



Everyday discrimination and cancer metaphor preferences: The mediating effects of needs for personal significance and cognitive closure

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ABSTRACT

Metaphors are often used to describe cancer experiences (e.g., battle, journey). Few studies explore how social threats (e.g., discrimination) shape metaphor preferences. We examined the relationship between discrimination and preferences for cancer *battle* metaphors (i.e., concrete, action-based) versus *journey* metaphors (i.e., open-ended, reflective) and mediating effects of needs for personal significance and cognitive closure. We also stratified the analysis when discrimination was/was not attributed to race and by racial/ethnic group.

Four-hundred twenty-seven U.S. participants completed an online survey. Items included everyday discrimination, need for personal significance, need for cognitive closure, and preference for cancer scenarios using battle or journey metaphors. Multigroup structural equation modeling examined: serial mediation (i.e., discrimination predicting metaphor preference via needs for personal significance and cognitive closure) stratified by discrimination attribution; and single mediation (i.e., discrimination predicting need for cognitive closure via need for personal significance) stratified by racial/ethnic group.

Discrimination was associated with *battle* metaphor preferences through serial mediation when discrimination was not attributed to race ($\beta = 0.02$, 95% CI [0.01,0.05]). Discrimination was directly associated with *journey* metaphor preferences ($\beta = -0.20$, 95% CI [-0.37,-0.06]) and the serial mediation was nonsignificant when discrimination was attributed to race. The single mediation model varied across racial/ethnic groups and was strongest for Non-Hispanic White participants ($\beta = 0.17$, 95% CI [0.07,0.30]).

Discrimination may shape cancer metaphor preferences through needs for personal significance and cognitive closure, yet these relationships differ based on whether discrimination is attributed to race and racial/ethnic group. Given that the U.S. health system often focuses on battle metaphors when framing cancer treatment and screenings, individuals who prefer journey metaphors (i.e., those who experienced more frequent racial discrimination in the present study) may experience a systematic disadvantage in cancer communication. A more careful consideration of cultural, racial, and ethnic differences in metaphor use may be a crucial step towards reducing cancer disparities.

1. Introduction

Cancer experiences are often processed by using conceptual metaphors to describe cancer in more tangible terms (e.g., describing the experience as a “battle” or “journey”) (Lakoff & Johnson, 2003; Reisfield & Wilson, 2004), to help patients communicate about their disease, and to make sense of complex and often difficult experiences (Harrington,

2012). Given their role in the conceptualization and communication of cancer experiences, patient-centered metaphor use in cancer care has gained increased attention in the cancer literature (Gustafsson et al., 2020; Hommerberg et al., 2020). This increased attention includes recent research suggesting that patients can use cancer metaphors as a type of coping strategy (i.e., an emotional, cognitive, or behavioral response to stress) (Gustafsson et al., 2020; Nipp et al., 2016) and related

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studies demonstrating that coping styles can vary by racial/ethnic group (Kagawa-Singer, 1993; Umezawa et al., 2012). Among older women living with breast cancer, for example, religious/spiritual coping was commonly reported among African Americans and Latinas (Umezawa et al., 2012), whereas White Americans living with various forms of cancer commonly expressed beliefs related to fighting and their individual strength (Kagawa-Singer, 1993). Furthermore, since coping styles and cancer metaphors can affect patient-provider communication and both psychological and physiological cancer-related outcomes (Casarett et al., 2010; Greer et al., 2020; Gustafsson et al., 2020; Svensson et al., 2016), the recognition and careful consideration of cultural, racial, and ethnic differences in coping and metaphor use is increasingly recognized as a crucial step to reduce disparities in cancer outcomes (e.g., prevention, screening, and treatment) between patients from racial/ethnic minority groups and their Non-Hispanic White counterparts (Kagawa-Singer et al., 2010; McMullin et al., 2009).

Despite these findings on racial and ethnic differences in coping styles, cross-cultural differences in cancer care are poorly understood and rarely addressed in clinical settings (Kagawa-Singer et al., 2010). Cultural, racial, and ethnic differences can influence the ways in which individuals think about and respond to cancer and the health care system (e.g., perceptions of cancer risk, trust in health care providers and institutions) as well as patients' interactions with providers and quality of care (Kagawa-Singer et al., 2010). However, a recent nationally representative survey found that compared to patients who identified as Non-Hispanic White, those who identified as Hispanic/Latino and/or racial/ethnic minoritized groups reported a lower likelihood of receiving care by physicians who shared or understood their culture (Butler et al., 2020). Cross-cultural differences in cancer metaphor use and coping styles are factors that contribute to patients' diverse cancer care experiences, yet limited research addresses the development and complexity of metaphor use within coping styles and how cancer metaphor preferences differ based on patients' race, ethnicity, and culture (Gustafsson et al., 2020; Kagawa-Singer et al., 2010; Rivas et al., 2016; Semino et al., 2017). These gaps in the literature may be informed by a better understanding of the factors that shape individuals' metaphor preferences (Hendricks et al., 2018; Semino et al., 2017).

In the U.S., many cancer metaphors are framed in violent terms, such as waging a war or fighting a battle against cancer, defending against invasion, or confronting an enemy (Reisfield & Wilson, 2004). In some cases, these representations, collectively referred to as *battle* metaphors, can empower individuals through increased personal agency and feelings of solidarity with other fighters and survivors of cancer (Semino et al., 2017). In other cases, battle metaphors can disempower individuals through increased feelings of fatalism, decreased intentions to engage in preventive behaviors, and increased feelings of personal failure and inadequacy if treatment fails (Hauser and Schwarz, 2015, 2020; Hendricks et al., 2018).

Alternatively, cancer can be framed as an experience with a starting point and destination, collectively representing *journey* metaphors (Landau et al., 2014; Reisfield & Wilson, 2004). Journey metaphors include terms such as traveling down a road or path that may include bumps, unexpected turns, struggles, and hope (Reisfield & Wilson, 2004). Some patients find journey metaphors comforting and supportive, whereas other patients consider them too peaceful/passive or they consider themselves reluctant travelers on a journey without control, which can feel disempowering (Semino et al., 2017).

Conceptual metaphor theory (Lakoff & Johnson, 2003) and motivational needs frameworks (Kruglanski et al., 2021; Kruglanski & Webster, 1996) provide insight into the development of metaphor preferences and their variance across individuals. Given that metaphor use is shaped by the physical and social environment (Lakoff & Johnson, 2003; Landau, 2018; Landau et al., 2014), social experiences may influence individuals' thought processes and how they choose to conceptualize their life experiences by activating certain psychological "needs" (i.e., resources or conditions required for well-being

(Vansteenkiste et al., 2020)). A recent set of studies found that exposure to social threats, or situations that cause psychological harm such as rejection, betrayal, or being devalued by others, can activate a specific set of psychological needs (i.e., the need for personal significance and the need for cognitive closure) (Webber et al., 2018). Additional social threats, such as exposure to discrimination (i.e., differential and often unfair treatment based on one's social group (Krieger, 2014)), may activate these psychological needs and in turn, influence metaphor preferences. Examination of this process addresses recent calls to better understand how social experiences affect the use of metaphors (Hendricks et al., 2018; Landau, 2018).

Discrimination and metaphor use. The association between discrimination and metaphor use may be particularly important in the healthcare context, given previous studies linking discrimination to disparities in patient-provider cancer care communication (Hausmann et al., 2011). Discrimination disproportionately affects individuals from racial and ethnic minority groups (Davis, 2020) who are more likely than White patients to experience poorer communication with their health care providers and less patient-centered decision-making (Cooper & Roter, 2003, pp. 552–593). Therefore, it is plausible that physicians' increased knowledge of and cultural sensitivity to the roles that discrimination and metaphor preferences play could improve patient-provider cancer care communication with patients from racial/ethnic minority backgrounds. Given the outcomes associated with poor communication (e.g., lower satisfaction with cancer care, lower trust in providers, and poorer adherence to cancer screening and treatment (Mead et al., 2013; Street et al., 2016)), additional studies focused on metaphor use among diverse populations may help reduce these racial/ethnic disparities in cancer care communication and may ultimately improve cancer outcomes for all patients.

