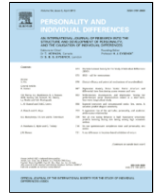




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Goal relevance and desirability of virtuous behavior in satisfying affiliative and pathogen avoidance needs

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ABSTRACT

Recent findings suggest that behavioral repertoires frequently conceptualized as virtuous possess a fundamental nature that implicates virtues as highly desirable in facilitating group living through factors of caring, self-control, and inquisitiveness. Although much of this desirability has previously demonstrated in mating domains, it could be possible their benefits extend to affiliative and pathogen-avoidant domains. Two studies ($N = 285$) sought to determine the potential costs and benefits of associating with virtuous individuals (Study 1) and how these affordances could shape subsequent interpersonal preferences (Study 2). In Study 1, participants inferred a caring behavioral repertoire as particularly effective at facilitating affiliative, whereas inquisitiveness was perceived as particularly threatening to pathogen-avoidant goals. Study 2 provides evidence dispositionally heightened affiliative interests heightened preferences for caring, but pathogen-avoidant motives did not influence preferences. I frame results from an evolutionary perspective and synthesize it with recent findings demonstrating how virtue shapes effective group living.

Successful group living requires identification of individuals capable of optimizing inclusive fitness. Affiliative decisions are based on whether the perceiver's goals are congruent or incongruent with those of a social target, prompting approach with the former and avoidance with the latter (Neuberg et al., 2020; Zebrowitz & Montepare, 2006). These inferences of congruence are contingent upon the salience of specific fundamental social motives that facilitate perceptions of certain traits as advantageous to goal acquisition and others as detrimental (Neuberg, Kenrick, & Schaller, 2011). The value of these traits critically shifts with the fluctuating salience of motives (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). One notable shift occurs through the competition between affiliative and pathogen-avoidant motives leading individuals to pursue satisfaction of one goal at the expense of another (Sacco, Young, & Hugenberg, 2014). Exclusionary experiences heighten individuals' motivations to ingratiate themselves in social groups and their acuity toward affiliative cues (Brown, Sacco, & Medlin, 2019a). The gregariousness of these affiliative opportunities would nonetheless represent a pathogenic threat when disease is salient due to the increased likelihood of infection from extensive interpersonal contact (Pollet, Roberts, & Dunbar, 2011), prompting aversion

toward otherwise beneficial interactions (Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010).

When identifying those capable of facilitating perceivers' acquisition of their salient goals, individuals could utilize others' chronic behavioral patterns as heuristics to infer goal congruence. One behavioral pattern that individuals could employ in these affordance judgments are those that foster individual and communal flourishing within a given environment, namely traits regarded as *virtue*. Recent research investigating cross-cultural interpretations of virtue has argued it to have a fundamental nature in human evolution that suggests certain components of the construct have been selected in groups to facilitate group living (McGrath, in press; McGrath & Brown, 2020). Such virtuous dispositions encompass domains related to morality, self-regulation, and intellect, which could contribute to optimizing group living in unique capacities. However, it could be possible certain virtues may be more advantageous than others at satisfying affiliative motives and others at satisfying pathogen-avoidant motives. This possibility would necessitate individuals to invoke a tradeoff in their preferences for specific virtues to include in their social groups. The current program of research investigates how the competing salience of affiliative and

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pathogen-avoidant motives shapes preferences for various displays of virtue.

1. Tradeoffs in affiliation and pathogen avoidance

Humans' fundamentally social nature has historically led to the emergence of group living to ensure survival (Baumeister & Leary, 1995). Inclusion in group living increases access to resources through cooperation and reproductive opportunities to enhance one's inclusive fitness. The consequences of exclusion from group living led to the evolution of a sociometer that serves as a psychological alarm system to motivate individuals to pursue affiliative opportunities following exclusionary experiences (Leary & Baumeister, 2000). Exclusionary experiences foster interest in affiliation, particularly through identification of conspecifics whose physical appearance connotes an optimal affiliative opportunity (Bernstein, Sacco, Young, Brown, & Claypool, 2007; Brown et al., 2019a; Maner, DeWall, Baumeister, & Schaller, 2007).

