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## Social power may be associated with health through positive emotion

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### ABSTRACT

Increased social power—defined as one’s influence on *another’s* behavior—guides activation of one’s behavioral activation system which, in turn, elicits greater positive emotion. Positive emotion has also been linked to greater health. The current research assessed whether power and positive emotion are related to health. In Study 1, participants ( $N = 403$ ;  $M_{\text{age}} = 48.33$  years) wrote a narrative about a time in which they felt powerful or powerless. Greater self-reported feelings of power, concurrent with more frequent use of positive emotional words within the narrative, was associated with fewer references to health within the narrative. In Study 2, participants ( $N = 401$ ;  $M_{\text{age}} = 33.05$  years) primed with the concept of power (vs. powerlessness) reported greater health competency through enhanced positive emotion. Findings provided preliminary data supporting the continued study of power to better understand the link between positive emotion and health. Future research should elucidate the long-term relationships between these variables to examine whether increased power can produce downstream positive effects on health and health behavior.

### ARTICLE HISTORY

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### KEYWORDS

Health; health competency; social power; positive emotion; linguistic inquiry and word count analysis (LIWC)

Research in health psychology often emphasizes the role of locus control—that is, the extent to which a person attributes outcomes to their own behavior rather than to external forces (e.g., friends, fate, religious entities)—in facilitating one’s health and well-being (Kesavayuth, Poyago-Theotoky, Tran, & Zikos, 2020). Feelings of power and powerlessness, defined as one’s perception of influence over *another’s* behavior (Anderson, John, & Keltner, 2012; Magee & Galinsky, 2008), a related but distinct construct, might also be linked to health, serving as an additional avenue for improving health. This potential relationship is supported by research demonstrating a positive association between power and cardiovascular functioning (Scheepers, de Wit, Ellemers, & Sassenberg, 2012). The approach-inhibition theory of power asserts that increased feelings of

power guide activation of one's behavioral approach system which elicits greater experiences of positive emotion (Cho & Keltner, 2020; Keltner, Gruenfeld, & Anderson, 2003). Outside of the power literature, positive emotion is linked to greater health and engagement in health behaviors (e.g., Nylocks, Rafaeli, Bar-Kalifa, Flynn, & Coifman, 2019; Tuck, Adams, Pressman, & Consedine, 2017). It can be hypothesized that feelings of power that co-occur with greater positive emotion may support improved health. This manuscript describes two studies testing the hypothesis that power is associated with health through positive emotion. Study 1 used a correlational design to assess the relationship between feelings of power, use of positive emotional words, and references to health when asking a sample of adults to describe a time in which they felt powerful or powerless. Study 2 used an experimental design to test the effect of power (high vs. low) on positive emotion and self-reported health competency.

### **Power and positive emotion**

Power is linked to greater experiences of positive emotion (for review, see Cho & Keltner, 2020; Guinote, 2017) but findings have not yet been applied to understand how power and positive emotion may conjunctively influence health. The relationship between power—often referred to as *social power* due to its characterization as one's perceived ability to control their social relationships rather than their own personal outcomes (Magee & Galinsky, 2008)—and positive emotion can be best explained by the approach-inhibition theory of power (Cho & Keltner, 2020; Keltner et al., 2003). The approach-inhibition theory of power asserts that level of social power is a key mechanism in explaining an individual's experience of approach- or inhibition-related propensities (Cho & Keltner, 2020). Persons high in social power are provided more rewards and freedoms compared to less powerful persons, including high control over those less powerful others in their immediate social context. Powerholders possess more resources compared to the powerless, which facilitates greater positive emotion and less negative emotion. The approach-inhibition theory of power is supported by evidence that, when in a group context, people who have greater power (e.g., leaders of a group discussion who also have the power to decide how to allocate resources to group members) express greater positive emotion compared to their powerless counterparts (Berdahl & Martorana, 2006). Across multiple studies powerholders demonstrated more optimal emotional functioning, including more frequent experiences of positive emotions, compared to the powerless (Van Kleef & Lange, 2020). Although there is ample evidence linking power to positive emotion, there have been no attempts to extend this model to explain how power

and positive emotion may be related to outcomes such as health (but see Cassidy, Goldberg, & Aston, 2016; Ceatha, Mayock, Campbell, Noone, & Browne, 2019; Ford & Airhihenbuwa, 2018 for discussions of power situated within a social hierarchy guided by self-determination theory; Ryan & Deci, 2017).