Moreover, the association between discrimination and metaphor use could contribute to the development of racial and ethnic differences in coping styles. Existing literature suggests that coping styles often vary based on cultural beliefs (e.g., the duty to protect others from worrying by hiding cancer diagnoses in African American families (Passmore et al., 2017; Rivas et al., 2016), fatalistic views about cancer among Mexican-American breast cancer survivors (Gonzalez et al., 2016)). In addition, individuals' psychological needs could be activated by the threat of cancer itself (e.g., the need for safety, the need for autonomy (Vansteenkiste et al., 2020)). As such, it is plausible that both coping styles and metaphor preferences develop in response to a combination of physical and social factors (e.g., cultural beliefs, cancer threat, and/or social threat) that could vary across racial/ethnic groups.

Discrimination, need for personal significance, and need for cognitive closure. Previous literature suggests that discrimination can threaten self-esteem, especially if individuals internalize the reason for discrimination (Smart Richman & Leary, 2009). These experiences can compromise an individual's sense of personal significance (i.e., a sense of mattering, respect from others, and feelings of self-worth (Deci & Ryan, 2000; Fiske, 2010; Frankl, 1962; Kruglanski et al., 2014; Maslow, 1943)) and undermine the universal motivation to perceive oneself positively (Webber et al., 2018). Consequently, social threats that cause a loss of personal significance (e.g., shame, humiliation, disempowerment) can prompt individuals' desire to restore their significance (also referred to as "the need for personal significance" (Kruglanski et al., 2021)).

Given the evidence that discrimination can threaten self-worth (Jia et al., 2017), it is likely that it can activate the need for personal significance and as a result, destabilize an individual's sense of self, and increase their feelings of personal uncertainty (i.e., sense of doubt or feeling uncertain about oneself) (van den Bos, 2009). Since the experience of uncertainty is often aversive and stressful (Mendes et al., 2007), individuals with heightened feelings of personal uncertainty may develop a need for control, stability, and cognitive closure (i.e., the psychological construct termed "need for cognitive closure" which represents a general intolerance of uncertainty, a desire for definitive

answers, and an aversion to ambiguity (Kruglanski & Webster, 1996)). Fulfilling this need for cognitive closure can therefore provide individuals with a means of reestablishing certainty or coherence. In this proposed process, more frequent exposure to discrimination may result in higher chronic needs for personal significance and cognitive closure.

Proposed links to cancer metaphor use. Prior studies have established causal pathways between need for personal significance and need for cognitive closure (Webber et al., 2018), but have yet to tie social threats like discrimination to cancer metaphor preferences. Once in a state of a heightened need for cognitive closure, individuals may wish to conceptualize additional threats, like the experience of cancer, in a way that provides decisive action and certainty. Battle metaphors, representing concrete actions and targets such as ‘fight’ and ‘enemy’, may provide certainty more than journey metaphors.

Discrimination could be associated with cancer battle metaphors by increasing the needs for personal significance and cognitive closure. However, it is possible that certain types of discrimination, specifically racial discrimination, may function differently than other forms of discrimination (e.g., gender, age), and could vary by racial/ethnic group. These potential differences would likely be based on whether the experience of discrimination activates the process linking discrimination to metaphor preferences beginning with the need for personal significance. Prior literature provides mixed evidence regarding this relationship, with some studies linking racial discrimination to poorer self-esteem and others to higher self-esteem by allowing for external attribution (i.e., attributing negative encounters to discrimination rather than the self) (Versey & Curtin, 2016). In addition, experiences of discrimination can differ based on culturally perceived racial stereotypes (Zou & Cheryan, 2017). These different experiences of racial discrimination (i.e., the extent to which racial discrimination is attributed to the self and reduces personal significance, as well as the heterogeneity in experiences of racial discrimination across racial/ethnic groups) suggest a unique area for research connecting racial discrimination to cancer metaphor use. Specifically, the pathways between discrimination, need for personal significance, and need for cognitive closure could vary across racial/ethnic groups and the relationship between discrimination and cancer metaphor use could also vary based on whether discrimination is attributed to race/ethnicity.

Present study. The present study aims to address these gaps in the literature by examining whether perceptions of everyday discrimination (henceforth referred to as discrimination) are associated with individuals’ need for personal significance and need for cognitive closure, and in turn, influence their preferences for cancer *battle* metaphors (i.e., action-based and concrete) versus cancer *journey* metaphors (i.e., open-ended and reflective). In addition, this study explores whether these relationships vary by attribution of discrimination (i.e., the presence versus absence of racial discrimination) and whether the relationship between discrimination, need for personal significance, and need for cognitive closure differs by racial/ethnic group. Through studying this mediation process, the present study findings could inform communication practices in the delivery of cancer care by providing a better understanding of the underlying processes connecting discrimination, psychological needs, and cancer metaphor preferences.

2. Material and methods

2.1. Data source

Participants (N = 542) were recruited from January 8, 2021 to February 17, 2021 using the online survey platform Prolific, which includes an opt-in pool of participants from around the world (additional details on Prolific can be found elsewhere (Palan & Schitter, 2018)).

Prolific users who were at least 18 years of age and living in the U.S. were eligible to complete the survey on “Health Attitudes.” Participants were recruited using a disproportionate stratified sampling-based approach in which specific subgroups of participants were recruited

based on race/ethnicity, education level, and income (Table S1). Given that online sampling platforms tend to overrepresent White and highly educated participants (Kennedy et al., 2016), this sampling approach was designed to capture racial/ethnic subgroups of the population to allow for more meaningful comparisons across race/ethnicity, and to increase the diversity of the sample in terms of education level and income. Sampling weights were not used, as this study did not include a probabilistic national sample.

Participants accessed the survey and received compensation (\$8.00/hour) through the integrated Prolific online platform. Informed consent was obtained from all participants prior to participation and all procedures were approved by the University of Maryland Institutional Review Board. This study was conducted as part of a larger study about metaphor preferences. In the present study, participants read both the battle and journey metaphor scenarios and selected their preference between the two scenarios. They then responded to a series of questions on discrimination, need for personal significance, need for cognitive closure, and sociodemographic characteristics.

Participants were excluded if they did not complete the survey responses (i.e., returned submissions or unfinished responses) and if they did not pass required attention checks (n = 115). The final analytic sample included non-missing data for 427 participants between the ages of 18 and 77 years.

2.2. Measures

2.2.1. Exposure variables

Everyday discrimination. Perceived everyday discrimination was assessed using an adapted nine-item version of the Everyday Discrimination Scale (EDS) (Williams et al., 2008) (Cronbach’s $\alpha = 0.88$ in this sample). The EDS captured encounters of chronic mistreatment in everyday life such as “You receive poorer service than other people at restaurants or stores” and “You are threatened or harassed” (Table S2). Response options ranged from “Never” (1) to “Almost every day” (6). The mean score of everyday discrimination was calculated from these responses, with higher scores representing more frequent exposure to discrimination.

Attribution of everyday discrimination. Participants who reported experiencing everyday discrimination (more than “Never” on the 6-point EDS response scale) (Williams et al., 2008) were asked to select from a list of predetermined items (e.g., race and non-racial factors such as gender and age) that indicated the main reason for these experiences (Table S2). A binary variable was created to indicate the presence of racial discrimination (i.e., participants who selected race as a reason for experiencing any item of everyday discrimination) or absence of racial discrimination (i.e., participants who did not experience discrimination attributed to their race or did not experience discrimination).

2.2.2. Mediating variables

Need for personal significance. Need for personal significance was measured using a 6-item Quest for Significance scale recently validated in a diverse sample including participants from Poland, Italy, Argentina, and the U.S. (Cronbach’s $\alpha = 0.95$ in this sample) (Molinario et al., 2021). The scale included items such as “I wish I could be more respected” and “I wish I was more appreciated by other people.” The 7-point response scale ranged from “Strongly Disagree” to “Strongly Agree” (Table S3). The mean score was calculated from these responses with higher scores representing greater desire for increased personal significance.

Need for cognitive closure. Need for cognitive closure was measured using the Need for Closure 15-item scale (Cronbach’s $\alpha = 0.87$ in this sample) (Roets & Van Hiel, 2011) which included items such as “I enjoy having a clear and structured mode of life” and “I dislike unpredictable situations.” The 6-point response scale ranged from “Strongly Disagree” to “Strongly Agree” (Table S4). The mean score was calculated from these responses, with higher scores representing greater desire for

cognitive closure.

2.2.3. Outcome variables

Preference for battle versus journey. Participants were asked to review two scenarios describing a person's experience with cancer (presented in a random order). The *battle* scenario described cancer using the terms "battle," "fight" and "battlefield." The *journey* scenario described cancer using the terms "journey," "road" and "path." Participants were asked to select the scenario that best represented their thoughts about cancer (Table S5).