Despite its benefits, close interactions through group living necessitate a tradeoff that could leave individuals vulnerable to disease transmission. Increased interpersonal contact heightens opportunities for disease transmission within densely populated ecologies (Hoang et al., 2019; Jones et al., 2008; Salathé et al., 2010). Just as the sociometer may have evolved to alert individuals to their insufficient social connections (Leary et al., 1995), humans may have concurrently evolved a motivational system to identify and avoid environmental pathogens with a behavioral immune system (Murray & Schaller, 2016). Chronic and situational activation of this behavioral immune system facilitates identification of pathogenic environments (Wang & Ackerman, 2019) and conspecifics (Young, Sacco, & Hugenberg, 2011). This activation reduces interest in direct interpersonal contact (Brown, Young, & Sacco, in press; Makhanova & Shepherd, 2020; Sawada, Auger, & Lydon, 2018), fosters interpersonal reticence (Mortensen et al., 2010; Murray & Schaller, 2012), and heightens desire for social structures to reduce infection risk (Brown & Sacco, 2020).

Recent findings suggest affiliative and pathogen-avoidant motives compete with each other, such that satisfaction of one is at the expense of another. Exclusionary experiences lead to the downregulation of the behavioral immune system if the affiliative motives are more acutely salient than disease threats (Sacco et al., 2014). Nonetheless, motivation to reestablish belonging can foster risky socialization that increases the odds of disease transmission. For example, chronic and acute activation of affiliative motives heighten preferences for extraverted interaction partners (Brown et al., 2019a; Brown & Sacco, 2017). Despite extraversion affording extensive social networks, the resulting interpersonal contact in these networks increases risk of exposure to infectious disease (Nettle, 2005; Pollet et al., 2011). Conversely, chronic activation of pathogen concerns heightens aversion to features associated with infection risk, suggesting disease salience heightens the salience of extraversion's threat (Brown & Sacco, 2016). These findings suggest that associating with certain group members offer both costs and benefits that likely shift in their overall salience depending on activation of a given survival motive, with inferences of these affordances likely being made through virtuous behavior.

2. Adaptive value of virtue

Despite various, and often conflicting, conceptualizations of virtue, definitions normally center around traits deemed *good*. One conceptualization derives from the VIA Classification of Character Strengths and Virtues (Peterson & Seligman, 2004). Character strengths are components of personality identified as socially desirable and thought to contribute to collective thriving through social or moral functioning, which appear to be the components of what are described as virtue in folk language across various cultures and religions (Dahlsgaard,

Peterson, & Seligman, 2005; Park & Peterson, 2006). Recent endeavors have since streamlined this classification of virtue through superordinate categories most readily observed in a population. Extensive factor analyses resulted in an empirically robust model of three virtues derived from character strengths: caring, self-control, and inquisitiveness (McGrath, 2015; McGrath, Greenberg, & Hall-Simmonds, 2018). Originally derived from an Aristotelian conceptualization of virtue, recent work suggests these virtues appear *fundamental* to individual and communal flourishing. This suggests an evolutionary basis to these factors, given their cross-cultural prevalence and valuation (McGrath, in press; but see Gurven, von Rueden, Massenkoff, Kaplan, & Lero Vie, 2013). When faced with survival and reproductive problems, ancestral humans exhibiting traits deemed virtuous could have enjoyed an adaptive advantage, ensuring survival of their own genes. Such traits would be desirable in promoting inclusive fitness and group living (Buss, 2009).

