ethnicity (Tables S13-S14). In the same models, trait dominance was not significantly associated with positive affect (r=0.046, [-0.018, 0.110], p=0.157) and was associated with higher negative affect (r=0.205, [0.143, 0.266], p<0.001). Given prior associations of trait dominance with hostility and hostility with health, follow-up exploratory analyses focused on self-reported hostility. In these follow-up analyses, trait prestige was associated with lower hostility (r = -0.299, [-0.356, -0.240], p<0.001) and trait dominance was associated with higher hostility (r=0.315, [0.256, 0.371], p<0.001).

Equivalence Testing

Given that data collection occurred across three studies (one exploratory and two pre-registered, confirmatory studies), it is important to determine whether the effects could be considered equivalent across studies. Further, despite robust meta-effects evident, some heterogeneity was also evident in the significance of the effects across the three studies (see supplemental tables).

Study 2 (First Confirmatory Study) vs. Study 1

Equivalence testing of the regression coefficients (Anderson & Hauck, 1983; Counsell & Cribbie, 2015) revealed that the effects evident in Study #2 were statistically equivalent for links between trait prestige and SF36 mental health and change in health; the MIDUS health, life, physical symptoms, and sleep questionnaires; the LHQB measures of young-adult health, and trait negative affect [i.e., just over half

Table 2 Equivalence testing results

	Dominance		Prestige	
	Study 2 vs. Study 1	Study 3 vs. Studies 1 and 2	Study 2 vs. Study 1	Study 3 vs. Studies 1 and 2
Perceived Stress Scale	**0.049**	**0.036**	0.079	**0.037**
SF36 – Physical Health	**0.003**	**0.042**	0.060	0.062
SF36 – Mental Health	**0.036**	**0.016**	**0.040**	**0.032**
SF36 – Change in Health	**0.019**	**0.010**	**0.006**	**0.014**
Lifestyles and Habits Questionnaire – Brief (total score)	**0.001**	**0.012**	**0.031**	**0.037**
MIDUS – Health	**0.031**	**0.008**	**0.039**	**0.019**
MIDUS – Life	**0.004**	**0.027**	**0.026**	**0.022**
MIDUS – Comparison	**0.041**	**0.007**	0.056	**0.028**
MIDUS – Control	**0.022**	0.067	0.092	0.064
MIDUS – Symptoms	**0.001**		**0.043**	
MIDUS – Sleep	**0.040**		**0.005**	
Positive Affect	**0.012**	**0.005**	0.133	0.063
Negative Affect	**0.017**	**0.007**	0.053	**0.044**

Note: This table reports results from the Anderson and Hauck (1983) method of equivalence testing. The values reported are essentially *p* values, akin to those used in the null hypothesis significance testing framework. A *p* value less than .05 (in bold) indicates that the two effects being tested can be considered equivalent within a moderate effect size ($\delta = 0.5$)

(54%) of effects tested; Table 2]. The remaining effects – perceived stress, SF36 physical health, and trait positive affect – could not be considered statistically equivalent, despite matching the direction and statistical significance of the exploratory effects. This degree of inequivalence might be reasonable given the difference in sample size: The Study 1 exploratory phase was a smaller sample and more susceptible to inflation of effect size. Indeed, Study 2's effects were all smaller than Study 1, with the exception of trait positive affect, which was larger in Study 2. All tests associating trait dominance with self-reported stress and health outcomes were statistically equivalent between Studies 1 and 2.

Study 3 (Second Confirmatory Study) vs. Studies 1 and 2

The effects evident in Study 3 were statistically equivalent to effects from models based on the entirety of data available from Studies 1 and 2, with the exceptions of trait prestige's association with SF36 physical health (but see footnote about missing data in this study), the MIDUS sense of control over one's health, and with the exceptions of trait dominance's association with the MIDUS sense of control over one's health (i.e., 73% of prestige effects and 91% of dominance effects tested were equivalent). In each of these exceptions, the effect evident in Study 3 was in the same direction as the effects evident in the combined data of Studies 1 and 2 and, for the exceptions related to trait prestige, were statistically significant in all studies.

In sum, meta-analyses revealed evidence of robust associations of trait dominance and prestige with self-reported stress and health. These meta-analyses revealed weaker effects for trait dominance (range of absolute values of significant Pearson's r correlations = [0.074, 0.314]; see also Fig. 1 and supplemental materials for evidence of sporadic non-significant effects in smaller samples within a given study) compared to trait prestige (|*r*| = [0.134, 0.478]). Using equivalence testing, a majority of statistical effects (79%) were found to be equivalent between studies. Further, the associations of trait dominance and prestige with stress and health outcomes demonstrated a pattern of similar direction and statistical significance between the exploratory (Study 1) and confirmatory phases (Studies 2 and 3).

Exploratory Covariate Analyses

Objective and Subjective Socioeconomic Status (SES)

In Study 1, several covariates were explored to examine the specificity of the hypothesized associations of trait dominance and prestige with stress and health. Hence, models were re-run that included other, traditional measures of objective (mother's education, family income) and subjective socioeconomic status (the MacArthur ladder scales for community and US). Including these measures did not meaningfully impact the results or interpretations of the initial findings of trait prestige's positive associations with stress- and health-relevant outcomes (e.g., a median 3.3% change in effect size across all effects examined) and trait dominance being negatively associated (or unassociated in Study 1) with health-relevant outcomes (a median 1.0% change in effect size; Table S15).

Other Status-Relevant Traits

An initial check of correlations among the status-relevant trait surveys in Study 1 revealed evidence that the SOP scale was more strongly correlated to trait prestige ($r = 0.633$, $p < 0.001$) than dominance ($r = 0.259$, $p < 0.001$) and that the PRF Dominance scale was more strongly correlated with trait dominance ($r = 0.539$, $p < 0.001$) than prestige ($r = 0.346$, $p < 0.001$; see supplemental materials, Fig. S4). The strong prestige-SOP correlation is in line with prior work (Anderson et al., 2012).

The positive association between trait prestige and positive affect (B = 0.178, [0.002, 0.359], t(173) = 1.941, p = 0.054) and the negative association between trait dominance and negative affect (B = 0.133, [-0.024, 0.290], t(173) = 1.659, p = 0.099) were rendered non-significant by the inclusion of SOP and PRF in Study 1's data. Otherwise, entering SOP and PRF as covariates did not substantially alter the interpretations of the associations of trait dominance (e.g., median 2.2% change in effect size) and prestige (median 1.8% change in effect size) with stress and health outcomes (Table S16).