2.2.4. Sociodemographic variables

The present study controlled for participants' self-reported age (in years), gender (male, female, gender non-conforming), education level (a high school diploma or less, some college credit or vocational training, college degree, graduate degree), and annual household income (less than \$50,000, \$50,000 - \$99,000, \$100,000 or more). The presentation of the battle or journey metaphor in the first part of the larger study was also included to control for any potential primacy effects (i.e., the order of scenario presentation) stemming from the larger study. Participants' self-reported race (American Indian or Alaska Native; Asian; Black or African American; White; Other or More than one race) and ethnicity (Hispanic or Latino; Non-Hispanic or Non-Latino) were included in all models with the exception of the models stratified by racial/ethnic group. No participants self-identified as Native Hawaiian or Other Pacific Islander.

2.3. Data analysis

Descriptive statistics including t-tests, Analysis of Variance (ANOVA) and chi-square tests to examine group differences were conducted in R version 4.0.2. Unadjusted and adjusted mediation analyses and multigroup structural equation modeling (SEM) were conducted in Mplus Version 8.4 (Muthén & Muthén, 2017). The adjusted models included age as a continuous variable and ethnicity, race, gender, education level, annual household income, and presentation of the battle or journey metaphor scenario in Part I as categorical variables. A power analysis assuming medium effect sizes based on previous evidence (Webber et al., 2018) suggested that the analysis was sufficiently powered (Lovakov and Agadullina).

Serial mediation analysis (discrimination, need for personal significance, need for cognitive closure, and metaphor preference) in the full study sample. A mediation model using the full study population (N = 427), 10,000-sample bootstrap estimation of the indirect effect, and 95% bias-corrected confidence intervals tested whether discrimination was associated with preference for battle versus journey metaphors via need for personal significance and need for cognitive closure. The mean scores for discrimination (exposure), need for personal significance (mediator 1), and need for cognitive closure (mediator 2) were treated as continuous variables with preference for metaphors (battle versus journey) treated as a binary variable (outcome). Given the binary outcome, a probit function with a diagonally weighted least squares approach (weighted least squares mean and variance adjusted robust estimator, WLSMV) and a theta parameterization were selected for the model.

Multigroup comparisons of serial mediation stratified by discrimination attribution (presence versus absence of racial discrimination). Multigroup SEM was used to compare the results of the serial mediation model in the group of participants who experienced racial discrimination compared with those who did not experience racial discrimination. This model included a probit function, WLSMV estimator, and theta parameterization.

Multigroup SEM allowed for testing group differences in the significance of specific direct and indirect paths in mediation models (Ryu & Cheong, 2017). In order to assess differences in the mediation model between those who experienced racial discrimination and those who did

not, a model with all paths constrained to be equal between the two groups was compared to a model in which the paths were allowed to vary freely. Sociodemographic variables were allowed to vary freely.

A series of model comparisons then tested for specific path differences using chi-square tests and model fit indices. Model fit indices included the Comparative Fit Index (CFI), Root Mean Square Error Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Goodness of fit recommendations were assessed using general guidance of CFI ≥ 0.95 , RMSEA < 0.05 , and SRMR < 0.08 (Hu & Bentler, 1999).

Multigroup comparisons of single mediation (discrimination, need for personal significance, and need for cognitive closure) stratified by racial/ethnic group. Mediation power analysis (Fritz & Mackinnon, 2007) using anticipated medium effect sizes (based on previous studies (Webber et al., 2018)) allowed for testing mediation in each racial/ethnic group, yet the stratified group sample sizes did not provide enough a priori power to examine metaphor preference as a binary outcome (Peduzzi et al., 1996). Therefore, a single mediation model and multigroup comparisons examined whether discrimination (exposure) was associated with need for cognitive closure (outcome) via need for personal significance (mediator) among participants who identified as Non-Hispanic White, Non-Hispanic Asian, Non-Hispanic Black, and Hispanic. This model did not include participants who identified as Non-Hispanic American Indian or Alaska Native, or Non-Hispanic Other or More than one race given the small sample size of these groups (N = 5). Therefore, the sample size for the single mediation analysis included 422 participants. Mediation analysis included a 10,000-sample bootstrap estimation of the indirect effect, 95% bias-corrected confidence intervals, and a maximum likelihood estimator. The adjusted model included all sociodemographic variables except for race and ethnicity. Wald tests were used to examine parameter differences in the mediation paths among racial/ethnic groups.

3. Results

3.1. Descriptive statistics

Sociodemographic Characteristics. Most participants self-identified as Non-Hispanic (74%) and White (42%), followed by Asian (25%), Black or African American (23%) and other (i.e., Other or, More than one race, American Indian, or Alaska Native) (9%). Participants were more likely to be women (54%) and on average, were 31 years of age (SD = 11.7). Most participants had at least some college or vocational training (87%) and an annual household income of \$50,000–99,000 (Table 1). However, the group of participants who experienced racial discrimination was slightly younger, had a smaller proportion of participants that identified as White, and had greater proportions of participants that identified as Asian, Black or African American, and Other or More than one race, compared to the group of participants who had not experienced racial discrimination.

Distribution of discrimination, need for personal significance, need for cognitive closure, and metaphor preference. Ninety-three percent of participants (n = 399) reported experiencing some degree of discrimination (i.e., more than never for at least one of the items on the Everyday Discrimination Scale). The mean scores for discrimination, need for personal significance, and need for cognitive closure were all significantly higher among those who had experienced discrimination attributed to race compared to those who had not experienced discrimination attributed to race (Table 2) ($p < 0.001$ (discrimination), $p < 0.001$ (need for personal significance), and $p = 0.04$ (need for cognitive closure)). Metaphor preferences did not differ significantly across these groups ($p = 0.78$), yet the preference for battle metaphors compared to journey preferences was 53.6% in the full study population, 54.2% in the presence of racial discrimination, and 52.9% in the absence of racial discrimination.

The mean scores for discrimination and need for personal

Table 1
Characteristics of the study population.

	Full Study Population (N = 427)	Presence of Racial Discrimination (n = 236)	Absence of Racial Discrimination (n = 191)	p value ^b
	n (%) or Mean (±SD ^a)	n (%) or Mean (±SD ^a)	n (%) or Mean (±SD ^a)	
Ethnicity				0.29
Hispanic or Latino	110 (25.8)	56 (23.7)	54 (28.3)	
Non-Hispanic or Non-Latino	317 (74.2)	180 (76.3)	137 (71.7)	
Race^c				<0.001
White	180 (42.2)	39 (16.5)	141 (73.8)	
Asian	107 (25.1)	83 (35.2)	24 (12.6)	
Black or African American	100 (23.4)	85 (36.0)	15 (7.9)	
Other or More than one race	36 (8.4)	27 (11.5)	9 (4.7)	
American Indian or Alaska Native	4 (0.9)	2 (0.8)	2 (1.0)	
Age	30.9 (±11.7)	29.8 (±10.6)	32.2 (±12.7)	0.03
Gender				0.58
Male	187 (43.8)	99 (42.0)	88 (46.1)	
Female	231 (54.1)	131 (55.5)	100 (52.3)	
Gender non-conforming	9 (2.1)	6 (2.5)	3 (1.6)	
Education				0.07
≤ High school diploma	55 (12.9)	22 (9.3)	33 (17.3)	
Some college/vocational training	113 (26.5)	69 (29.2)	44 (23.0)	
College degree	133 (31.1)	73 (31.0)	60 (31.4)	
Graduate degree	126 (29.5)	72 (30.5)	54 (28.3)	
Income				0.86
\$0–49,999	143 (33.5)	80 (33.9)	63 (33.0)	
\$50,000–99,999	164 (38.4)	88 (37.3)	76 (39.8)	
≥ \$100,000	120 (28.1)	68 (28.8)	52 (27.2)	

^a SD = Standard Deviation.

^b p values based on χ^2 and t-tests of group differences between racial discrimination and absence of racial discrimination.

^c No participants self-identified as Native Hawaiian or Other Pacific Islander.

significance differed across racial/ethnic groups ($p < 0.01$ and $p < 0.01$, respectively) (Table 3). Participants who identified as Non-Hispanic Black or African American reported the highest discrimination scores (mean = 2.3, SD 0.8) and those who identified as Non-Hispanic White reported the lowest (mean = 1.9, SD 0.7). Participants who identified as Non-Hispanic Asian reported the highest need for personal significance scores (mean = 4.8, SD 1.4) and those who identified as Non-Hispanic White reported the lowest (mean = 4.1, SD 1.7). Need for cognitive closure did not significantly differ across racial/ethnic groups ($p = 0.56$) (Table 3).