The adaptive advantage of each virtue is unique in ensuring communal success. Caring represents a moral domain and appears to have emerged following selection pressures for group cohesion. It has been argued the requisite heuristics for morality evolved to ensure cooperation among group members, rewarding participation in altruism (Cosmides & Tooby, 2006). The resulting cooperation ultimately became codified into appropriate treatment of group members with one's ability to uphold proper treatment of others as a basis for continued interaction (Krebs, 2008). Individuals are particularly interested in affiliating with those who appear moral and deem them as trustworthy (Jordan, Hoffman, Bloom, & Rand, 2016; Sacco, Brown, Lustgraaf, & Hugenberg, 2017). Self-control represents a regulatory domain that facilitates suppression of prepotent behaviors that ensures larger organisms possess requisite metabolic resources for daily functioning (Brumbach, Figueredo, & Ellis, 2009; Stevens, 2014). Inquisitiveness represents an intellectual domain, wherein this trait could be functionally associated with non-directive exploratory behavior found across species to facilitate identification of environmental resources to increase inclusive fitness (e.g., Réale, Reader, Sol, McDougall, & Dingemans, 2007). Those embodying these virtues could appear capable of contributing to flourishing on the individual and communal level, leading to its selection (see Brown, Westrich, Bates, Twibell, & McGrath, 2020; McGrath & Brown, 2020).

Although presenting downstream advantages for group members, certain domains of virtue may nonetheless present domain-specific risks that would undermine their desirability when specific survival and reproductive motives are salient. The increased capacity of virtuous mates to invest in monogamous pairbonds implicates them as optimal long-term mates (Brown et al., 2020). However, such monogamous intent undermines their desirability among individuals who employ short-term mating strategies seeking to identify mates with similar promiscuous intentions (see Brown & Sacco, 2019). In domains related to affiliation and pathogen avoidance, these virtues may present similar costs that could downregulate their desirability in certain environments while similarly heightening them in others. For caring, the heightened interest in identifying genuine affiliative opportunities would likely heighten its desirability with heightened affiliative motives. Conversely, the increased risk of disease transmission through interpersonal contact typical of caring could implicate them as aversive when disease is salient (e.g., Murray, Fessler, Kerry, White, & Marin, 2017). The restriction on interpersonal contact would further implicate self-control as desirable when disease is salient, given the downregulation of openness in pathogenic ecologies in the service of reducing the likelihood of contact with potential disease vectors (Schaller & Murray, 2008). Similar downregulations occur for exploratory tendencies when disease is salient, including a reduction in openness (Mortensen et al., 2010) and neophobia (Al-Shawaf, Lewis, Alley, & Buss, 2015), which could implicate inquisitive conspecifics as potentially deleterious in pathogenic contexts.

3. Current research

In an integration of evolutionary perspectives on virtue with an understanding of how competing motivational states shape interpersonal preferences (McGrath, in press; Sacco et al., 2014), the current program of research sought to clarify contexts wherein different facets of virtue would become particularly advantageous. Conversely, this focus of the social benefits of virtue further led to consider when certain domains would become costly in the satisfaction of salient motives. I conducted two studies to identify how the three domains of virtue, as outlined by the VIA Model, are inferred as capable of satisfying affiliative and pathogen avoidance motives. In Study 1, I consider the specific affordances for each virtue based on the extent they could facilitate acquisition of a relevant survival goal while considering potential threats they may pose in satisfying another. Study 2 specifically considered the degree individual differences in affiliative and pathogen-avoidant motives shape actual interpersonal preferences for each virtue. I report all measures, outcomes, and exclusions for these studies herein. Data and materials are available: https://osf.io/4ezuj/?view_only=7a5d0c15118341bdbaeaac5eab951734.

4. Study 1

This study sought to identify the affordance judgments of high and low levels of virtue that precede perceivers' affiliative decisions. These judgments should emerge based on two orthogonal inferences, a target's opportunity to satisfy a salient goal or the likelihood of the target being a threat (Lasseter, Hehman, & Neel, in press). Given that caring could represent a genuine affiliative opportunity, I predicted high levels of caring to connote more opportunities in satisfying affiliative motives compared to the other virtues at high levels and connoting more opportunities than low levels of caring. Conversely, these affiliative affordances further prompted me to predict low levels of caring would be perceived as more threatening to affiliative motives compared to both high levels of caring and the other virtues at low levels.