Self-Enhancement

In pre-registered exploratory analyses, Study 2 focused on self-enhancement as a possible explanation for the patterns of results evident in Study 1. Hence, two

measures of self-enhancement were included in models with trait dominance and prestige, as well as sex, age, and race/ethnicity. Models that included the self-enhancement measures as covariates revealed slightly weaker (e.g., approximately a 6% reduction in effect sizes) but still statistically significant relationships between trait prestige and lower stress, better health, higher positive affect, and lower negative affect (Table S17). This suggests that self-enhancement may only partially account for the relationship between trait prestige and self-reported health-relevant outcomes; direct associations between trait prestige and health are still evident after controlling for self-enhancement motives (see Supplemental Results for additional mediation analyses).

Study 3: Replication and Extension to COVID-relevant Health Behaviors

Study 3 aimed to replicate the initial effects evident in waves 1 and 2 and extend the findings to health behaviors relevant to the COVID-19 pandemic. Whereas the self-reported stress and health measures mostly deal in generalities (e.g., "I avoid binge drinking" in the LHQB or "In general, would you say your health is…" in the SF36), the COVID-19 questions were specific to the participant's behavior during the global pandemic (specifically, Fall 2020). Hence, Study 3 provides an opportunity to examine cross-sectional associations of trait dominance and prestige with specific health behaviors and attitudes with known consequences for morbidity.

Full results for the COVID19-relevant behaviors are reported in the supplemental materials. Overall, trait dominance and prestige were mostly unrelated to self-reported behaviors and perceptions relevant to the global pandemic (Table S18-S19). Higher trait dominance was significantly associated with higher mean ratings of the safety of pandemic-relevant behaviors (B = 0.052, [0.006, 0.097], t(281) = 2.235, $p = 0.026$, $p_{FDR} = 0.105$), such as the relative safety of attending a gathering of 100 or more people. This effect does not survive FDR correction, suggesting the effect may not be robust. Neither trait dominance nor prestige were associated with self-reported COVID19 exposure, worry about or the self-reported likelihood of contracting the disease, or self-reported COVID19 morbidity (i.e., either a positive test or a medical diagnosis with no test; Tables S20-S21).

Moderation by Gender

Although not pre-registered, gender was explored as a moderator of the effects of dominance and prestige on each of the stress and health outcomes using a meta-analytic approach to maximize power. Results indicate few, if any, robust moderating effects of gender (Table S22). There was weak meta-analytic evidence that gender moderated the association of trait dominance and prestige on the MIDUS measure related to sense of control over one's health. In each case, the associations of trait dominance and prestige were somewhat blunted for women compared to men. However, these were the only two non-zero results out of twenty-eight meta-analyses tested. Hence, the overall interpretation of these results is a lack of robust moderation by gender on the associations between trait dominance and prestige with stress and health.

Supplemental Results

Analyses reported in the Supplemental Results include factor loadings for the SF-36 survey (Table S1); full mediation models for self-enhancement as mediator; alternative analyses with the original, pre-registered sample size in Study 2 (Fig. S1); analyses of individual facets of the LHQ-B (i.e., the young adult health questionnaire subscales; Fig. S2); p-values FDR-corrected for multiple comparisons within each study (Table S23); and tables for each regression model in each study.

Discussion

This report examined trait dominance and prestige – traits indicative of preference for two routes by which status is earned – and their association with self-reported stress and health. In wide ranging work, higher social status has been associated with reduced stress and better health (Adler et al., 1994; Adler & Ostrove, 1999; Dohrenwend, 1973; Gallo & Matthews, 2003; Sapolsky, 2004, 2005; Tan et al., 2020; Turner & Avison, 2003). The present results suggest these health benefits of social status may be more evident for individuals who rely on prestige to earn status, and not dominance. Indeed, relatively smaller, negative impacts on self-reported stress and health were consistently observed among individuals higher in trait dominance using a meta-analytic approach. These associations of trait dominance and prestige with self-reported stress and health were evident even when controlling for socioeconomic status indicators, other status-relevant traits, and one possible psychological explanation, self-enhancement motives.

Despite the strong associations of trait dominance and prestige with self-reported stress and health, the results linking trait dominance and prestige to specific health behaviors relevant to a global pandemic were not robust. As such, it remains unclear if trait dominance and prestige may impact health behaviors relevant to communicable disease. A limiting factor in this aspect of the present study was its cross-sectional design and reliance on self-reported prevalence. Future work could improve on these findings by examining medically-determined disease incidence in a sample over time.

This work follows from a broad literature linking personality traits to health outcomes (Smith, 2006), as well as work examining personality traits relevant to the concepts of dominance and prestige. For example, the so-called Type A and Type D personality types share a focus on aggressive tendencies and negative affect (respectively) with trait dominance and each has been linked to poor cardiovascular health (Denollet, 2005; Friedman & Rosenman, 1959). Later work showed Type A personality was primarily linked to negative health outcomes via its association with hostility (Miller et al., 1996; Smith et al., 2004). Another personality concept, the interpersonal circumplex, organizes personality along the orthogonal concepts of agency (desiring individuation, power) and affiliation or communion (desiring connectedness, friendliness; Gurtman, 2009). The concepts of agency and affiliation somewhat overlap with dominance and prestige, respectively, and have been associated

with health outcomes (Gallo & Smith, 1998; Smith et al., 2010). Other traits that are relevant to trait dominance and prestige and that may explain stress and health outcomes include narcissism and self-esteem (Cheng et al., 2010; Johnson et al., 2012). However, Types A and D, the interpersonal circumplex, and other traits lack the explicit links to social status and social hierarchies evident in the concepts of trait dominance and prestige. Uniting relevant theory from the personality and social status fields may provide new insights on the links between the individual, their place in the social hierarchy, and health.

Possible Mechanisms

Physiological Mechanisms

Physiological research focused on dominance provides one possible explanation for the associations of trait dominance with poorer health. Trait dominance has been linked to heightened vascular constriction [indexed by total peripheral resistance (TPR)] in response to social threat, a response that does not tend to habituate to subsequent stress exposure (Lee & Hughes, 2014). Higher TPR increases blood pressure and is linked to risk of cardiovascular events and mortality in healthy and hypertensive populations (Fagard et al., 1996; Mensah et al., 1993). Within a laboratory setting, individuals who are high in trait dominance also demonstrated an exaggerated cardiovascular response to incongruencies between expected and actual status positions (Gramer & Schön, 2015). The links between trait dominance and physiology mirror evidence of heightened physiological responses among dominant, wild primates, who show heightened cardiovascular reactivity to sympathetic stimulation (Sapolsky & Share, 1994). Critically, these non-human primate associations between dominance and physiology may exist, in part, because of personality traits that underlie dominance rank in non-human primate hierarchies (Sapolsky, 1990, 1991). These physiological responses likely evolved to provide robust, sustained reactions to stress or threat. Such threat reactions provide metabolic energy needed to fight at the expense of increased allostatic wear and tear over longer term, repeated activations (McEwen & Gianaros, 2010).