## **Positive emotion and health**

Positive emotion is also independently related to overall health and provides an opportunity to investigate the potential role of power in the field of health psychology. The health benefits of positive emotion include but are not limited to reduced mortality, disease morbidity, disease severity, survival after disease diagnosis, and pain (Pressman, Jenkins, & Moskowitz, 2019 for review). For example, in a sample of adult women, greater positive emotion was related to greater subjective/perceived health (Andreasson et al., 2013). Also, greater positive emotion was associated with lower c-reactive protein levels, an index of inflammation, in both healthy and chronically ill adults (Ironson, Banerjee, Fitch, & Krause, 2018). Because factors such as power can enhance positive emotion, it is essential to apply the study of power to account for the observed link between positive emotion and health. This application may include examining the relationships between power, positive emotion, and multiple indices of health, such as references to health—which may index one's health salience—and health competency.

## **Research overview**

Although the role of power in understanding positive emotion and the link between positive emotion and health are each well-documented in separate bodies of literature, it is unknown whether power is related to health as a byproduct of concurrent experiences of positive emotion in the context of feeling powerful. Accordingly, the purpose of the current research was to examine whether power is related to health through positive emotion. We tested this hypothesis using a correlational method in Study 1 and an experimental method in Study 2. We hypothesized that positive emotion would provide an indirect pathway linking power to health.

## **Study 1**

The purpose of Study 1 was to examine whether feelings of power and use of positive emotional words were related to references to health in a sample of adults. Participants received random assignment to a writing prompt instructing them to describe an experience in which they had or lacked

power (Galinsky, Gruenfeld, & Magee, 2003). We used linguistic/text analysis to quantify the contents of participants' narratives, consistent with prior studies of emotion (e.g., Gill, French, Gergle, & Oberlander, 2008; Tausczik & Pennebaker, 2010) and health (e.g., Ziemer & Korkmaz, 2017). We operationalized positive emotion and health as the frequency of pertinent words included in participants' written narratives as quantified by Linguistic Inquiry and Word Count (LIWC) software (Pennebaker, Booth, Boyd, & Francis, 2015).

We hypothesized that participants randomized to the high-power condition would express positive emotion at a greater rate and reference health at a lower rate compared to participants randomized to the low-power condition. Specifically, we expected narratives describing high-power (vs. low-power) experiences to contain a higher proportion of words related to positive emotion and a lower proportion of words related to health. We predicted a negative association between power and reference to health because words representing the *health* category in the LIWC dictionary include *clinic*, *flu*, and *pill*, which often signal discussion of health concerns. We anticipated that power would be negatively related to reference to these words because power would reduce the salience of health concerns via positive emotion. Second, across the entire sample, we hypothesized that adults who reported greater feelings of power would also express positive emotion more frequently and reference health terms less frequently during the narrative-writing task.

## Method

The current investigation of participants' written narratives received approval from the Institutional Review Board (IRB) at a university in the southern U.S. All participants indicated their informed consent to participate in a larger study examining judgment and decision making. Participants' written narratives provided a rich dataset to investigate psychological phenomena in the context of power (see Livingston, Vik, & Singer, 2022).

## Participants

Four hundred three adults recruited from a nationwide (United States) sample responded to the survey via Qualtrics panels in exchange for \$3.25. The sample consisted of 274 women (68%) and 129 men (32%). Participants' mean age was 48.33 years ( $SD = 18.79$ ). Most participants identified as White ( $n = 336$ ; 83.38%), followed by Asian ( $n = 31$ ; 7.69%), Black or African American ( $n = 13$ ; 3.23%), Hispanic or Latino/a ( $n = 12$ ; 2.98%), and other racial/ethnic groups ( $n = 11$ ; 2.73%).

### Materials and procedure

Qualtrics software randomly assigned participants to write a narrative about a time in which they had power over someone else (i.e., high-power condition;  $n = 196$ ) or a time in which someone else had power over them (i.e., low-power condition;  $n = 207$ ). Random assignment to conditions facilitated an examination of the extent to which relationships between power, emotion, and health generalize to a broad population rather than among people who self-select as having or lacking power in their social relationships. Participants responded to the following narrative prompt adapted from prior research (Galinsky, Gruenfeld, & Magee, 2003; Galinsky, Rucker, & Magee, 2015 for review). Italics denote differences between the high-power and low-power prompts.