For pathogen-avoidant motives, there were several predictions regarding which virtues would be perceived as affording more opportunities and threats. First, given the reduction in novelty seeking in pathogenic ecologies (Schaller & Murray, 2008), I predicted high levels of inquisitiveness would be perceived as more threatening to pathogen-avoidant motives than high levels of caring and self-control and low levels of inquisitiveness. This perceived threat value led me to produce another converse prediction. That is, low levels of inquisitiveness would be perceived as affording more pathogen-avoidant opportunities compared to other low levels of caring and self-control and high levels of inquisitiveness.

When considering self-control, I predicted high levels of self-control would be perceived as presenting more opportunities to facilitate pathogen-avoidant motives compared to high levels of caring. This prediction emerged due to both the heightened valuation of reticence when disease is salient that could enhance the desirability of self-control (Murray & Schaller, 2012) and a recognition of the potential risks posed by caring through interpersonal contact (Murray et al., 2017). The valuation of reticence in pathogenic environments led me to a converse prediction that low levels of self-control would be perceived as more threatening to pathogen-avoidant motives compared to high levels of self-control. Finally, the greater interpersonal contact inferred through caring led me to predict high levels of caring would be inferred as more threatening to pathogen-avoidant motives than low levels of caring.

4.1. Method

4.1.1. Participants

A sample of 150 undergraduates completed this study in exchange for course credit at a large public university in Southeastern U.S. using Qualtrics software for remote online data collection (108 women, 42 men; $M_{Age} = 19.70$, $SD = 3.66$; 80.7% White). Though I intended to collect data for this study over the course of a month as a stop rule, a sensitivity analysis indicated I was adequately powered to detect small effects (Cohen's $f = 0.10$, $1-\beta = 0.80$). No data warranted exclusion.

4.2. Materials and procedures

4.2.1. Virtue targets

Consenting participants evaluated a series of six targets represented by a brief descriptions of prospective interaction partners for how each target approaches life. Targets were described as exhibiting high or low levels of virtue in one of the three virtues identified in the VIA Model (McGrath, 2015; McGrath et al., 2018): caring, self-control, and inquisitiveness. Though previously developed as means to articulate virtue for a hypothetical dating site (Brown et al., 2020), these vignettes were employed in this study under a general affiliative context for evaluation akin to identifying people with whom one could have satisfying or dissatisfying interactions.

Articulation of the virtues was derived from converting items from the VIA-IS-V3, a subset of items from the VIA Inventory specifically assessing virtues from previously defined character strengths (McGrath, 2019). These items were presented into third-person descriptions of each virtue. Positively scored items were used to create the high-virtue vignettes and reverse-scored items for the low-virtue vignettes as the basis of their content. Importantly, these vignettes were developed with a sense of balance to ensure no one target would be seen as unilaterally desirable or undesirable across targets, so that participants could weigh the costs and benefits of each target for a given domain (Brown et al., 2020). Importantly, descriptions of low-virtue targets were written to minimize potential negativity bias toward ostensibly undesirable traits (e.g., low-inquisitive target not perceiving a one-track mind as problematic, given it could help solve one's own problems) and reduce demand characteristics that would lead high-virtue targets to be overly desirable (e.g., high-caring target being particularly open about feelings, which could be viewed negatively or positively depending on contexts). Each target description was matched on length. See Table 1 for example information. I presented participants with exclusively matched-sex targets to prevent the likelihood of mating mo-

Table 1

Example passages from each vignette. *Notes.* These are examples from male targets; the same phrasing was applied to female targets.

	High	Low
Care	"...is quite open with his feelings and does not find it difficult to express his love for others."	"...he does not like to express his feelings and finds it entirely too difficult to express his love for others."
Self-Control	"...is focused on the future and will often restrain himself from acting impulsively in the moment so that he may have greater successes in the future."	"...is focused on the '[here] and now,' and will often act impulsively so that he may have optimum pleasure at any given time."
Inquisitiveness	"...a desire to understand everything simply for the sake of understanding it."	"...not really interested in learning something new unless he sees something practical about it."

tives influencing results, which appeared in a randomized and counter-balanced order.