3.2. Serial mediation analyses and multigroup SEM

Discrimination, need for personal significance, need for cognitive closure, and metaphor preference in the full study population. Adjusted mediation analyses revealed more frequent exposure to discrimination was associated with higher need for personal significance ($\beta = 0.26$, 95% CI [0.18, 0.34]), higher need for personal significance was associated with higher need for cognitive closure ($\beta = 0.32$, 95% CI

Table 2
Distribution of discrimination, need for cognitive closure, metaphor preference and personal significance in the full study population and stratified by discrimination attribution.

	Full Study Population (N = 427)	Presence of Racial Discrimination (n = 236)	Absence of Racial Discrimination (n = 191)	p value ^b
	n (%) or Mean (±SD ^a)	n (%) or Mean (±SD ^a)	n (%) or Mean (±SD ^a)	
Discrimination	2.1 (±0.8)	2.3 (±0.8)	1.8 (±0.7)	<0.001
Need for personal significance	4.5 (±1.5)	4.7 (±1.4)	4.2 (±1.6)	<0.001
Need for cognitive closure	3.9 (±0.8)	4.0 (±0.8)	3.9 (±0.8)	0.04
Metaphor preference				0.78
Battle Scenario	229 (53.6)	128 (54.2)	101 (52.9)	
Journey Scenario	198 (46.4)	108 (45.8)	90 (47.1)	

^a SD = Standard Deviation.

^b p values based on χ^2 and t-tests of group differences between racial discrimination and absence of racial discrimination.

Table 3
Distribution of discrimination, need for cognitive closure, and need for personal significance stratified by racial/ethnic group status.

	Non-Hispanic White (n = 109)	Non-Hispanic Asian (n = 107)	Non-Hispanic Black (n = 96)	Hispanic (n = 110)	p value ^b
	Mean (±SD ^a)	Mean (±SD ^a)	Mean (±SD ^a)	Mean (±SD ^a)	
Discrimination	1.9 (±0.7)	2.0 (±0.6)	2.3 (±0.9)	2.1 (±0.8)	<0.01
Need for personal significance	4.1 (±1.7)	4.8 (±1.4)	4.6 (±1.4)	4.6 (±1.4)	<0.01
Need for cognitive closure	3.9 (±0.8)	4.0 (±0.7)	3.9 (±0.8)	4.0 (±0.8)	0.56

^a SD = Standard Deviation.

^b p values based on ANOVA tests of group differences between racial/ethnic groups.

[0.20, 0.43]), and higher need for cognitive closure was associated with preference for battle (versus journey) metaphors ($\beta = 0.18$, 95% CI [0.06, 0.30]) (Fig. 1). There were also significant serial indirect effects of need for personal significance and need for cognitive closure on the association between discrimination and metaphor preference ($\beta = 0.02$, 95% CI [0.01, 0.04]). The total effect between discrimination and metaphor preference was nonsignificant ($\beta = -0.04$, 95% CI [-0.21, 0.13]).

Multigroup comparisons of serial mediation stratified by discrimination attribution. When stratifying groups by discrimination attribution, the model in which all paths varied freely across the two groups had a significantly better model fit compared to the fully constrained model (χ^2 (df = 6, N = 427) = 21.41, $p < 0.01$). Subsequent model comparisons revealed the best fitting model as the model allowing the paths between discrimination and need for personal significance and between discrimination and metaphor preference to vary freely. Allowing the remaining paths to vary freely did not improve the model's fit; therefore, these paths were constrained to be equal across groups. The final model had strong model fit (CFI: 1.00, RMSEA: 0.01, 90% CI

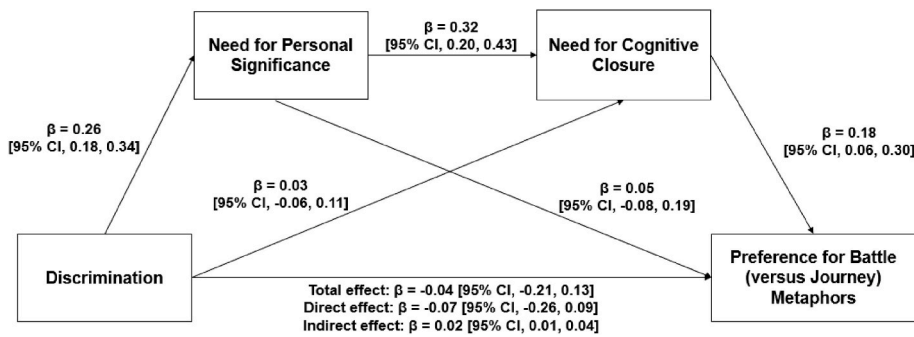


Fig. 1. The relationship between discrimination and preference for battle (versus journey) metaphors as mediated sequentially by need for personal significance and need for cognitive closure. The model is adjusted for race, ethnicity, age, gender, education, income and presentation of the battle or journey metaphor scenario in Part I. All presented effects are standardized.

[0.00, 0.10], SRMR: 0.03).

Among those who did not experience racial discrimination, adjusted mediation analyses (Fig. 2) revealed more frequent exposure to discrimination was associated with higher need for personal significance ($\beta = 0.40$, 95% CI [0.27, 0.52]), higher need for personal significance was associated with higher need for cognitive closure ($\beta = 0.31$, 95% CI [0.17, 0.43]), and higher need for cognitive closure was associated with preference for battle (versus journey) metaphors ($\beta = 0.19$, 95% CI [0.07, 0.32]). There were also significant serial indirect effects of need for personal significance and need for cognitive closure on the association between discrimination and metaphor preference ($\beta = 0.02$, 95% CI [0.01, 0.05]). The total effect between discrimination and metaphor preference was nonsignificant ($\beta = 0.10$, 95% CI [-0.10, 0.29]).

Among those who experienced racial discrimination, adjusted mediation analyses (Fig. 3) revealed there were significant associations between need for personal significance and need for cognitive closure ($\beta = 0.27$, 95% CI [0.15, 0.38]) and between need for cognitive closure and battle metaphors ($\beta = 0.17$, 95% CI [0.06, 0.31]). However, discrimination was not associated with need for personal significance among those who experienced racial discrimination ($\beta = 0.09$, 95% CI [-0.04, 0.22]). The serial indirect effects of need for personal significance and need for cognitive closure on the association of discrimination and metaphor preference were not statistically significant ($\beta = 0.004$, 95% CI [0.000, 0.02]). Furthermore, more frequent exposure to discrimination was directly associated with *journey* metaphor preferences in the presence of racial discrimination ($\beta = -0.20$, 95% CI [-0.37, -0.06]) and the total effect between discrimination and metaphor preference was significant ($\beta = -0.19$, 95% CI [-0.35, -0.04]).

3.3. Single mediation analyses and multigroup SEM

Multigroup comparisons of single mediation (discrimination, need for personal significance, and need for cognitive closure) stratified by racial/ethnic group. Multigroup comparisons were then used to examine the relationship between discrimination, need for

personal significance, and need for cognitive closure when stratified by racial/ethnic group. Metaphor preference was not included in the single mediation model given the sample size and limited a priori power to examine metaphor preference as a binary outcome. Adjusted mediation analyses (Fig. 4) revealed more frequent exposure to discrimination was associated with higher need for personal significance among participants who identified as Non-Hispanic White ($\beta = 0.39$, 95% CI [0.22, 0.53]), Non-Hispanic Black ($\beta = 0.22$, 95% CI [0.13, 0.44]), and Hispanic ($\beta = 0.35$, 95% CI [0.20, 0.54]). Among participants who identified as Non-Hispanic Asian, discrimination was not associated with need for personal significance ($\beta = 0.05$, 95% CI [-0.15, 0.23]). Higher need for personal significance was associated with higher need for cognitive closure among participants who identified as Non-Hispanic White ($\beta = 0.44$, 95% CI [0.23, 0.63]), Non-Hispanic Asian ($\beta = 0.32$, 95% CI [0.02, 0.57]), and Hispanic ($\beta = 0.25$, 95% CI [0.03, 0.45]). This relationship was nonsignificant for those who identified as Non-Hispanic Black ($\beta = 0.20$, 95% CI [-0.09, 0.46]). The indirect effects of need for personal significance on the association between discrimination and need for cognitive closure were significant among participants who identified as Non-Hispanic White ($\beta = 0.17$, 95% CI [0.07, 0.30]), Non-Hispanic Black ($\beta = 0.04$, 95% CI [0.003, 0.15]), and Hispanic ($\beta = 0.09$, 95% CI [0.03, 0.20]). These indirect effects were nonsignificant among participants who identified as Non-Hispanic Asian ($\beta = 0.02$, 95% CI [-0.04, 0.10]). The direct effect of discrimination on need for cognitive closure, after controlling for need for personal significance, was nonsignificant across all groups.