The seeming benefits of trait prestige for stress and health may, in turn, be physiologically explained by the parasympathetic nervous system. In polyvagal theory (Porges, 2001, 2007), parasympathetic nervous system activity originating in the nucleus ambiguus, and perpetuated via the supradiaphragmatic vagus nerve, provides a physiological brake on sympathetic-driven "fight or flight" behaviors, which presumably reduces physiological wear and tear and allostatic load. Within polyvagal theory, parasympathetic activity also facilitates pro-social behaviors and social engagement (Porges, 2001, 2007). Later work adapted the polyvagal theoretical framework, arguing that parasympathetic-mediated behaviors were *necessary* for the evolution of human prestige hierarchies (Lenfesty & Morgan, 2019). Indeed, parasympathetic activity has been linked to behaviors relevant to prestige based hierarchies – including social engagement, emotional and behavioral regulation, and compassion, among other pro-social behaviors (Bornemann et al., 2016; Miller et al.,

2016; Roos et al., 2017; Segerstrom et al., 2011; Smith et al., 2020) – but parasympathetic activity has not been linked explicitly to trait prestige. Such a relationship could mediate associations between trait prestige and health, given the extensive work linking parasympathetic activity to better health outcomes (Kemp & Quintana, 2013; O'Connor et al., 2021; Williams et al., 2019).

Social endocrine mechanisms could also be explored to better understand relationships between trait dominance, trait prestige, and stress and health. In particular, testosterone is theorized to underlie status-seeking motivations (Mazur & Booth, 1998) and is intricately and bidirectionally linked to cortisol and immune responses to stress (Muehlenbein & Bribiescas, 2005; Viau, 2002). However, testosterone is not robustly linked to self-report measures of dominance (Grebe et al., 2019; Sundin et al., 2021) and, instead, testosterone may be considered an implicit component of dominance that operates largely outside of conscious awareness (Akinola et al., 2016; Josephs et al., 2006; Knight et al., 2020; Schultheiss et al., 2005; Terburg et al., 2012) that modulates the associations of explicit, self-reported trait dominance with physiology and behavior (Carré et al., 2009, 2017; Knight et al., 2017; Slatcher et al., 2011). There are also inconsistencies in this implicit-explicit dominance interaction hypothesis, suggesting more work is necessary to develop this theoretical framework (Knight et al., 2022; Kutlikova et al., 2021).

Less work has examined trait prestige and testosterone, and initial evidence provides a mixed view. Trait prestige was associated with lower testosterone levels in men, but not women, in one sample, and trait dominance was unrelated to testosterone levels in men in the same study (Johnson et al., 2007). However, other work indicates that earned prestige (the conferred rank, which may be determined, in part, by trait prestige, the personality concept; (Cheng et al., 2021; McClanahan et al., 2021) in a large group was associated with increased testosterone levels across a two-month period (Cheng et al., 2018). In still other work, trait prestige was not found to robustly modulate testosterone's causal effects on cortisol and affective responses to social evaluative stress in men (Knight et al., 2017). Hence, with somewhat limited data and mixed results, examining testosterone's associations and interactions with trait dominance and prestige as a means of understanding how these traits relate to stress and health outcomes is suggestive but in need of further testing.

Psychological Mechanisms

The defined characteristics of trait dominance and prestige – that is, their relative reliance on more forceful versus more pro-social behaviors – provide an initial psychological understanding of the links between these traits and stress and health. Higher trait dominance was associated with higher stress, poorer health, and higher negative affect. This may be explained, in part, by trait dominance resulting in greater exposure to stressful or contentious social interactions, relying on relatively more anti-social behaviors, and being associated with greater threat sensitivity. In this proposed model, relying on dominance requires fighting one's way to the top, being on guard for the need to defend one's position, and possibly fighting off potential usurpers. Contrast this summary of trait dominance with the more pro-social tactics related to trait prestige, which include social engagement, building social

relationships, and earning the liking and honor of group members. Prior work in a pre-industrial society suggests men with higher prestige also have higher reproductive success and gain more cooperation partners (von Rueden et al., 2011, 2019). These prestige-related psychosocial processes – that is, the pro-social tactics and interpersonal success – may be associated with objectively better lives and, in prior work, are associated with benefits for health and well-being (Cacioppo & Hawkley, 2003; Cohen, 2004; Hawkley et al., 2008; Holt-Lunstad, 2021; Holt-Lunstad et al., 2017; Uchino et al., 1996).

Exploratory analyses indicated that self-enhancement partly (but not fully) explained the association between trait prestige and stress and health outcomes. These results suggests that some (but not all) of the prestige-health association is likely due to trait prestige's relationship with desires to maintain the good impressions of others, which could lead to responding in a desirable fashion on the stress and health questionnaires. To help delineate trait prestige's direct and specific impact on health as opposed to indirect effects via desirable responding, future research could examine objective physiological indices of stress and health that are unlikely to be confounded with self-enhancement. Interventions that alter trait prestige levels could also be developed and implemented to produce experimental evidence of causal associations between prestige and stress and health outcomes, an approach used with other personality traits (Roberts et al., 2017).

Hierarchies also differ in their relative acceptance, encouragement, and rewarding of dominance and prestige behaviors (de Waal-Andrews et al., 2015). It is possible that the findings evident in this study are a result of the fit between the individual (trait dominance and/or prestige) and the social context (hierarchy style), in the same vein of an extensive literature on personality-environment fit (Mueller et al., 2019; Van Heck, 1997). No research to date has provided evidence of the modern US university system being more dominance versus prestige oriented[5]. Evidence that indicates the university setting is more prestige oriented would suggest that trait prestige may reduce stress and improve health by fostering a good fit between an individual and his or her social setting. In other contexts – for example, within a military, athletic, or other dominance-oriented group – trait prestige may not be as beneficial, and so may not be related to reduced stress and better health outcomes. Trait dominance may instead predict personality-environment fit, which in turn may lead to trait dominance associating with better stress and health outcomes. This speculative psychological mechanism involving fit between an individual and his or her social setting could be studied in future work that measures or manipulates the dominance or prestige characteristics of a hierarchy (de Waal-Andrews et al., 2015) and examines downstream stress and health consequences.

Limitations and Future Directions

A primary limitation of the present work is the cross-sectional study design. While important for initial exploration and confirmation of hypothesized relationships, the cross-sectional design cannot eliminate the possibility that stress and health

[5] See de Waal-Andrews and colleagues' (2015) work for evidence of gradations of dominance and prestige style hierarchies in UK classes of older adolescents (16–17 years) within one school.