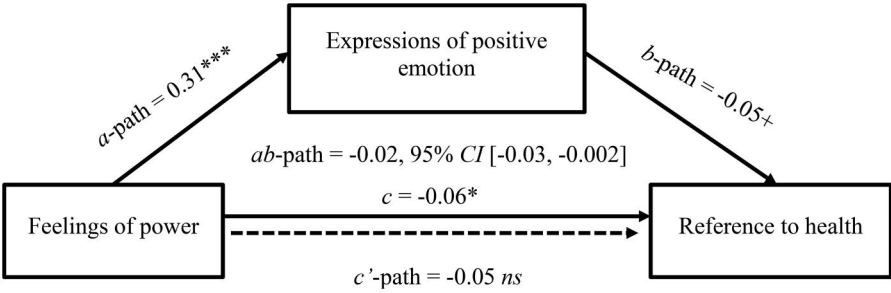
A Time You Felt Powerful (*Powerless*): In this section we would like you to write about a particular incident in which you had power over another person or people (*someone else had power over you*). By power, we mean a situation in which you controlled the ability of another person or people to get something they wanted (*someone had control over your ability to get something you wanted*), or in which you were in a position to evaluate those people (*someone was in a position to evaluate you*). Please describe this situation in which you had power (*did not have power*) including what happened, how you felt, etc. Take a moment to relive the experience in your mind.

Instructions prompted each participant to describe “what happened” and “how you felt” in approximately 100 words each to probe contextual details of the high-power or low-power experience.

Participants self-reported their feelings of power in the situation they described using a six-item scale with endpoints from 1 (*not at all*) to 7 (*very much*). The items read, “In the situation you described, to what extent did you feel superior/in control/respected/that you were an authority/helpless (reverse coded)/powerful” (adapted from Fischer, Fischer, Englich, Aydin, & Frey, 2011). We created a mean score for each participant by calculating the sum of the seven items and dividing by the number of items ( $\alpha = .92$ ).

### Analysis strategy

LIWC software (Pennebaker et al., 2015) compared the contents of participants’ written narratives to 92 linguistic dimensions that constitute its validated internal dictionary. The software generated a data output file that coded the prevalence of expressions of positive emotion (i.e., words such as *love*, *nice*, *sweet*), references to health (i.e., words such as *clinic*, *flu*, and *pill*), and other linguistic characteristics within each written narrative. Words included in the LIWC dictionary assess general themes (e.g., references to health) without establishing valence of such words (e.g., “pill” can be discussed in the context of beneficial treatment or severe illness). To



**Figure 1.** Mediation pathway linking power, positive emotion, and health using a correlational design. Self-reported feelings of power were negatively related to reference to health through expressions of positive emotion. \*\*\* =  $p < .001$ , \* =  $p < .05$ , + =  $p < .10$ , ns =  $p > .10$ .

gain insight regarding the context of health salience, we tested the association between emotion expression and reference to health. We also identified exemplar narratives to illustrate and contextualize our quantitative findings.

To examine our first and second hypotheses, we used  $t$ -tests with power condition as the input variable and reference to health and expressions of positive emotion as outcome variables, respectively. To examine our third hypothesis, we constructed a mediation model using PROCESS for R Version 4.1 (Hayes, 2022) with self-reported feelings of power as the input variable, reference to health as the outcome variable, and expressions of positive emotion as the mediator. We conducted all analyses using RStudio (RStudio Team, 2020). The model is depicted in Figure 1.

To test our observed statistical power, we performed a sensitivity analysis in G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007) on our main regression model with feelings of power predicting expressions of positive emotion and references to health. Assuming a Type I error rate of  $\alpha = .05$ , desired power to detect an effect of 0.80, and a sample size of  $N = 403$ , results of the sensitivity analysis indicated that Cohen's  $f^2 = 0.015$  was the smallest effect our analysis could reliably detect. Our observed effect size for this model was  $f^2 = 0.02$ , suggesting adequate statistical power to detect a small effect (Cohen, 1992).

## Results

### Relationships between power, expressions of positive emotion, and references to health

Table 1 provides means and standard deviations of outcome variables separated by power condition. Consistent with our first hypothesis, low-power narratives contained a significantly higher proportion of words referencing health ( $M = 0.73$ ,  $SD = 1.15$ ) compared to high-power narratives ( $M = 0.46$ ,  $SD = 0.90$ ;  $t(401) = 2.67$ ,  $p < .01$ ,  $d = 0.27$ ). The following narrative excerpt

**Table 1.** Means and Standard Deviations of Outcome Variables Separated by Power Condition.

LIWC category	Example words	Power condition	
		High-power <i>M</i> ( <i>SD</i> )	Low-power <i>M</i> ( <i>SD</i> )
Health	<i>Clinic, flu, pill</i>	0.46 (0.90)	0.73 (1.15)**
Positive emotion	<i>Love, nice, sweet</i>	3.25 (2.08)***	2.40 (1.58)

\*\*\* $p < .001$ , \*\* $p < .01$  for comparisons between high-power and low-power conditions.

written by a participant, age 42, illustrated reference to health among participants assigned to the low-power condition:

I taught for 17 years, mostly in the same school district, and I was being evaluated by an administrator. The week that it took me to complete the observation and evaluation, I was so anxious. I felt sick to my stomach, had migraines, was in a horrible mood. Thank goodness I did well. I hated this aspect of teaching, but it was my job.