Wald tests revealed that the path between exposure to discrimination and need for personal significance was significantly stronger for participants who identified as Non-Hispanic White compared to Non-Hispanic Asian and Non-Hispanic Black (Wald χ^2 (Lakoff & Johnson, 2003) = 7.57, $p < 0.01$, Wald χ^2 (Lakoff & Johnson, 2003) = 5.73, $p = 0.02$, respectively). The indirect effects were significantly stronger for participants who identified as Non-Hispanic White compared to Non-Hispanic Asian (Wald χ^2 (Lakoff & Johnson, 2003) = 6.22, $p = 0.01$) and Non-Hispanic Black (Wald χ^2 (Lakoff & Johnson, 2003) = 5.49, $p =$

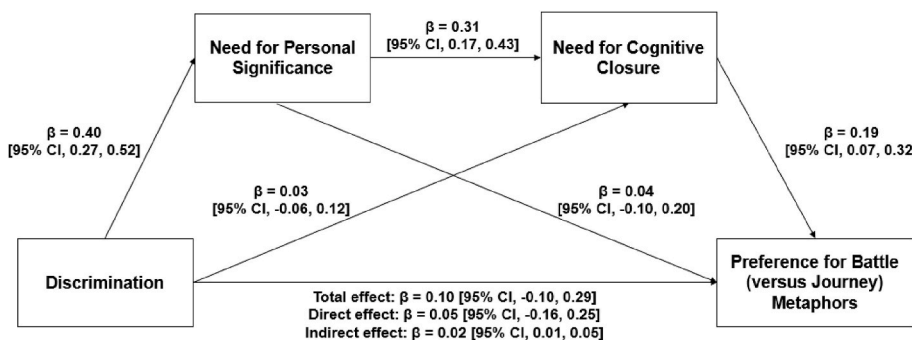


Fig. 2. The relationship between discrimination and preference for battle (versus journey) metaphors as mediated sequentially by need for personal significance and need for cognitive closure among participants who did not experience discrimination attributed to their race or did not experience discrimination (i.e., in the absence of racial discrimination). The model is adjusted for race, ethnicity, age, gender, education, income and presentation of the battle or journey metaphor scenario in Part I. All presented effects are standardized.

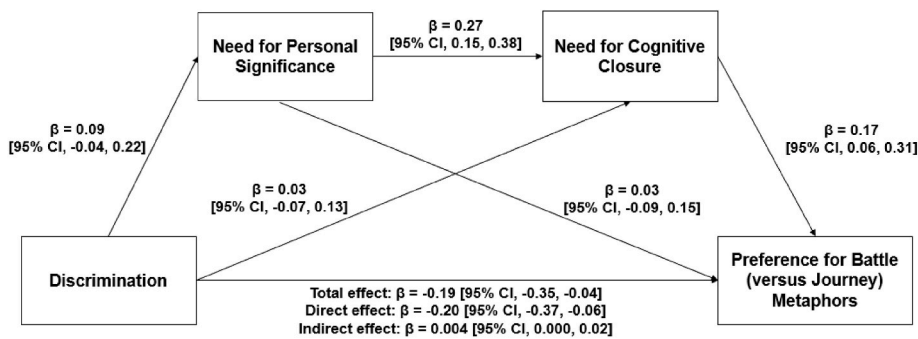


Fig. 3. The relationship between discrimination and preference for battle (versus journey) metaphors as mediated sequentially by need for personal significance and need for cognitive closure among participants who reported at least one instance of discrimination attributed to their race (i.e., in the presence of racial discrimination). The model is adjusted for race, ethnicity, age, gender, education, income and presentation of the battle or journey metaphor scenario in Part I. All presented effects are standardized.

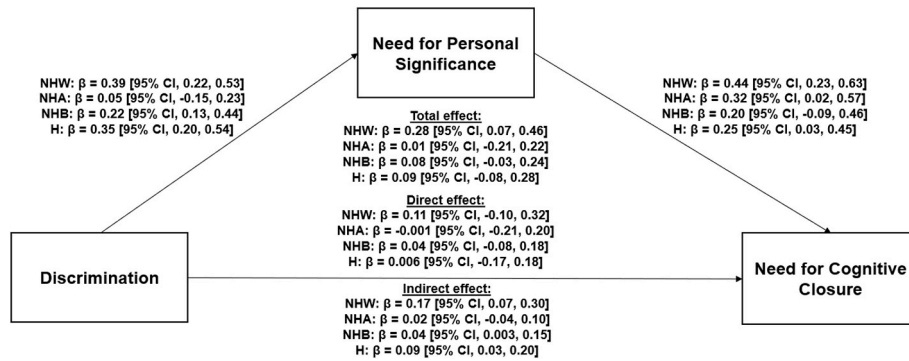


Fig. 4. The relationship between discrimination and need for cognitive closure as mediated by need for personal significance stratified by racial and ethnic group status (NHW: Non-Hispanic White, NHA: Non-Hispanic Asian, NHB: Non-Hispanic Black, H: Hispanic). The models are adjusted for age, gender, education, income and presentation of the battle or journey metaphor scenario in Part I. All presented effects are standardized.

0.02). The remaining paths did not vary significantly across groups.

4. Discussion

The present study makes novel connections between cancer metaphor and social psychological research by highlighting the ways in which social experiences and psychological needs can predict individuals' cancer metaphor preferences.

Discrimination, need for personal significance, need for cognitive closure, and metaphor preferences. In this study, discrimination was associated with cancer *battle* metaphor preferences through serial indirect effects of need for personal significance and need for cognitive closure, but these relationships existed only among those who did not experience racial discrimination (i.e., those who experienced other forms of discrimination such as gender or age discrimination and/or did not experience discrimination). Among those who experienced racial discrimination, discrimination was directly associated with cancer *journey* metaphor preferences and need for significance and need for cognitive closure did not mediate this relationship. These results suggest that the underlying thought processes related to racial discrimination may be different from other forms of discrimination. Recent research supports this notion, showing that perceptions of negative social treatment can activate different neural regions of the brain based on the type of discrimination experienced (i.e., racial discrimination compared to income, gender or weight discrimination) (Fourie et al., 2019).

Multigroup comparisons further highlighted the specific paths that differed in the presence versus absence of racial discrimination. In both the presence and absence of racial discrimination, higher need for personal significance was associated with higher need for cognitive closure and higher need for cognitive closure was associated with battle metaphor preferences. Given that these relationships held in both the presence and absence of racial discrimination, battle metaphors may provide a more action-based and concrete means of coping with cancer (Lupton,

2012) which may satisfy the need for cognitive closure.

However, path analysis revealed that discrimination was only significantly associated with need for personal significance in the absence of racial discrimination (i.e., among those who attributed discrimination to other factors such as their gender or age as well as those who did not experience any discrimination). These findings may be partially explained by prior literature suggesting that racial discrimination differentially impacts individuals' self-esteem based on whether the discriminatory action is internalized or attributed to external factors rather than the self (Versey & Curtin, 2016). Previous studies also found that women exposed to overt prejudice cues had higher self-esteem than those exposed to ambiguous prejudice cues (Major et al., 2003). Perhaps racial discrimination may be more overt than other forms of discrimination (e.g., gender discrimination or age discrimination) and may allow for more external attributions (i.e., attributing discrimination to the external factor of racism rather than attributing it to an internal characteristic related to the self). In these cases, external attributions may buffer the effects of discrimination on need for personal significance.

Preference for journey metaphors. The present study also revealed that discrimination was directly associated with preference for journey metaphors among individuals who experienced racial discrimination. These findings highlight two potential explanations connecting journey metaphor preferences to racial discrimination. Journey metaphors are often described more holistically through the lens of meaning-making, hope, and purpose (Hendricks et al., 2018; Reisfield & Wilson, 2004). Given the overlap of these characteristics with coping and resilience strategies, which can often buffer experiences of racial discrimination (Spence et al., 2016), perhaps individuals who experience racial discrimination may become accustomed to using journey-based strategies in response to various types of threats in their lives, which may apply to cancer threat. Alternatively, those who experience racial discrimination could also have negative attitudes toward battle

metaphors because they represent another challenge that requires actively using their already limited resources. Social threats like racial discrimination may represent battles that exhaust mental and physical resources for dealing with additional stressors (Smith et al., 2020; Smith and Schaefer, 2008).