4.2.2. Affordance judgments

Participants evaluated the extent to which targets presented a threat and an opportunity to both their affiliative and pathogen-avoidant motives (Lassetter et al., in press). Affordance judgments were represented by three items for each target category: affiliative opportunity, affiliative threat, pathogen-avoidant opportunity, pathogen-avoidant threat. See Table 2 for example items. Participants evaluated each target with 12 items that operated along the same 7-point scale (1 = *Not Likely At All*; 7 = *Extremely Likely*). Items for each category had acceptable reliabilities, prompting aggregation for each category ($\alpha > 0.73$).

4.3. Results

4.3.1. Affiliation

I conducted an initial 2 (Affordance: Threat vs. Opportunity) \times 2 (Virtue Level: High vs. Low) \times 3 (Virtue Domain: Self-Control vs. Caring vs. Inquisitiveness) repeated ANOVA. Given the ambiguity in what the main effects in this analysis could have, we have not reported or interpreted the main effects and only report the interactions. Effects were most superordinately qualified by an Affordance \times Virtue Level \times Virtue Domain interaction, $F(2, 296) = 272.35, p < 0.001, \eta_p^2 = 0.648$ (Fig. 1). I decomposed this interaction by conducting a separate subordinate repeated ANOVA for threat and opportunity. This analytic decision was to minimize the number of subordinate analyses while affording me the opportunity for within-level comparisons of high and low levels of virtue in addition to between-level comparisons of each virtue separately. Pairwise comparisons in the reported simple effects tests were LSD tests; the alphas were not adjusted due to my hypotheses. Table 3 contains all descriptive statistics from the affiliative decompositions.

4.3.2. Opportunity

Effects for perceived opportunity were qualified by a subordinate Virtue Level \times Virtue Domain interaction, $F(2, 296) = 276.55,$

Table 2
Example items for affiliative and pathogen-avoidant opportunities and threats in Study 1.

	Affiliative	Pathogen-avoidant
Opportunity	If you were to encounter this person, how likely is it that she would help you stay healthy?	If you were to encounter this person, how likely is it that she would include you in social situations?
Threat	If you were to encounter this person, how likely is it that she/he would socially exclude you?	If you were to encounter this person, how likely is it that she/he would increase your risk for physical illness?

$p < 0.001, \eta_p^2 = 0.651$. Decomposition of this interaction indicated the emergence of a significant simple effect for high-virtue targets, $F(2, 147) = 82.55, p < 0.001, \eta_p^2 = 0.529$. The high-caring target afforded the most opportunity for affiliative motives, followed by high-inquisitiveness, and then high-self-control; all differences were significant ($ps < 0.005, ds > 0.82$). Another simple effect for low-virtue targets emerged, $F(2, 147) = 246.82, p < 0.001, \eta_p^2 = 0.771$. The low-caring target were perceived as affording the least opportunity for affiliative needs, followed by low-inquisitiveness, and then low-self-control; all means were significantly different from each other ($ps < 0.001, ds > 1.76$). Viewed another way, high levels of virtue were perceived as greater opportunities in satisfying affiliative motives than low levels, $F_s > 37.88, ps < 0.001$. The difference between levels of caring was again the largest ($\eta_p^2 = 0.879$), followed by inquisitiveness ($\eta_p^2 = 0.652$), then self-control ($\eta_p^2 = 0.204$).

4.3.3. Threat

Effects for perceived threat were additionally qualified by a subordinate Virtue Level \times Virtue Domain interaction, $F(2, 296) = 189.37, p < 0.001, \eta_p^2 = 0.561$. Decomposition of this interaction indicated the emergence of a significant simple effect for high-virtue targets, $F(2, 147) = 78.10, p < 0.001, \eta_p^2 = 0.515$. The high-caring target was perceived as significantly less threatening to affiliative goals than both high-inquisitiveness and high-self-control targets ($ps < 0.001, ds > 0.88$); no difference emerged between the high-inquisitive and high-self-control targets ($p = 0.186, d = 0.11$). A significant simple effect also emerged for low-virtue targets, $F(2, 147) = 110.09, p < 0.001, \eta_p^2 = 0.600$. The low-caring target was perceived as the most threatening to affiliative goals, followed by low-inquisitiveness, and low-self-control; all differences were significant from each other ($ps < 0.001, ds > 1.20$). Viewed another way, low-virtue targets were nonetheless perceived as more threatening than high-virtue targets, $F_s > 62.07, ps < 0.001$. The difference between high and low levels of caring was magnitudinally the largest ($\eta_p^2 = 0.846$), followed by inquisitiveness ($\eta_p^2 = 0.608$), then self-control ($\eta_p^2 = 0.295$).