'outcomes' precede the development of trait dominance and prestige characteristics. Major life events and health conditions are associated with changes in personality traits (Haehner et al., 2022; Jackson et al., 2017). For example, major stressors (e.g., in childhood) have been associated with the development of behaviors related to trait dominance, including heightened hostility and increased narcissistic rivalry (Clemens et al., 2022; Luecken, 2000), and chronic stress or health concerns may limit one's ability to perform prosocial behaviors related to trait prestige. The complement to this model – that lower stress and better health precedes higher trait prestige and lower trait dominance – seems less probable: Lower stress and better health *could* permit or encourage use of pro-social tactics (e.g., because of an increased capacity to perform affiliative behaviors relative to an individual with higher stress, poorer health), but a healthy, unstressed state would seem unlikely to discourage dominant behaviors. The well established "tend and befriend" model of acute stress, in which stress is theorized to *heighten* human affiliative motivations (Taylor, 2006), further complicates any speculation that stress might precede higher dominant- and lower prestige-related traits. Future work that examines prospective, longitudinal associations of trait dominance and prestige with stress and health will be important for confirming causal direction.

Despite collecting three samples from two locations, the populations sampled share many demographic characteristics, perhaps especially consisting of young adults from large, public universities in the American West/Mountain West region. Such similarities make it difficult to determine the generalizability of the findings. Important demographic variables that are not strongly represented or were not selected for in the present sample must be specifically investigated, including variables related to race and ethnicity, sexual minority status, lower-income status, midlife and older adults, and the intersection among these and other variables (Crenshaw, 1989; Gkiouleka et al., 2018). Indeed, the associations between social status and health are likely most easily explained by rampant and unremitting inequality in our social systems. That a psychological concept (e.g., trait dominance or prestige) may explain some of the variability in stress and health outcomes does not negate our duty to examine and fix societal issues—issues that ultimately affect the stress and health of those already unfairly burdened.

As discussed previously, this initial exploration and confirmation of links between trait dominance, trait prestige, and stress and health should be followed up with an explicit focus on objective indices of stress and health. Such work could start with examinations of autonomic and endocrine activity, perhaps especially examining responses to manipulated status-relevant social stimuli, like a status-relevant threat. An experimental approach such as this, when coupled with longitudinal and ecological approaches linking trait dominance and prestige to longer term physiological indices, would produce a more comprehensive model of stress and health outcomes related to trait dominance and prestige.

Conclusion

These results point to intriguing associations between personality traits, social hierarchies, and health. Whereas trait dominance and prestige have each been

linked with status attainment in human hierarchies (McClanahan et al., 2021; van Kleef & Cheng, 2020; Van Vugt & Smith, 2019) and social status has been linked with stress and health (Adler et al., 1994; Sapolsky, 2004, 2005), only trait prestige was associated with reduced stress and better health; trait dominance was associated with increased stress and poorer health outcomes. Hence, this work suggests the preferred route by which status is earned matters for understanding links between status, stress, and health. Future work that unpacks psychological and physiological pathways by which trait dominance and prestige may link to stress and health, with more diverse populations, will be important for determining the direct and sustained impact these personality types may have on health and well-being within our societal hierarchies.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40750-022-00199-3.

Acknowledgements I thank Dr. Smrithi Prasad and Dr. Jason Isbell for reading drafts and providing feedback on this manuscript. I thank Dr. Pranjal Mehta and the former SPELab for providing early feedback on data collected in Studies 1 and 2.

Data Availability All data, materials, and pre-registrations are available on the Open Science Framework (https://osf.io/xc8h3/).

Declarations

Conflict of Interest The corresponding author states that there is no conflict of interest.

References

Adler, N. E., & Ostrove, J. M. (1999). Socioeconomic status and health: what we know and what we don't. *Annals of the New York Academy of Sciences*, *896*(1), 3–15. https://doi.org/10.1111/J.1749-6632.1999.TB08101.X

Adler, N. E., Boyce, W. T., Chesney, M. A., Folkman, S., & Syme, S. L. (1993). Socioeconomic inequalities in health: no easy solution. *Journal of the American Medical Association*, *269*(24), 3140–3145. https://doi.org/10.1001/JAMA.1993.03500240084031

Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, S. L. (1994). Socioeconomic status and health: the challenge of the gradient. *American Psychologist*, *49*(1), 15–24. https://doi.org/10.1037/0003-066X.49.1.15

Akinola, M., Page-Gould, E., Mehta, P. H., & Lu, J. G. (2016). Collective hormonal profiles predict group performance. *Proceedings of the National Academy of Sciences*, *113*(35), 9774–9779. https://doi.org/10.1073/pnas.1603443113

Anderson, S., & Hauck, W. W. (1983). A new procedure for testing equivalence in comparative bioavailability and other clinical trials. *Communications in Statistics - Theory and Methods*, *12*(23), 2663–2692. https://doi.org/10.1080/03610928308828634

Anderson, C., John, O. P., & Keltner, D. (2012a). The personal sense of power. Journal of Personality, 80(2), 313–344. https://doi.org/10.1111/J.1467-6494.2011.00734.X

Anderson, C., Kraus, M. W., Galinsky, A. D., & Keltner, D. (2012b). The local-ladder effect: Social status and subjective well-being. Psychological Science, 23(7), 764–771. https://doi.org/10.1177/0956797611434537

Bauldry, S., Shanahan, M. J., Boardman, J. D., Miech, R. A., & Macmillan, R. (2012). A life course model of self-rated health through adolescence and young adulthood. *Social Science & Medicine*, *75*(7), 1311–1320. https://doi.org/10.1016/J.SOCSCIMED.2012.05.017

Blazer, D. G., & Hybels, C. F. (2004). What symptoms of depression predict mortality in community-dwelling elders? *Journal of the American Geriatrics Society*, *52*(12), 2052–2056. https://doi.org/10.1111/J.1532-5415.2004.52564.X

Bornemann, B., Kok, B. E., Böckler, A., & Singer, T. (2016). Helping from the heart: voluntary upregulation of heart rate variability predicts altruistic behavior. *Biological Psychology*, *119*, 54–63. https://doi.org/10.1016/j.biopsycho.2016.07.004

Buss, D. M., Durkee, P. K., Shackelford, T. K., Bowdle, B. F., Schmitt, D. P., Brase, G. L., et al. (2020). Human status criteria: sex differences and similarities across 14 nations. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspa0000206

Cacioppo, J. T., & Hawkley, L. C. (2003). Social isolation and health, with an emphasis on underlying mechanisms. *Perspectives in Biology and Medicine*, *46*(3), S39–S52. https://doi.org/10.1353/PBM.2003.0063

Carré, J. M., Putnam, S. K., & McCormick, C. M. (2009). Testosterone responses to competition predict future aggressive behaviour at a cost to reward in men. *Psychoneuroendocrinology*, *34*(4), 561–570. https://doi.org/10.1016/j.psyneuen.2008.10.018