Discrimination, need for personal significance, and need for cognitive closure stratified by racial/ethnic group. This study also makes important contributions to the study of discrimination and psychological needs among diverse racial/ethnic groups. Higher need for personal significance was associated with higher need for cognitive closure in all racial/ethnic groups (i.e., Non-Hispanic White, Non-Hispanic Asian, Non-Hispanic Black, and Hispanic). However, more frequent discrimination was not associated with need for personal significance in those who identified as Non-Hispanic Asian and need for personal significance was not associated with need for cognitive closure in those who identified as Non-Hispanic Black. Furthermore, the mediating effect of need for personal significance on discrimination and need for cognitive closure was significantly stronger for those who identified as Non-Hispanic White compared to those who identified as Non-Hispanic Asian or Non-Hispanic Black. Although this model did not include metaphor preference, these racial/ethnic differences in the association between discrimination and need for personal significance might suggest that the full underlying process linking discrimination to metaphor use could also vary across racial/ethnic groups. Frequent exposure to discrimination among individuals who identify as Non-Hispanic White might trigger battle metaphor preferences, but this may not occur in those who identify as Non-Hispanic Asian and Non-Hispanic Black. Such findings would be particularly important for cancer communication involving diverse populations that have high exposure to discrimination. In diverse populations, discrimination might differentially shape cancer metaphor preferences (i.e., the same discrimination might increase preference for battle metaphors for those who identify as Non-Hispanic White, but not for those who identify as Non-Hispanic Asian or Non-Hispanic Black).

Limitations. Limitations should be considered when interpreting these findings. The use of a nonprobability online panel reduced the ability to obtain results that can be generalized to the larger U.S. population (Newman et al., 2020). This is because participants drawn from such panels tend to be younger, more liberal, more highly educated, and less religious than the general U.S. population (Chandler & Shapiro, 2016). These panels also often underrepresent Black and Hispanic Americans (Kennedy et al., 2016; Paolacci & Chandler, 2014). Given the evidence that discrimination and feelings of personal significance and/or coping behaviors may differ based on race/ethnicity, socioeconomic status, age, and/or political affiliation (Bell et al., 2020; Brenner et al., 2018; Oskooii, 2018), the sampling strategy may have resulted in unknown sources of bias. Despite this limitation, the use of stratified sampling methods in this study helped to mitigate some of these issues related to representation among racial and ethnic groups, education levels, and annual income. The online panel also allowed participants to self-select into the study, which may have overrepresented perspectives from participants interested in health topics. Potential issues stemming from topical self-selection (Lehdonvirta et al., 2021) were mitigated by excluding specific details about the measures of discrimination, psychological needs, and cancer metaphors from the study description and by not requiring prior or current experience with cancer as inclusion criteria. Although the decision to include non-cancer patients limited the ability to generalize findings to cancer patients' metaphor preferences, 63.7% of participants responded "Yes" to the question "Have you or anyone close to you experienced cancer" measured at the end of the survey, suggesting that the patient perspective may have been included in this study.

In addition, the use of cross-sectional data limited the ability to make causal inferences given that the measures were assessed at one time point and the direction of these relationships could not be assumed. Moreover, the frequency of discrimination was measured, yet other

features were not assessed, such as severity, duration, or perceived stress. Given that these features have also been linked to self-worth (Pascoe, 2009), a more comprehensive measure of discrimination could more fully capture the relationship between discrimination and need for personal significance.

Finally, the indirect effects in the serial mediation occurred in the absence of a significant total effect of discrimination on battle metaphors. These findings may suggest that discrimination simultaneously activated need for significance and need for cognitive closure which were positively related to battle metaphors, while also activating an unobserved indirect pathway that was negatively related to battle metaphors (i.e., cancelling out the total effect (Hayes, 2009)). This explanation has been suggested in related studies on loss of significance and need for cognitive closure (Webber et al., 2018).

Strengths. Despite these limitations, the study had several strengths. This study addressed gaps in the health communication and psychological literature by examining specific individual and situational factors associated with metaphor preferences (Hendricks et al., 2018; Hommerberg et al., 2020; Landau, 2018; Semino et al., 2017). The use of validated measures capturing need for personal significance and need for cognitive closure helps illuminate important psychological processes linking social experience to individuals' conceptualization of health. This is also the first study to specifically examine perceived discrimination as a predictor of cancer metaphor preferences. Previous studies have examined metaphor use in health domains by using metaphors to predict health attitudes and behaviors (Landau et al., 2018; Liebscher et al., 2020; Occa et al., 2020; Scherer et al., 2015) and have examined how individual differences (e.g., desire for thinking about complex topics and desire for certain answers) moderated these relationships (Landau et al., 2014). The present study focused on cancer metaphor use by examining individuals' cancer metaphor preferences as an outcome rather than a predictor of a process and contributes to a growing body of literature linking discrimination to health communication and cancer coping styles (Hausmann et al., 2011). This study not only suggests new ways in which discrimination can shape communication preferences, but it also addresses recent calls for providers to use patient-centered, tailored, and culturally appropriate metaphors when communicating with patients (Hommerberg et al., 2020).

In addition, this study used a stratified sampling approach that allowed for meaningful comparisons between racial/ethnic groups and included representation across varying levels of education and income. The analysis also addressed prior literature that discrimination might differentially impact psychological needs if the discrimination was attributed to race. Finally, multigroup SEM allowed for testing these important group differences in serial mediation (Ryu & Cheong, 2017).

Future studies can examine whether patients are more likely to engage in specific health behaviors when providers use their preferred metaphors. Future research could also build on the present findings to examine if battle versus journey metaphor preferences differ between different racial/ethnic groups and can further examine potential differences within racial/ethnic groups (e.g., Mexican American, Cuban American, Puerto Rican, and Guatemalan within Hispanic/Latino populations or East Asian and South Asian within Asian populations).

Additionally, from a healthcare perspective, future studies could assess whether providers are less aware of and/or less likely to use patients' preferred metaphors among racial/ethnic minority groups compared to Non-Hispanic White patients, and whether these potential scenarios contribute to disparities in health communication. These types of studies among diverse cancer survivors would advance our knowledge substantially. Relatedly, it would be important to examine whether the present study findings hold among cancer survivors and those without cancer who have a family history of cancer and thus, are at elevated risk.

Furthermore, future studies could examine whether battle and journey metaphors are associated with coping styles related to attitudes of a "fighting spirit" and religious/spiritual practices (Gonzalez et al.,

2016). In some religious/spiritual practices that emphasize mindfulness and meditation, for example, cancer journey metaphors might be more frequently used over battle metaphors. It would be important to examine the use of cancer metaphors across different religious/spiritual practices and whether the use of battle or journey metaphors changes over the course of the cancer experience (e.g., early versus later stages of survivorship). Moreover, future studies could examine whether accepting difficult life experiences (Nipp et al., 2016) relates to journey metaphors and if this might partially explain why individuals who experienced more frequent exposure to racial discrimination were more likely to prefer journey metaphors in the present study. Given that difficult life experiences (e.g., childhood adversity) have been associated with greater cancer risk (Holman et al., 2016), examining whether hardship and trauma shape metaphor use may be particularly important for these individuals at a higher risk of developing cancer.

Finally, in terms of research design, future studies could examine metaphor preferences in larger, nationally representative samples with sample weights to obtain more accurate point estimates, as well as use randomized designs and/or longitudinal studies to test causal pathways. In addition, future studies could examine whether additional forms of discrimination (e.g., major experiences of lifetime discrimination (Williams et al., 2008)) function differently from everyday discrimination. Major experiences of lifetime discrimination might have distinct effects on need for personal significance given that major experiences of lifetime discrimination focus primarily on socioeconomic status (e.g., being unfairly fired, denied a promotion, and/or denied a bank loan), whereas everyday discrimination focuses on assaults to one's character (Ayalon & Gum, 2011; Kessler et al., 1999). Alternatively, major experiences of lifetime discrimination might activate need for personal significance for individuals with strong work identity. Finally, previous research has found differential associations between major experiences of lifetime discrimination and mental health outcomes among Non-Hispanic White, Non-Hispanic Black, and Latino older adults (Ayalon & Gum, 2011). Therefore, it is also possible that the association between major experiences of lifetime discrimination and metaphor use could also differ across racial/ethnic groups.