Consistent with our second hypothesis, high-power narratives contained a significantly higher proportion of words expressing positive emotion ( $M = 3.25$ ,  $SD = 2.08$ ) compared to low-power narratives ( $M = 2.40$ ,  $SD = 1.58$ ;  $t(401) = -4.67$ ,  $p < .001$ ,  $d = 0.47$ ). The following narrative excerpt written by a participant, age 65, illustrated expressions of positive emotion among participants assigned to the high-power condition:

I was VP of Marketing for a consumer products manufacturer. I had 15 team members that were driven and worked together helping each other. I was the guiding light that drove these people to achieve goals and excel in what they did. We were always on top. It was a terrific feeling. We appreciated each other and that was the way everything gelled.

### Mediation analysis

A mediation analysis, depicted in Figure 1, indicated that feelings of power were indirectly related to reference to health through expressions of positive emotion. The total effect of feelings of power on references to health was significant ( $c$ -path;  $b = -0.06$ ,  $p = .02$ , 95%  $CI [-0.12, -0.01]$ ). The indirect effect through expressions of positive emotion was significant ( $ab$ -path;  $b = -0.02$ , 95%  $CI [-0.03, -0.002]$ , indicating that the mediator provided a pathway linking the input variable to the outcome variable. When accounting for the mediator, the direct effect of feelings of power on references to health was rendered nonsignificantly different from zero ( $c'$ -path;  $b = -0.05$ ,  $p = .12$ , 95%  $CI [-0.10, 0.02]$ ), indicating that expressions of positive emotion explained the relationship. Feelings of power were positively related to expressions of positive emotion ( $a$ -path;  $b = 0.31$ ,  $p < .001$ , 95%  $CI [0.22, 0.41]$ ). Though only approaching significance, expressions of positive emotion were inversely related to reference to health ( $b$ -path;  $b = 0.05$ ,  $p = .08$ , 95%  $CI [-0.11, 0.01]$ ). Together, feelings of power and



**Table 2.** Correlations between Variables Included in the Mediation Model (Study 1).

Variable	<i>M (SD)</i>	1	2	3
1. Feelings of power	3.24 (1.84)	–		
2. Positive emotion	2.81 (1.89)	0.30***	–	
3. Reference to health	0.60 (1.05)	–0.11*	–0.12*	–

\*\*\* $p < .001$ , \* $p < .05$ .

expressions of positive emotion explained 1.94% of the variance in references to health ( $F(2,400) = 3.96$ ,  $p = .02$ ,  $R^2 = 0.0194$ ). Table 2 reports correlations between the variables included in the model.

## Discussion

Study 1 examined associations between power, positive emotion, and health using a narrative-writing task. Positive emotion and health were independently associated with power such that participants assigned to the high-power condition used positive emotional words more frequently and referenced health less frequently than did participants assigned to the low-power condition. Also, the association between power and health was explained by positive emotion such that greater feelings of power, concurrent with more frequent use of positive emotion words, was associated with fewer references to health. The findings provided preliminary evidence supporting the study of power to expand our understanding of the link between positive emotion and health. However, the findings were limited because conclusions regarding causality could not be drawn from a correlational model that lacked experimental control and temporal precedence (Kendall, Olino, Carper, & Makover, 2017). To address these limitations, Study 2 utilized an alternative methodology to triangulate the nature of the relationships between power, positive emotion, and health.

## Study 2

The purpose of Study 2 was to test whether experimentally manipulated power could increase self-reported health competency through increased positive emotion, thus replicating the pattern of findings from Study 1 and providing evidence of a causal relationship. Health competency was measured as a proxy variable for health given that health competency has been linked to engagement in various health promoting behaviors such as cancer prevention strategies (Jung, Jo, & Oh, 2016) and physical activity and other health-related behaviors (Xie, Du, He, Liu, & Li, 2022).