Carré, J. M., Geniole, S. N., Ortiz, T. L., Bird, B. M., Videto, A., & Bonin, P. L. (2017). Exogenous testosterone rapidly increases aggressive behavior in dominant and impulsive men. *Biological Psychiatry*. https://doi.org/10.1016/j.biopsych.2016.06.009

Case, C. R., & Maner, J. K. (2014). Divide and conquer: When and why leaders undermine the cohesive fabric of their group. *Journal of Personality and Social Psychology*, *107*(6), 1033–1050. https://doi.org/10.1037/A0038201

Cheng, J. T., Tracy, J. L., & Henrich, J. (2010). Pride, personality, and the evolutionary foundations of human social status. *Evolution and Human Behavior*, *31*(5), 334–347. https://doi.org/10.1016/j.evolhumbehav.2010.02.004

Cheng, J. T., Tracy, J. L., Foulsham, T., Kingstone, A., & Henrich, J. (2013). Two ways to the top: evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/a0030398

Cheng, J. T., Kornienko, O., & Granger, D. A. (2018). Prestige in a large-scale social group predicts longitudinal changes in testosterone. *Journal of Personality and Social Psychology, 114*(6), 924. https://doi.org/10.1037/pspi0000126

Cheng, J. T., Tracy, J. L., & Henrich, J. (2021). Dominance is necessary to explain human status hierarchies. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(22), https://doi.org/10.1073/PNAS.2103870118

Christian, C. B. (2017). *Doubly double negative: When not being negative is more important than being positive*. Dissertation Abstracts International: Section B: The Sciences and Engineering.

Clemens, V., Fegert, J. M., & Allroggen, M. (2022). Adverse childhood experiences and grandiose narcissism – Findings from a population-representative sample. *Child Abuse & Neglect*, *127*, 105545. https://doi.org/10.1016/j.chiabu.2022.105545

Cohen, S. (2004). Social relationships and health. *American Psychologist*, *59*(8), 676–684. https://doi.org/10.1037/0003-066X.59.8.676

Counsell, A., & Cribbie, R. A. (2015). Equivalence tests for comparing correlation and regression coefficients. *British Journal of Mathematical and Statistical Psychology*, *68*(2), 292–309. https://doi.org/10.1111/bmsp.12045

Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: a black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics.*University of Chicago Legal Forum*, (1), 139–167.

de Waal-Andrews, W., Gregg, A. P., & Lammers, J. (2015). When status is grabbed and when status is granted: getting ahead in dominance and prestige hierarchies. *British Journal of Social Psychology*, *54*(3), 445–464. https://doi.org/10.1111/BJSO.12093

Denollet, J. (2005). DS14: standard assessment of negative affectivity, social inhibition, and Type D personality. *Psychosomatic medicine*, *67*(1), 89–97. https://doi.org/10.1097/01.PSY.0000149256.81953.49

Dinzeo, T. J., Thayasivam, U., & Sledjeski, E. M. (2014). The development of the lifestyle and habits questionnaire-brief version: relationship to quality of life and stress in college students. *Prevention Science*, *15*(1), 103–114. https://doi.org/10.1007/S11121-013-0370-1/TABLES/2

Dohrenwend, B. S. (1973). Social status and stressful life events. *Journal of Personality and Social Psychology*, *28*(2), 225–235. https://doi.org/10.1037/H0035718

Fagard, R. H., Pardaens, K., Staessen, J. A., & Thijs, L. (1996). Prognostic value of invasive hemodynamic measurements at rest and during exercise in hypertensive men. *Hypertension*, *28*(1), 31–36. https://doi.org/10.1161/01.HYP.28.1.31

Farivar, S. S., Cunningham, W. E., & Hays, R. D. (2007). Correlated physical and mental health summary scores for the SF-36 and SF-12 Health Survey, V.1. *Health and Quality of Life Outcomes*, *5*(1), 54. https://doi.org/10.1186/1477-7525-5-54

Friedman, M., & Rosenman, R. H. (1959). Association of specific overt behavior pattern with blood and cardiovascular findings: Blood cholesterol level, blood clotting time, incidence of arcus senilis, and clinical coronary artery disease. *Journal of the American Medical Association*, *169*(12), 1286. https://doi.org/10.1001/jama.1959.03000290012005

Gallo, L. C., & Matthews, K. A. (2003). Understanding the association between socioeconomic status and physical health: Do negative emotions play a role? *Psychological Bulletin*, *129*(1), 10–51. https://doi.org/10.1037/0033-2909.129.1.10

Gallo, L. C., & Smith, T. W. (1998). Construct validation of health-relevant personality traits: interpersonal circumplex and five-factor model analyses of the aggression questionnaire. *International Journal of Behavioral Medicine*, *5*(2), 129–147. https://doi.org/10.1207/S15327558IJBM0502_4.

Gkiouleka, A., Huijts, T., Beckfield, J., & Bambra, C. (2018). Understanding the micro and macro politics of health: inequalities, intersectionality & institutions - A research agenda. *Social Science & Medicine*, *200*, 92–98. https://doi.org/10.1016/J.SOCSCIMED.2018.01.025

Gramer, M., & Schön, S. (2015). Experimental manipulations of social status and stress-induced cardiovascular responses in high and low trait dominant men. *Personality and Individual Differences*, *85*, 30–34. https://doi.org/10.1016/J.PAID.2015.04.040

Grebe, N. M., Del Giudice, M., Emery Thompson, M., Nickels, N., Ponzi, D., Zilioli, S., et al. (2019). Testosterone, cortisol, and status-striving personality features: a review and empirical evaluation of the Dual Hormone hypothesis. *Hormones and Behavior*, *109*, 25–37. https://doi.org/10.1016/j.yhbeh.2019.01.006

Gurtman, M. B. (2009). Exploring personality with the interpersonal circumplex. *Social and Personality Psychology Compass*, *3*(4), 601–619. https://doi.org/10.1111/J.1751-9004.2009.00172.X

Haehner, P., Rakhshani, A., Fassbender, I., Lucas, R. E., Donnellan, M. B., & Luhmann, M. (2022). Perception of major life events and personality trait change. *European Journal of Personality*, 08902070221107973. https://doi.org/10.1177/08902070221107973

Hawkley, L. C., Hughes, M. E., Waite, L. J., Masi, C. M., Thisted, R. A., & Cacioppo, J. T. (2008). From social structural factors to perceptions of relationship quality and loneliness: the Chicago health, aging, and social relations study. *The Journals of Gerontology: Series B*, *63*(6), S375–S384. https://doi.org/10.1093/GERONB/63.6.S375