4.3.4. Pathogen avoidance

I conducted a similarly dimensioned repeated ANOVA for pathogen-avoidant motives. Table 4 provides all descriptive statistics for pathogen-avoidant motives. Like affiliative motives, I do not interpret the main effects of this analysis and only report the interactions. Effects were most superordinately qualified by an Affordance \times Virtue Level \times Virtue Domain interaction, $F(2, 296) = 99.23, p < 0.001, \eta_p^2 = 0.401$ (Fig. 2).

4.3.5. Opportunity

In my similarly dimensioned subordinate analyses, I first found effects were qualified by a subordinate interaction, $F(1, 296) = 89.28, p < 0.001, \eta_p^2 = 0.376$. Decomposition of this interaction indicated a significant simple effect for high-virtue targets, $F(2, 147) = 29.08,$

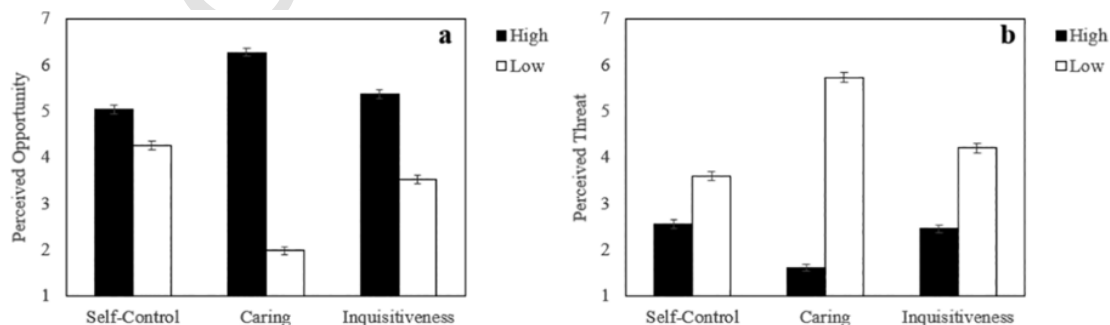


Fig. 1. Perceived opportunity (a) and threat (b) of targets for affiliative motives across high and low levels of each virtue in Study 1 (with standard error bars).

Table 3

Mean affiliative threat and opportunity affordance judgments (with standard deviations) for high- and low-virtue targets across each domain in Study 1.

	Self-control		Caring		Inquisitiveness	
	High	Low	High	Low	High	Low
Threat	2.59 (1.12)	3.60 (1.26)	1.60 (0.92)	5.73 (1.36)	2.45 (1.10)	4.20 (1.24)
Opportunity	5.04 (1.14)	4.26 (1.13)	6.27 (1.06)	1.98 (1.02)	5.35 (1.11)	3.52 (1.05)

Table 4

Mean pathogen-avoidant threat and opportunity affordance judgments (with standard deviations) for high- and low-virtue targets across each domain in Study 1.

	Self-control		Caring		Inquisitiveness	
	High	Low	High	Low	High	Low
Threat	2.09 (1.10)	4.15 (1.53)	2.06 (1.15)	4.47 (1.71)	2.74 (1.33)	3.11 (1.34)
Opportunity	4.81 (1.43)	2.76 (1.16)	5.38 (1.46)	2.02 (1.17)	4.55 (1.38)	3.50 (1.22)