Study 2 used a two-group between-participants experimental design that randomly assigned participants to a high-power or low-power condition. Rather than asking participants to write a personal narrative as in Study 1,

Study 2 manipulated power via a conceptual priming task that asked participants to imagine what it would be like to occupy a position of high versus low power in society (adapted from Goodman et al., 2001). A measure of self-reported health competency served as an assessment of health-related outcomes (Smith, Wallston, & Smith, 1995). Participants responded to the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) to measure positive emotion as a mediating variable linking power to health. We expected that the powerful would report greater positive emotion relative to the powerless, and that positive emotion would in turn predict enhanced self-reported health competency, supporting the hypothesized pathway linking power to health-related outcomes through positive emotion.

### **Method**

The study was approved by the IRB at a university in the southern U.S. All participants indicated their informed consent to participate.

#### **Participants**

Participants were 595 U.S.-based Amazon Mechanical Turk (MTurk) workers who completed the study in exchange for \$0.20.<sup>1</sup> To protect data quality, participants must have achieved an approval rate of 95% on at least 100 prior MTurk tasks to enroll in the current study (Paolacci & Chandler, 2014; Peer, Vosgerau, & Acquisti, 2014). Furthermore, participants indicated their commitment to thoughtful responding at the onset of the study and completed an attention check at the end of the study. Removing participants who failed either check produced a final sample of  $N = 401$ . Participants were 236 women (58.85%) and 165 men (41.15%). Participants' mean age was 33.05 years ( $SD = 8.87$ ). Most participants identified as White ( $n = 365$ ; 91.02%), followed by Asian ( $n = 28$ ; 6.98%), Black or African American ( $n = 3$ ; 0.75%), and other racial/ethnic groups ( $n = 5$ ; 1.25%).

#### **Materials and procedure**

Qualtrics software randomly assigned participants to one of two experimental conditions in which participants viewed an image of a ladder depicting how power is distributed in society (see Appendix for figure and instructions adapted from Goodman et al., 2001). Participants received instructions to imagine that people at the top of the ladder have the most power to control, influence, and evaluate others, whereas people at the bottom of the ladder have the least. Participants assigned to the low-

power condition ( $n = 187$ ; 46.63%) received instructions to imagine that they had “very little power to control, influence, and evaluate others” with an accompanying figure depicting their location near the bottom of the ladder. Participants assigned to the high-power condition ( $n = 214$ ; 53.37%) received instructions to imagine that they had “a lot of power to control, influence, and evaluate others” with an accompanying figure depicting their location near the top of the ladder. The figure depicting participants’ location in the power distribution remained visible through the duration of the study to facilitate a consistent effect of the experimental manipulation.

Participants then completed a measure of self-reported feelings of power to verify the effectiveness of the manipulation. Items read, “In my position in the power ladder, I can control/influence/evaluate/am powerful compared to others” ( $\alpha = .92$ ;  $M = 5.37$ ,  $SD = 1.25$ ). Participants rated each item on a scale from 1 (*not at all*) to 7 (*completely*). The manipulation was effective such that participants assigned to the high-power condition ( $M = 5.75$ ,  $SD = 0.71$ ) reported greater feelings of power compared to participants assigned to the low-power condition ( $M = 4.92$ ,  $SD = 1.55$ ; Welch’s  $t(252.35) = 6.61$ ,  $p < .001$ ,  $d = 0.68$ ).

Next, participants responded to the 20-item Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). Items measuring positive affect/emotion included *interested*, *excited*, *strong*, *enthusiastic*, *proud*, *alert*, *inspired*, *determined*, *attentive*, and *active* ( $\alpha = .95$ ;  $M = 5.48$ ;  $SD = 1.15$ ). Items measuring negative affect/emotion included *distressed*, *upset*, *guilty*, *hostile*, *irritable*, *ashamed*, *nervous*, *jittery*, *afraid*, and *scared* ( $\alpha = .97$ ;  $M = 4.27$ ;  $SD = 1.65$ ). Instructions asked participants to report their current feelings using a scale from 1 (*not at all*) to 7 (*very much*) given their location on the power ladder. For the purposes of the current study, only the positive emotion scores were included in analyses.

Finally, participants responded to the Perceived Health Competence Scale consisting of eight items that measured the extent to which participants felt capable of managing their health outcomes (Smith et al., 1995). Items included statements such as, “I am generally able to accomplish my goals with respect to my health” and “I am able to do things for my health as well as most people” ( $\alpha = .65$ ;  $M = 4.18$ ;  $SD = 0.72$ ). Participants rated each statement using a scale from 1 (*disagree strongly*) to 7 (*agree strongly*) given their location on the power ladder.