Hays, N. A. (2013). Fear and loving in social hierarchy: Sex differences in preferences for power versus status. *Journal of Experimental Social Psychology*, *49*(6), 1130–1136. https://doi.org/10.1016/j.jesp.2013.08.007

Henrich, J., & Gil-White, F. J. (2001). The evolution of prestige: freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior*, *22*(3), 165–196. https://doi.org/10.1016/S1090-5138(00)00071-4

Holt-Lunstad, J. (2021). The major health implications of social connection. *Current Directions in Psychological Science*, *30*(3), 251–259. https://doi.org/10.1177/0963721421999630

Holt-Lunstad, J., Robles, T. F., & Sbarra, D. A. (2017). Advancing social connection as a public health priority in the United States. *American Psychologist*, *72*(6), 517–530. https://doi.org/10.1037/amp0000103

Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior*, *38*(1), 21–37. https://doi.org/10.2307/2955359

Imami, L., Jiang, Y., Murdock, K. W., & Zilioli, S. (2022). Links between socioeconomic status, daily depressive affect, diurnal cortisol patterns, and all-cause mortality. *Psychosomatic Medicine*, *84*(1), 29–39. https://doi.org/10.1097/PSY.0000000000001004

Jackson, D. N. (1984). *Personality research form manual* (3rd ed.). Sigma Assessment Systems.

Jackson, J. J., Weston, S. J., & Schultz, L. H. (2017). Personality development and health. In J. Specht (Ed.), *Personality Development Across the Lifespan* (pp. 371–384). Academic. https://doi.org/10.1016/B978-0-12-804674-6.00023-5

Johnson, R. T., Burk, J. A., & Kirkpatrick, L. A. (2007). Dominance and prestige as differential predictors of aggression and testosterone levels in men. *Evolution and Human Behavior*, *28*(5), 345–351. https://doi.org/10.1016/J.EVOLHUMBEHAV.2007.04.003

Johnson, S. L., Leedom, L. J., & Muhtadie, L. (2012). The dominance behavioral system and psychopathology: evidence from self-report, observational, and biological studies. *Psychological Bulletin*, *138*(4), 692–743. https://doi.org/10.1037/a0027503

Josephs, R. A., Sellers, J. G., Newman, M. L., & Mehta, P. H. (2006). The mismatch effect: when testosterone and status are at odds. *Journal of Personality and Social Psychology*, *90*(6), 999–1013. https://doi.org/10.1037/0022-3514.90.6.999

Kapteyn, A., Angrisani, M., Bennett, D., de Bruin, W. B., Darling, J., Gutsche, T., et al. (2020). Tracking the effect of the COVID-19 pandemic on the lives of American households. *Survey Research Methods*, *14*(2), 179–186. https://doi.org/10.18148/SRM/2020.V14I2.7737

Kemp, A. H., & Quintana, D. S. (2013). The relationship between mental and physical health: insights from the study of heart rate variability. *International Journal of Psychophysiology*, *89*(3), 288–296. https://doi.org/10.1016/j.ijpsycho.2013.06.018

Kim, J. K., & Crimmins, E. M. (2020). How does age affect personal and social reactions to COVID-19: results from the national understanding America study. *Plos One*, *15*(11 November), e0241950. https://doi.org/10.1371/journal.pone.0241950

Knight, E. L., Christian, C. B., Morales, P. J., Harbaugh, W. T., Mayr, U., & Mehta, P. H. (2017). Exogenous testosterone enhances cortisol and affective responses to social-evaluative stress in dominant men. *Psychoneuroendocrinology*. https://doi.org/10.1016/j.psyneuen.2017.08.014

Knight, E. L., Sarkar, A., Prasad, S., & Mehta, P. H. (2020). Beyond the challenge hypothesis: the emergence of the dual-hormone hypothesis and recommendations for future research. *Hormones and Behavior*. https://doi.org/10.1016/j.yhbeh.2019.104657

Knight, E. L., Morales, P., Christian, C., Harbaugh, W., Mehta, P., & Mayr, U. (2022). The causal effect of testosterone on men's competitive behavior is moderated by basal cortisol and cues to an opponent's status: evidence for a context-dependent dual hormone hypothesis. *Journal of Personality and Social Psychology*. https://doi.org/10.31234/osf.io/y4hfu

Kutlikova, H. H., Geniole, S. N., Eisenegger, C., Lamm, C., Jocham, G., & Studer, B. (2021). Not giving up: testosterone promotes persistence against a stronger opponent. *Psychoneuroendocrinology*, *128*, 105214. https://doi.org/10.1016/j.psyneuen.2021.105214

Lee, E. M., & Hughes, B. M. (2014). Trait dominance is associated with vascular cardiovascular responses, and attenuated habituation, to social stress. *International Journal of Psychophysiology*, *92*(2), 79–84. https://doi.org/10.1016/J.IJPSYCHO.2014.03.001

Lekander, M., Elofsson, S., Neve, I. M., Hansson, L. O., & Unden, A. L. (2004). Self-rated health is related to levels of circulating cytokines. *Psychosomatic Medicine*, *66*(4), 559–563. https://doi.org/10.1097/01.PSY.0000130491.95823.94

Lenfesty, H. L., & Morgan, T. J. H. (2019). By reverence, not fear: prestige, religion, and autonomic regulation in the evolution of cooperation. *Frontiers in Psychology*, *10*, 2750. https://doi.org/10.3389/FPSYG.2019.02750/BIBTEX

Luecken, L. J. (2000). Attachment and loss experiences during childhood are associated with adult hostility, depression, and social support. *Journal of Psychosomatic Research*, *49*(1), 85–91. https://doi.org/10.1016/S0022-3999(00)00151-3

Mazur, A., & Booth, A. (1998). Testosterone and dominance in men. *Behavioral and Brain Sciences*. https://doi.org/10.1017/S0140525X98001228

McClanahan, K. J., Maner, J. K., & Cheng, J. T. (2021). Two ways to stay at the top: prestige and dominance are both viable strategies for gaining and maintaining social rank over time. https://doi.org/10.1177/01461672211042319

McEwen, B. S., & Gianaros, P. J. (2010). Central role of the brain in stress and adaptation: links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences*, *1186*(1), 190–222. https://doi.org/10.1111/j.1749-6632.2009.05331.x

Mead, N. L., & Maner, J. K. (2012). On keeping your enemies close: powerful leaders seek proximity to ingroup power threats. *Journal of Personality and Social Psychology*, *102*(3), 576–591. https://doi.org/10.1037/a0025755

Mensah, G. A., Pappas, T. W., Koren, M. J., Ulin, R. J., Laragh, J. H., & Devereux, R. B. (1993). Comparison of classification of the severity of hypertension by blood pressure level and by World Health Organization criteria in the prediction of concurrent cardiac abnormalities and subsequent

complications in essential hypertension. *Journal of Hypertension*, *11*(12), 1429–1440. https://doi.org/10.1097/00004872-199312000-00016