Conclusions and study implications. This study contributes to the growing body of research showing that discrimination has important consequences for health outcomes (Bey et al., 2019; Versey & Curtin, 2016) and may also have downstream effects (e.g., increased behavioral intentions stemming from messaging aligned with patients' metaphor preferences and poorer patient-provider communication due to providers' use of metaphors misaligned with patients' preferences). The focus on discrimination also adds to the limited body of research examining cancer metaphor use in racial/ethnic minority groups (Magaña, 2020; Spina et al., 2018) and is particularly important for healthcare messaging (Kagawa-Singer et al., 2010). The U.S. medical system and the media often use battle metaphors when framing cancer treatments and/or screenings (Hommerberg et al., 2020) which may systematically benefit individuals who prefer battle metaphors. By contrast, individuals who prefer journey metaphors may experience poorer patient-provider communication and be less responsive to battle-focused messaging campaigns. Given the present study findings that those who experienced racial discrimination were more likely to prefer journey metaphors and given the prior evidence that racial/ethnic minority groups more often experience racial discrimination (Davis, 2020), the overemphasis on battle metaphors by the U.S. medical system and media may represent a form of structural racism that systematically disadvantages the health of racial/ethnic minority populations. Such cases might partially explain specific cancer disparities (e.g., higher colorectal cancer screening rates among Non-Hispanic White adults compared to all other racial/ethnic groups (May et al., 2020)) and reiterate the need to continue examining differences in metaphor use among diverse racial/ethnic groups.

This line of research contributes to a broader understanding of how psychosocial factors and social threats can shape the way individuals

think about health and illness and impact important health outcomes. By examining discrimination and cancer metaphor use, differences based on whether discrimination was attributed to race, and differences across racial/ethnic groups, the present study advances efforts to improve cross-cultural competency and ultimately reduce racial/ethnic disparities in cancer communication and cancer outcomes.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from each participant in the study.

Disclaimer

The contents and views in this manuscript are those of the authors and should not be construed to represent the views of the National Institute on Minority Health and Health Disparities, National Institutes of Health, the Department of Health and Human Services, or the Agency for Healthcare Research and Quality.

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Anna M. Nápoles: Writing - Review & Editing.

Arie W. Kruglanski: Writing - Review & Editing, Funding acquisition.

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Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2021.100991>.

References

- Ayalon, L., & Gum, A. M. (2011). The relationships between major lifetime discrimination, everyday discrimination, and mental health in three racial and ethnic groups of older adults. *Aging & Mental Health, 15*, 587–594.
- Bell, C. N., Sacks, T. K., Thomas Tobin, C. S., & Thorpe, R. J. (2020). Racial non-equivalence of socioeconomic status and self-rated health among African Americans and whites. *SSM - Population Health, 10*, 100561.
- Bey, G. S., Jesdale, B., Forrester, S., Person, S. D., & Kiefe, C. (2019). Intersectional effects of racial and gender discrimination on cardiovascular health vary among black and white women and men in the CARDIA study. *SSM - Population Health, 8*, 100446.
- van den Bos, K. (2009). Making sense of life: The existential self trying to deal with personal uncertainty. *Psychological Inquiry, 20*, 197–217.
- Brenner, A. B., Diez-Roux, A. V., Gebreab, S. Y., Schulz, A. J., & Sims, M. (2018). The epidemiology of coping in African American adults in the Jackson heart study (JHS). *Journal of racial and ethnic health disparities, 5*, 978–994.
- Butler, S. S., Winkfield, K. M., Ahn, C., et al. (2020). Racial disparities in patient-reported measures of physician cultural competency among cancer survivors in the United States. *JAMA Oncology, 6*, 152–154.
- Casarett, D., Pickard, A., Fishman, J. M., et al. (2010). Can metaphors and analogies improve communication with seriously ill patients? *Journal of Palliative Medicine, 13*, 255–260.
- Chandler, J., & Shapiro, D. (2016). Conducting clinical research using crowdsourced convenience samples. *Annual Review of Clinical Psychology, 12*, 53–81.
- Cooper, L. A., & Roter, D. L. (2003). Patient-provider communication: The effect of race and ethnicity on process and outcomes of healthcare. *Unequal treatment: Confronting racial and ethnic disparities in health care*.
- Davis, B. A. (2020). *Discrimination: A social determinant of health inequities*. Health Affairs Blog.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268.
- Fiske, S. T. (2010). *Social beings: core motives in social psychology*. Hoboken, N.J.; Chichester: Wiley; John Wiley [distributor].
- Fourie, M. M., Stein, D. J., Solms, M., Gobodo-Madikizela, P., & Decety, J. (2019). Effects of early adversity and social discrimination on empathy for complex mental states: An fMRI investigation. *Scientific Reports, 9*, 12959.
- Frankl, V. E. (1962). *Man's search for ultimate meaning*. New York, NY: Basic Books.
- Fritz, M. S., & Mackinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science, 18*, 233–239.
- Gonzalez, P., Nuñez, A., Wang-Letzkus, M., et al. (2016). Coping with breast cancer: Reflections from Chinese American, Korean American, and Mexican American women. *Health Psychology, 35*, 19–28.
- Greer, J. A., Applebaum, A. J., Jacobsen, J. C., Temel, J. S., & Jackson, V. A. (2020). Understanding and addressing the role of coping in palliative care for patients with advanced cancer. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology, 38*, 915–925.
- Gustafsson, A. W., Hommerberg, C., & Sandgren, A. (2020). Coping by metaphors: The versatile function of metaphors in blogs about living with advanced cancer. *Medical Humanities, 46*, 267–277.
- Harrington, K. J. (2012). The use of metaphor in discourse about cancer: A review of the literature. *Clinical Journal of Oncology Nursing, 16*, 408–412.
- Hauser, D. J., & Schwarz, N. (2015). The war on prevention: Bellicose cancer metaphors hurt (some) prevention intentions. *Personality and Social Psychology Bulletin, 41*, 66–77.
- Hauser, D. J., & Schwarz, N. (2020). The war on prevention II: Battle metaphors undermine cancer treatment and prevention and do not increase vigilance. *Health Communication, 35*, 1698–1704.
- Hausmann, L. R. M., Hannon, M. J., Kresevic, D. M., et al. (2011). Impact of perceived discrimination in healthcare on patient-provider communication. *Medical Care, 49*, 626–633.
- Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*, 408–420.
- Hendricks, R. K., Demjén, Z., Semino, E., & Boroditsky, L. (2018). Emotional implications of metaphor: Consequences of metaphor framing for mindset about cancer. *Metaphor and Symbol, 33*, 267–279.
- Holman, D. M., Ports, K. A., Buchanan, N. D., et al. (2016). The association between adverse childhood experiences and risk of cancer in adulthood: A systematic review of the literature. *Pediatrics, 138*, S81–S91.
- Hommerberg, C., Gustafsson, A. W., & Sandgren, A. (2020). Battle, journey, imprisonment and burden: Patterns of metaphor use in blogs about living with advanced cancer. *BMC Palliative Care, 19*, 59.
- Hu, L-t, & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.
- Jia, X., Liu, X., & Shi, B. (2017). Perceived discrimination and subjective well-being in Chinese migrant adolescents: Collective and personal self-esteem as mediators. *Frontiers in Psychology, 8*.
- Kagawa-Singer, M. (1993). Redefining health: Living with cancer. *Social Science & Medicine, 37*, 295–304.
- Kagawa-Singer, M., Valdez Dadia, A., Yu, M. C., Surbone, A., Cancer, C., & Health Disparities. (2010). Time to chart a new course? *CA: A Cancer Journal for Clinicians, 60*, 12–39.
- Kennedy, C., Mercer, A., Keeter, S., et al. (2016). *Evaluating online nonprobability surveys*. Pew Research Center.
- Kessler, R. C., Mickelson, K. D., & Williams, D. R. (1999). The prevalence, distribution, and mental health correlates of perceived discrimination in the United States. *Journal of Health and Social Behavior, 40*, 208–230.
- Krieger, N. (2014). Discrimination and health inequities. *International Journal of Health Services, 44*, 643–710.
- Kruglanski, A. W., Gelfand, M. J., Bélanger, J. J., et al. (2014). The psychology of radicalization and deradicalization: How significance quest impacts violent extremism. *Political Psychology, 35*, 69–93.
- Kruglanski, A. W., Molinaro, E., Jasko, K., et al. (2021). *Significance quest theory. Perspectives in psychological science* (in press).
- Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing." *Psychological Review, 103*, 263–283.
- Lakoff, G., & Johnson, M. (2003). *Metaphors we live by*. Chicago: University of Chicago Press.
- Landau, M. J. (2018). Using metaphor to find meaning in life. *Review of General Psychology: Journal of Division 1, of the American Psychological Association, 22*, 62–72.
- Landau, M. J., Arndt, J., & Cameron, L. D. (2018). Do metaphors in health messages work? Exploring emotional and cognitive factors. *Journal of Experimental Social Psychology, 74*, 135–149.
- Landau, M. J., Keefer, L. A., & Rothschild, Z. K. (2014). Epistemic motives moderate the effect of metaphorical framing on attitudes. *Journal of Experimental Social Psychology, 53*, 125–138.
- Lehdonvirta, V., Oksanen, A., Räsänen, P., & Blank, G. (2021). Social media, web, and panel surveys: Using non-probability samples in social and policy research. *Policy & Internet, 13*, 134–155.
- Liebscher, A., Trott, S., & Bergen, B. (2020). *Effects of battle and journey metaphors on charitable donations for cancer patients*. CogSci.
- Lovakov A, Agadullina ER: Empirically derived guidelines for effect size interpretation in social psychology. *European Journal of Social Psychology, (n/a) 51*:485-504.
- Lupton, D. (2012). *Medicine as culture: Illness, disease and the body*. London: SAGE Publications Ltd.
- Magaña, D. (2020). Praying to win this battle: Cancer metaphors in latina and Spanish women's narratives. *Health Communication, 35*, 649–657.
- Major, B., Quinton, W. J., & Schmader, T. (2003). Attributions to discrimination and self-esteem: Impact of group identification and situational ambiguity. *Journal of Experimental Social Psychology, 39*, 220–231.
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50*, 370–396.
- May, F. P., Yang, L., Corona, E., Glenn, B. A., & Bastani, R. (2020). Disparities in colorectal cancer screening in the United States before and after implementation of the affordable care act. *Clinical Gastroenterology and Hepatology, 18*, 1796–1804. e1792.
- McMullin, J., & Weiner, D. (2009). An anthropology of cancer. In J. McMullin, & D. Weiner (Eds.), *Confronting cancer: Metaphors, advocacy, and anthropology* (pp. 3–26). Santa Fe, NM: School for Advanced Research Press.
- Mead, E. L., Doorenbos, A. Z., Javid, S. H., et al. (2013). Shared decision-making for cancer care among racial and ethnic minorities: A systematic review. *American Journal of Public Health, 103*, e15–e29.
- Mendes, W. B., Blascovich, J., Hunter, S. B., Lickel, B., & Jost, J. T. (2007). Threatened by the unexpected: Physiological responses during social interactions with expectancy-violating partners. *Journal of Personality and Social Psychology, 92*, 698.
- Molinaro, E., Elster, A., Jasko, A. W., Jasko, K., Webber, D., Sensales, G., Agostini, M., Leander, P., & Szumowska, E. (2021). *Striving for significance: Development and validation of the quest for significance scale*.
- Muthén, L. K., & Muthén, B. (2017). *Mplus user's guide: Statistical analysis with latent variables, user's guide*. Muthén & Muthén.
- Newman, A., Bavik, Y. L., Mount, M., & Shao, B. (2020). Data collection via online platforms: Challenges and recommendations for future research. *Applied Psychology, Nipp, R. D., El-Jawahri, A., Fishbein, J. N., et al. (2016). The relationship between coping strategies, quality of life, and mood in patients with incurable cancer. Cancer, 122, 2110–2116.*
- Oscooii, K. A. R. (2018). Perceived discrimination and political behavior. *British Journal of Political Science, 50*, 867–892.
- Palan, S., & Schitter, C. (2018). Prolific.ac—a subject pool for online experiments. *Journal of Behavioral and Experimental Finance, 17*, 22–27.
- Paolacci, G., & Chandler, J. (2014). Inside the Turk: understanding mechanical Turk as a participant pool. *Current Directions in Psychological Science, 23*, 184–188.
- Pascoe, E. A. (2009). Smart richman L: Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin, 135*, 531–554.
- Passmore, S. R., Williams-Parry, K. F., Casper, E., & Thomas, S. B. (2017). Message received: African American women and breast cancer screening. *Health Promotion Practice, 18*, 726–733.
- Peduzzi, P., Concato, J., Kemper, E., Holford, T. R., & Feinstein, A. R. (1996). A simulation study of the number of events per variable in logistic regression analysis. *Journal of Clinical Epidemiology, 49*, 1373–1379.
- Reisford, G. M., & Wilson, G. R. (2004). Use of metaphor in the discourse on cancer. *Journal of Clinical Oncology, 22*, 4024–4027.
- Rivas, C., Matheson, L., Nayoan, J., et al. (2016). Ethnicity and the prostate cancer experience: A qualitative metasynthesis. *Psycho-Oncology, 25*, 1147–1156.
- Roets, A., & Van Hiel, A. (2011). Item selection and validation of a brief, 15-item version of the Need for Closure Scale. *Personality and Individual Differences, 50*, 90–94.
- Ryu, E., & Cheong, J. (2017). Comparing indirect effects in different groups in single-group and multi-group structural equation models. *Frontiers in Psychology, 8*.