### Analysis strategy

All continuous variable distributions were normal with skewness within the range of  $\pm 2$  and kurtosis within the range of  $\pm 7$  requiring no

transformation (Byrne, 2010; Hair, Black, Babin, & Anderson, 2010). Independent samples *t*-tests examined the effects of power condition on positive emotion and health competency. Levene's test of homogeneity of variance across experimental conditions was significant; thus, we report the results of Welch's (1947) *t*-test where appropriate to account for heterogeneous variances (Delacre, Lakens, & Leys, 2017). Mediation analysis tested the hypothesis that positive emotion would provide an indirect pathway through which power can influence health-related outcomes. Residuals were normally distributed. Bootstrapping analyses tested the mediation model using the Lavaan package (Rosseel, 2012) in RStudio (RStudio Team, 2020).

To test our observed statistical power, we performed a sensitivity power analysis in G\*Power (Faul et al., 2007) on our primary multiple regression model with experimental condition predicting positive emotion and health competency. Assuming a Type I error rate of  $\alpha = .05$ , desired power to detect an effect of 0.80, and an achieved sample size of  $N = 401$ , results of the sensitivity power analysis indicated that Cohen's  $f^2 = 0.015$  was the smallest effect our analysis could reliably detect. Our observed effect size for this model was  $f^2 = 0.11$ , suggesting adequate statistical power to detect a small-to-medium effect (Cohen, 1992).

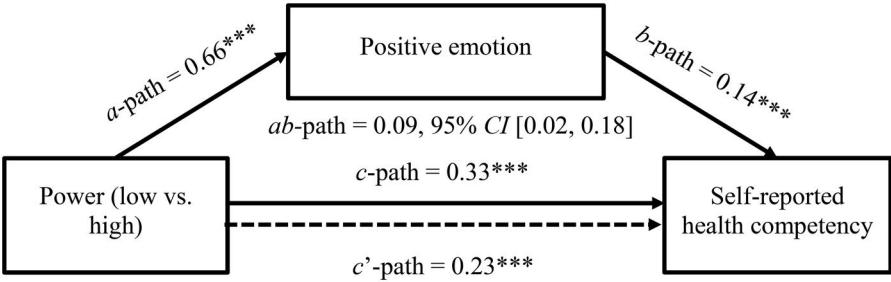
## Results

### *Effects of power on positive emotion and health competency*

We performed Welch's independent samples *t*-tests to examine the effects of manipulated power on self-reported positive emotion and health competency. Consistent with our hypotheses, power condition influenced positive emotion such that high-power participants ( $M = 5.70$ ,  $SD = 0.77$ ) reported greater positive emotion compared to low-power participants ( $M = 5.03$ ,  $SD = 1.39$ ;  $t(282.20) = 5.80$ ,  $p < .001$ ,  $d = 0.59$ ). Also consistent with our hypotheses, high-power participants ( $M = 4.33$ ,  $SD = 0.75$ ) reported greater health competency compared to low-power participants ( $M = 4.00$ ,  $SD = 0.64$ ;  $t(398.80) = 4.70$ ,  $p < .001$ ,  $d = 0.47$ ).

### *Mediation analysis*

A mediation analysis, depicted in Figure 2, indicated that power increased ratings of health competency through positive emotion. The total effect of power condition on health competency was significant (*c*-path;  $b = 0.33$ ,  $p < .001$ , 95% *CI* [0.19, 0.47]). The indirect effect through positive emotion was significant (*ab*-path;  $b = 0.09$ , 95% *CI* [0.02, 0.18]), indicating that the mediator provided an explanatory pathway linking the independent variable to the dependent variable. When accounting for the mediator, the direct



**Figure 2.** Mediation pathway linking power, positive emotion, and health using an experimental design. Random assignment to a high-power versus low-power experimental condition resulted in increased self-reported health competency through positive emotion. \*\*\*= $p < .001$ .

effect of power condition on health competency was diminished in magnitude but remained significantly different from zero ( $c'$ -path;  $b = 0.23$ ,  $p < .001$ , 95%  $CI$  [0.12, 0.33]), indicating that positive emotion helped to explain the relationship. High (vs. low) power increased positive emotion ( $a$ -path;  $b = 0.66$ ,  $p < .001$ , 95%  $CI$  [0.45, 0.89]), which was associated in turn with increased health competency ( $b$ -path;  $b = 0.14$ ,  $p < .001$ , 95%  $CI$  [0.02, 0.24]). Together, power condition and positive emotion explained 9.80% of the variance in health competency ( $F(2,398) = 21.52$ ,  $p < .001$ ,  $R^2 = 0.098$ ).

### Discussion

Study 2 replicated and extended the conceptual model proposed in Study 1. Manipulated power increased self-reported health competency and positive emotion among powerholders relative to the powerless. Positive emotion helped to explain the relationship between power and health-related outcomes. Findings provided evidence for the present conceptual model using manipulated (rather than measured) power as an independent variable and alternative operationalizations of positive emotion and health. Enhanced social power may improve health-related outcomes by enhancing positive emotion.