Miller, T. Q., Smith, T. W., Turner, C. W., Guijarro, M. L., & Hallet, A. J. (1996). A meta-analytic review of research on hostility and physical health. *Psychological Bulletin*, *119*(2), 322–348. https://doi.org/10.1037/0033-2909.119.2.322

Miller, J. G., Nuselovici, J. N., & Hastings, P. D. (2016). Nonrandom acts of kindness: parasympathetic and subjective empathic responses to sadness predict children's prosociality. *Child Development*, *87*(6), 1679–1690. https://doi.org/10.1111/cdev.12629

Muehlenbein, M. P., & Bribiescas, R. G. (2005). Testosterone-mediated immune functions and male life histories. *American Journal of Human Biology*, *17*(5), 527–558. https://doi.org/10.1002/ajhb.20419

Mueller, S., Ram, N., Conroy, D. E., Pincus, A. L., Gerstorf, D., & Wagner, J. (2019). Happy like a fish in water? The role of personality–situation fit for momentary happiness in social interactions across the adult lifespan. *European Journal of Personality*, *33*(3), 298–316. https://doi.org/10.1002/per.2198

Nandi, A., Glymour, M. M., & Subramanian, S. V. (2014). Association among socioeconomic status, health behaviors, and all-cause mortality in the United States. *Epidemiology (Cambridge, Mass.)*, *25*(2), 170–177. https://doi.org/10.1097/EDE.0000000000000038

Newton, T. L., & Bane, C. M. H. (2001). Cardiovascular correlates of behavioral dominance and hostility during dyadic interaction. *International Journal of Psychophysiology*, *40*(1), 33–46. https://doi.org/10.1016/S0167-8760(00)00124-0

O'Connor, D. B., Thayer, J. F., & Vedhara, K. (2021). Stress and health: a review of psychobiological processes. *Annual Review of Psychology*, *72*(1), 663–688. https://doi.org/10.1146/annurev-psych-062520-122331

Okun, M. A., & George, L. K. (1984). Physician- and self-ratings of health, neuroticism and subjective well-being among men and women. *Personality and Individual Differences*, *5*(5), 533–539. https://doi.org/10.1016/0191-8869(84)90027-8

Ostir, G. V., Markides, K. S., Black, S. A., & Goodwin, J. S. (2000). Emotional well-being predicts subsequent functional independence and survival. *Journal of the American Geriatrics Society*, *48*(5), 473–478. https://doi.org/10.1111/J.1532-5415.2000.TB04991.X

Ostir, G. V., Markides, K. S., Peek, M. K., & Goodwin, J. S. (2001). The association between emotional well-being and the incidence of stroke in older adults. *Psychosomatic Medicine*, *63*(2), 210–215. https://doi.org/10.1097/00006842-200103000-00003

Paulhus, D. L. (1984). Two-component models of socially desirable responding. *Journal of Personality and Social Psychology*, *46*(3), 598–609. https://doi.org/10.1037/0022-3514.46.3.598

Porges, S. W. (2001). The polyvagal theory: phylogenetic substrates of a social nervous system. *International Journal of Psychophysiology*, *42*(2), 123–146. https://doi.org/10.1016/S0167-8760(01)00162-3

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116–143. https://doi.org/10.1016/j.biopsycho.2006.06.009

Radler, & Barry, T. (2014). The midlife in the United States (MIDUS) Series: a national longitudinal study of health and well-being. *Open Health Data*, *2*(1). https://doi.org/10.5334/OHD.AI

Roberts, B. W., Luo, J., Briley, D. A., Chow, P. I., Su, R., & Hill, P. L. (2017). A systematic review of personality trait change through intervention. *Psychological Bulletin*, *143*(2), 117–141. https://doi.org/10.1037/bul0000088

Roos, L. E., Knight, E. L., Beauchamp, K. G., Berkman, E. T., Faraday, K., Hyslop, K., & Fisher, P. A. (2017). Acute stress impairs inhibitory control based on individual differences in parasympathetic nervous system activity. *Biological Psychology*. https://doi.org/10.1016/j.biopsycho.2017.03.004

Sapolsky, R. M. (1990). Adrenocortical function, social rank, and personality among wild baboons. *Biological Psychiatry*, *28*(10), 862–878. https://doi.org/10.1016/0006-3223(90)90568-M

Sapolsky, R. M. (1991). Testicular function, social rank and personality among wild baboons. *Psychoneuroendocrinology*, *28*(10), 862–878. https://doi.org/10.1016/0306-4530(91)90015-L

Sapolsky, R. M. (2004). Social status and health in humans and other animals. *Annual Review of Anthropology*, *33*, 393–418. https://doi.org/10.1146/annurev.anthro.33.070203.144000

Sapolsky, R. M. (2005). The influence of social hierarchy on primate health. *Science*, *308*(5722), 648–652. https://doi.org/10.1126/science.1106477

Sapolsky, R. M., & Share, L. J. (1994). Rank-related differences in cardiovascular function among wild baboons: role of sensitivity to glucocorticoids. *American Journal of Primatology*, *32*(4), 261–275. https://doi.org/10.1002/AJP.1350320404

Schultheiss, O. C., Wirth, M. M., Torges, C. M., Pang, J. S., Villacorta, M. A., & Welsh, K. M. (2005). Effects of implicit power motivation on men's and women's implicit learning and testosterone changes after social victory or defeat. *Journal of Personality and Social Psychology*, *88*(1), 174–188. https://doi.org/10.1037/0022-3514.88.1.174

Segerstrom, S. C., Hardy, J. K., Evans, D. R., & Winters, N. F. (2011). Pause and plan: self-regulation and the heart. In R. A. Wright, & G. H. E. Gendolla (Eds.), *How motivation affects cardiovascular response: mechanisms and applications* (pp. 181–198). American Psychological Association. https://doi.org/10.1037/13090-009

Siegman, A. W., Townsend, S. T., Civelek, A. C., & Blumenthal, R. S. (2000). Antagonistic behavior, dominance, hostility, and coronary heart disease. *Psychosomatic Medicine*, *62*(2), 248–257. https://doi.org/10.1097/00006842-200003000-00017

Slatcher, R. B., Mehta, P. H., & Josephs, R. A. (2011). Testosterone and self-reported dominance interact to influence human mating behavior. *Social Psychological and Personality Science*. https://doi.org/10.1177/1948550611400099

Smith, T. W. (2006). Personality as risk and resilience in physical health. *Current Directions in Psychological Science*, *15*(5), 227–231. https://doi.org/10.1111/j.1467-8721.2006.00441.x