- Scherer, A. M., Scherer, L. D., & Fagerlin, A. (2015). Getting ahead of illness: Using metaphors to influence medical decision making. *Medical Decision Making*, *35*, 37–45.
- Semino, E., Demjén, Z., Demmen, J., et al. (2017). The online use of violence and journey metaphors by patients with cancer, as compared with health professionals: A mixed methods study. *BMJ Supportive & Palliative Care*, *7*, 60–66.
- Smart Richman, L., & Leary, M. R. (2009). Reactions to discrimination, stigmatization, ostracism, and other forms of interpersonal rejection: A multimotive model. *Psychol Rev*, *116*, 365–383.
- Smith, W. A. (2008). Higher education: Racial battle fatigue. In R. T. Schaefer (Ed.), *Encyclopedia of race, ethnicity, and society* (pp. 615–618). Thousand Oaks, CA: Sage Publications.
- Smith, W. A., David, R., & Stanton, G. S. (2020). Racial battle fatigue: The long-term effects of racial microaggressions on African American boys and men. In R. Majors, K. Carberry, & T. S. Ransaw (Eds.), *The international handbook of Black community mental health* (pp. 83–92). Emerald Publishing Limited.
- Spence, N. D., Wells, S., Graham, K., & George, J. (2016). Racial discrimination, cultural resilience, and stress. *Canadian journal of psychiatry. Revue canadienne de psychiatrie*, *61*, 298–307.
- Spina, M., Arndt, J., & Landau, M. J. (2018). Cameron LD: Enhancing health message framing with metaphor and cultural values: Impact on Latinas' cervical cancer screening. *Annals of Behavioral Medicine*, *52*, 106–115.
- Street, R. L., Jr., Mazor, K. M., & Arora, N. K. (2016). Assessing patient-centered communication in cancer care: Measures for surveillance of communication outcomes. *J Oncol Pract*, *12*, 1198–1202.
- Svensson, T., Inoue, M., Sawada, N., et al. (2016). Coping strategies and cancer incidence and mortality: The Japan Public Health Center-based prospective study. *Cancer Epidemiology*, *40*, 126–133.
- Umezawa, Y., Lu, Q., You, J., et al. (2012). Belief in divine control, coping, and race/ethnicity among older women with breast cancer. *Annals of Behavioral Medicine*, *44*, 21–32.
- Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, *44*, 1–31.
- Versey, H. S., & Curtin, N. (2016). The differential impact of discrimination on health among Black and White women. *Social Science Research*, *57*, 99–115.
- Webber, D., Babush, M., Schori-Eyal, N., et al. (2018). The road to extremism: Field and experimental evidence that significance loss-induced need for closure fosters radicalization. *Journal of Personality and Social Psychology*, *114*, 270–285.
- Williams, D. R., Gonzalez, H. M., Williams, S., et al. (2008). Perceived discrimination, race and health in South Africa. *Social Science & Medicine*, *67*, 441–452.
- Zou, L. X., & Cheryan, S. (2017). Two axes of subordination: A new model of racial position. *Journal of Personality and Social Psychology*, *112*, 696–717.