### General discussion

The current research tested positive emotion as a pathway linking power to health. Because positive emotion has been independently linked to both power and health, the present studies applied these distinct bodies of literature to examine whether positive emotion may serve as a novel avenue to facilitate health-related outcomes. The robust nature of these relationships

demonstrated across varied methodologies provided evidence of the reliability of the present conceptual model linking power to health-related outcomes through positive emotion.

First, our finding in Study 1 that participants who wrote powerful (vs. powerless) narratives used more positive emotion words expands upon the approach-inhibition theory of power (Cho & Keltner, 2020) to explain the association between power within a specific context—rather than more constant or trait social power that is more heavily influenced by one's position within the broader social hierarchy—and positive emotionality. Study 2 similarly demonstrated a positive relationship between power and positive emotion, whereby participants randomized to the high-power condition reported greater overall positive emotion compared to participants randomized to the low-power condition. Though not directly investigated, based on the present findings, it could be hypothesized that when individuals feel powerful in a social interaction, they may experience greater positive emotionality as a function of their increased access to rewards and freedoms in that same social interaction. Accordingly, individuals who feel powerless within a given social interaction may be at risk for experiencing lesser positive emotionality. These findings have implications for the continued study of strategies to induce positive emotion. For example, it is possible that, in a specific social relationship in which an individual anticipates (or is currently) experiencing a sense of powerlessness, a manipulation of power, such as a self-narrative task as used in Study 1 (Galinsky et al., 2003) or an imagined power distribution used in Study 2 (adapted from Goodman et al., 2001), could increase feelings of power and, in turn, positive emotionality (see Galinsky et al., 2015 for review of approaches to manipulating power). Replication and extension of the current research can guide a more nuanced understanding of the link between power and concurrent or near-term positive emotion (Cho & Keltner, 2020; Keltner et al., 2003).

Second, our finding that participants in the powerless conditions in Studies 1 and 2 referenced a significantly higher proportion of words related to health and reported greater health competency, respectively, is consistent with preliminary data linking feelings of power and health (Scheepers et al., 2012). An extensive body of literature suggests locus of control, a similar but distinct construct from sense of power, is associated with health (e.g., Bettencourt, Talley, Molix, Schlegel, & Westgate, 2008). For example, Bettencourt et al. (2008) found that breast cancer patients who endorsed external forms of locus of control experienced lower perceived health. However, the major difference between sense of power and locus of control is that sense of power is defined as control over another person's behavior, whereas locus of control explains the extent to which a

person attributes their own life outcomes to their own behavior (Kesavayuth et al., 2020). Based on the current findings, it could be hypothesized that, in social contexts in which individuals feel powerful (rather than a general sense of an internal locus of control as generally studied), they feel healthier and perceive themselves as having greater overall well-being, making their health less salient and leading them feel more competent about managing their health. Alternatively, when feeling powerful, perhaps health salience declines and health competency increases because people believe that, regardless of their health status, they will be able to influence their healthcare provider's decision making, which can have downstream positive effects on their own health. Further replication is needed to garner a more nuanced understanding of the relationship between power and health.

Last, although use of positive emotional words shared only a trending association with reference to health in Study 1, the full mediational model indicated the association between power and health was explained by positive emotion such that greater feelings of power and concurrently more frequent use of positive emotional words were associated with fewer references to health. The former findings are inconsistent evidence of a relationship between positive emotion and health, as Ironson et al. (2018) found that greater positive emotion was associated with lower c-reactive protein levels, an index of inflammation, in both healthy and chronically ill adults and may be a product of our use of references to health rather than participants' objective health status. Nonetheless, Study 1 extended this model to apply our understanding of positive emotion and health in the context of feeling powerful or powerless. In Study 2, positive emotion shared a significant association with health competency such that greater self-reported positive emotion was related to greater perceived health competency. This finding is consistent with prior literature and supports the supposition that positive emotion and health are intertwined (e.g., Andreasson et al., 2013; Ironson et al., 2018; see also Pressman et al., 2019 for review). Though it was outside of the scope of the current studies to examine participants' perceived health status as an outcome, it can be hypothesized that, when individuals feel more powerful and experience greater positive emotion in a given context, they may either feel healthier or well, or perhaps generally be less concerned about their health status in that moment (as observed by the fewer references to health and greater health competency found in the current studies for powerful vs. powerless participants). Conversely, when individuals feel less powerful in a social interaction, they may experience more negative emotions and feel unhealthy or unwell, such that their perceived health is more salient in that context (as observed by the greater references to health found in the



current study for powerless vs. powerful participants) and they perceive themselves as less competent in managing their health. Further replication of findings is needed to more clearly understand this potential pathway linking power to health via positive emotion.