Smith, T. W., Deits-Lebehn, C., Williams, P. G., Baucom, B. R. W., & Uchino, B. N. (2020). Toward a social psychophysiology of vagally mediated heart rate variability: concepts and methods in self-regulation, emotion, and interpersonal processes. *Social and Personality Psychology Compass*, *14*(3), e12516. https://doi.org/10.1111/spc3.12516

Smith, T. W., Glazer, K., Ruiz, J. M., & Gallo, L. C. (2004). Hostility, anger, aggressiveness, and coronary heart disease: an interpersonal perspective on personality, emotion, and health. *Journal of Personality*, *72*(6), 1217–1270. https://doi.org/10.1111/J.1467-6494.2004.00296.X

Smith, T. W., Traupman, E. K., Uchino, B. N., & Berg, C. A. (2010). Interpersonal circumplex descriptions of psychosocial risk factors for physical illness: application to hostility, neuroticism, and marital adjustment. *Journal of Personality*, *78*(3), 1011–1036. https://doi.org/10.1111/J.1467-6494.2010.00641.X

Steptoe, A., Dockray, S., & Wardle, J. (2009). Positive affect and psychobiological processes relevant to health. *Journal of Personality*, *77*(6), 1747–1776. https://doi.org/10.1111/j.1467-6494.2009.00599.x

Sugiyama, L. S., & Sugiyama, M. S. (2003). Social roles, prestige, and health risk. *Human Nature*, *14*(2), 165–190. https://doi.org/10.1007/s12110-003-1002-4

Sundin, Z. W., Chopik, W. J., Welker, K. M., Ascigil, E., Brandes, C. M., Chin, K., et al. (2021). Estimating the associations between big five personality traits, testosterone, and cortisol. *Adaptive Human Behavior and Physiology*. https://doi.org/10.1007/s40750-020-00159-9

Tan, J. J. X., Kraus, M. W., Carpenter, N. C., & Adler, N. E. (2020). The association between objective and subjective socioeconomic status and subjective well-being: a meta-analytic review. *Psychological Bulletin*, *146*(11), 970–1020. https://doi.org/10.1037/bul0000258

Taylor, S. E. (2006). Tend and befriend: biobehavioral bases of affiliation under stress. *Current Directions in Psychological Science*, *15*(6), 273–277. https://doi.org/10.1111/j.1467-8721.2006.00451.x

Terburg, D., Aarts, H., & van Honk, J. (2012). Testosterone affects gaze aversion from angry faces outside of conscious awareness. *Psychological Science*, *23*(5), 459–463. https://doi.org/10.1177/0956797611433336

Thayer, J. F., Åhs, F., Fredrikson, M., Sollers, J. J., & Wager, T. D. (2012). A meta-analysis of heart rate variability and neuroimaging studies: Implications for heart rate variability as a marker of stress and health. *Neuroscience and Biobehavioral Reviews*, *36*(2), 747–756. https://doi.org/10.1016/j.neubiorev.2011.11.009

Tomten, S. E., & Høstmark, A. T. (2007). Self-rated health showed a consistent association with serum HDL-cholesterol in the cross-sectional Oslo Health Study. *International Journal of Medical Sciences*, *4*(5), 278. https://doi.org/10.7150/IJMS.4.278

Turiano, N. A., Pitzer, L., Armour, C., Karlamangla, A., Ryff, C. D., & Mroczek, D. K. (2012). Personality trait level and change as predictors of health outcomes: findings from a National Study of Americans (MIDUS). *The Journals of Gerontology: Series B*, *67B*(1), 4–12. https://doi.org/10.1093/GERONB/GBR072

Turner, R. J., & Avison, W. R. (2003). Status variations in stress exposure: implications for the interpretation of research on race, socioeconomic status, and gender. *Journal of Health and Social Behavior*, *44*(4), 488–505. https://doi.org/10.2307/1519795

Uchino, B. N., Cacioppo, J. T., & Kiecolt-Glaser, J. K. (1996). The relationship between social support and physiological processes: a review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin*, *119*(3), 488–531. https://doi.org/10.1037/0033-2909.119.3.488

Undén, A. L., Andréasson, A., Elofsson, S., Brismar, K., Mathsson, L., Rönnelid, J., & Lekander, M. (2007). Inflammatory cytokines, behaviour and age as determinants of self-rated health in women. *Clinical Science*, *112*(6), 363–373. https://doi.org/10.1042/CS20060128

Van Heck, G. L. (1997). Personality and physical health: toward an ecological approach to health-related personality research. *European Journal of Personality*, *11*(5), 415–443. https://doi.org/10.1002/(SICI)1099-0984(199712)11:5<415::AID-PER306>3.0.CO;2-G

van Kleef, G. A., & Cheng, J. T. (2020). Power, status, and hierarchy: current trends and future challenges. *Current Opinion in Psychology*, *33*, iv–xiii. https://doi.org/10.1016/j.copsyc.2020.03.011

Van Vugt, M., & Smith, J. E. (2019). A dual model of leadership and hierarchy: evolutionary synthesis. *Trends in Cognitive Sciences*. https://doi.org/10.1016/J.TICS.2019.09.004

Viau, V. (2002). Functional cross-talk between the Hypothalamic-Pituitary-Gonadal and -Adrenal Axes. *Journal of Neuroendocrinology*, *14*(6), 506–513. https://doi.org/10.1046/j.1365-2826.2002.00798.x

von Rueden, C. R., Gurven, M., & Kaplan, H. (2011). Why do men seek status? Fitness payoffs to dominance and prestige. *Proceedings of the Royal Society B: Biological Sciences*, *278*(1715), 2223–2232. https://doi.org/10.1098/rspb.2010.2145

von Rueden, C. R., Redhead, D., O'Gorman, R., Kaplan, H., & Gurven, M. (2019). The dynamics of men's cooperation and social status in a small-scale society. *Proceedings of the Royal Society B: Biological Sciences*, *286*(1908). https://doi.org/10.1098/rspb.2019.1367

Ware, J. E., & Gandek, B. (1994). The SF-36 health survey: development and use in mental health research and the IQOLA Project. *International Journal of Mental Health*, *23*(2), 49–73. https://doi.org/10.1080/00207411.1994.11449283

Wasylkiw, L., & Fekken, G. C. (2002). Personality and self-reported health: matching predictors and criteria. *Personality and Individual Differences*, *33*(4), 607–620. https://doi.org/10.1016/S0191-8869(01)00175-1

Williams, D. P., Koenig, J., Carnevali, L., Sgoifo, A., Jarczok, M. N., Sternberg, E. M., & Thayer, J. F. (2019). Heart rate variability and inflammation: a meta-analysis of human studies. *Brain Behavior and Immunity*, *80*, 219–226. https://doi.org/10.1016/j.bbi.2019.03.009