### Limitations

Findings should be considered within the context of the limitations of this research. First, LIWC software provided proportions of reference to categories such as positive emotion and health, but the software cannot describe *how* participants discussed these categories. Second, the mediation analysis conducted in Study 1 should be interpreted as exploratory because the study's non-experimental methodology could not establish causality nor temporal precedence (Kendall et al., 2017). Study 2 and future experimental investigations of similar conceptual models can address these limitations. Third, participants in both studies were predominantly White, which could result in lack of generalizability of the results to other racial/ethnic groups. Last, our use of a self-narrative and self-reported health competence without also acquiring other measures of health (e.g., medical chart review) limits the generalizability of findings and our understanding of the link between power, positive emotion, and objective physical health functioning.

### Conclusion and future directions

This research provided preliminary findings supporting potential relationships between power, positive emotion, and health. Inducing feelings of power via random assignment to write about a past experience increased use of positive emotional words and reduced reference to health. Similarly, inducing feelings of power via random assignment to a high-power versus a low-power condition was related to greater self-reported positive emotion and health competency. Future research should attempt to replicate and extend the present findings among people who both hold and lack positional power within a social hierarchy (e.g., in the workplace, in the family) and among members of diverse cultural groups (see Park et al., 2013; Yong, Hartanto, & Tan, 2021). Additionally, future studies should manipulate power and measure its effect on health using mixed methodology, including a review of participants' medical chart or collection of physiological measures to acquire objective health data (e.g., heart rate variability) and provide more ecologically valid measurements such as those utilized by Scheepers et al. (2012). Importantly, such investigation should delineate between positive and negative health outcomes. If studies found that manipulating power significantly impacted health, just-



in-time adaptive interventions (e.g., Nahum-Shani et al., 2018) could be used to administer the power manipulation at various daily timepoints. Lastly, it would be advantageous to analyze participants' narratives qualitatively using a grounded approach (e.g., constant comparative method; Glaser & Strauss, 1967; see Livingston & Vik, 2021) to further explain the relationships between power, positive emotion, and health.

## Note

1. Participants responded to fewer measures than in Study 1 and did not write a personal narrative; thus, compensation was commensurate with study completion time (median = 3 min).

## Ethics approval

The Institutional Review Board at Angelo State University provided approval for this research.

## Consent form

All participants provided consent.

## Author contributions

TL: conceptualization, methodology, software, formal analysis, resources, writing, review, editing, project administration, visualization; CC: conceptualization, methodology, writing, review, editing; JS: conceptualization, review, editing.

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## Data availability statement

Data are available via the Open Science Framework ([https://osf.io/rufxq/?view\\_only=b09c8ebe92fa48968d41fb8f99860493](https://osf.io/rufxq/?view_only=b09c8ebe92fa48968d41fb8f99860493)) or by contacting the corresponding author (TL).

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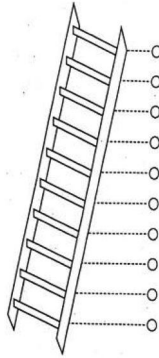
## APPENDIX

The manipulation of power in Study 2 asked participants to imagine that they occupied a position of high-power or low-power according to random assignment. Images and instructions were adapted from Goodman et al. (2001) as follows.

### Instructions

Imagine that the ladder below pictures *how power is distributed in society*.

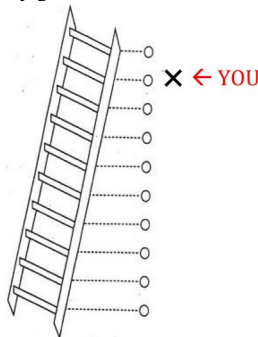
- At the top of the ladder are people with the **most power**: They have the **most** control, influence, and ability to evaluate others.
- At the bottom are people with the **least power**: They have the **least** control, influence, and ability to evaluate others.



### High-power condition

Imagine that your position in the workplace is near the top of the power ladder. You have a lot of power to control, influence, and evaluate others.

As you complete the survey, you will need to remember that ***your position is near the top of the ladder: You have a lot of power.***



### Low-power condition

Imagine that your position in the workplace is near the bottom of the power ladder. You have very little power to control, influence, and evaluate others.

As you complete the survey, you will need to remember that ***your position is near the bottom of the ladder: You have very little power.***