$p < 0.001$, $\eta_p^2 = 0.284$. High-caring targets were perceived as affording the most opportunity to satisfy pathogen-avoidant motives, followed by high-inquisitiveness, and then high-self-control ($ps < 0.032$, $ds > 0.18$). The simple effect for low-virtue targets was also significant, $F(1, 147) = 73.60$, $p < 0.001$, $\eta_p^2 = 0.500$. Low-inquisitiveness presented the most opportunity to satisfy pathogen-avoidant motives, followed by low-self-control, and then low-caring. All scores were significantly different from each other ($ps < 0.001$, $ds > 0.63$). Viewed another way, the high levels of virtue were perceived as affording more opportunities to satisfy pathogen-avoidant motives than low levels, $Fs > 72.31$, $ps < 0.001$. The largest difference was for caring ($\eta_p^2 = 0.737$), followed by self-control ($\eta_p^2 = 0.543$), then inquisitiveness ($\eta_p^2 = 0.328$).

4.3.6. Threat

Effects for perceived opportunity were further qualified by a subordinate Virtue Level \times Virtue Domain interaction for threat affordances, $F(2, 296) = 69.52$, $p < 0.001$, $\eta_p^2 = 0.320$. A significant simple effect emerged for high-virtue targets, $F(2, 147) = 23.17$, $p < 0.001$, $\eta_p^2 = 0.240$. High-inquisitiveness was perceived as most threatening to pathogen-avoidant goals, followed by high-self-control, and then high-caring. The differences between high-inquisitiveness with the other two virtues were significant ($ps < 0.001$, $ds > 0.53$). No difference emerged between high-self-control and high-caring ($p = 0.802$, $d = 0.02$). The simple effect was also significant for the low-virtue targets, $F(2, 147) = 57.24$, $p < 0.001$, $\eta_p^2 = 0.438$. The low-caring target

was perceived as most threatening to pathogen-avoidant motives, followed by low-self-control, and then low-inquisitiveness. All scores were significantly different from each other ($ps < 0.037$, $ds > 0.19$). Viewed another way, low levels of virtue were perceived more threatening to pathogen-avoidant motives than high levels, $Fs > 9.84$, $ps < 0.003$. The largest difference was for self-control ($\eta_p^2 = 0.568$), followed by caring ($\eta_p^2 = 0.567$), then inquisitiveness ($\eta_p^2 = 0.062$).

4.4. Discussion

Results partially supported hypotheses, primarily those pertaining to affiliative motives. High levels of caring were perceived as providing more affiliative opportunities and fewer threats compared to the other virtues at high levels and low caring. These findings suggest perceptions of caring could represent perceptions of a genuine affiliative opportunity akin to preferences for extraverted facial features when motivated to find affiliative opportunities (Brown et al., 2019a; Brown & Sacco, 2017). The low-caring targets were conversely perceived as affording more threats and fewer opportunities to affiliative goals. Wariness toward low-caring targets could parallel wariness toward fake emotional displays, including non-Duchenne smiles, which could be diagnostic of deceptive intent that could implicate a social target as having exploitative intentions (Bernstein, Sacco, Brown, Young, & Claypool, 2010).

Pathogen-avoidant motives yielded several predicted and unexpected findings. Highly inquisitive targets were perceived as more threatening to pathogen-avoidant motives than the high levels of the other virtues, which aligns with work suggesting a downregulation of openness to experience in pathogenic environments that could serve to reduce an interest in engaging potential disease vectors (Schaller & Murray, 2008). This finding was complemented by perceptions of low-inquisitiveness targets as providing more opportunities to satisfy these motives more than other low-virtue targets, potentially due to perceptions of low openness that could implicate one as having greater likelihood of coming into contact with disease.

More unexpectedly, high levels of caring were perceived as affording more opportunities for pathogen avoidance than high levels of self-control. This could align with other inferences of caring based on its status as a moral domain of virtue. Participants could have equivocated caring with an interest in adherence to group rules, an interest associated with chronic disease concern (e.g., Makhanova, Plant, Monroe, & Maner, 2019). Though high levels of caring and self-control were perceived facilitative to pathogen avoidance opportunities, caring appeared more beneficial to these goals compared to self-control. High-self-control targets could be perceived as likely to adhere to social rules that prevent infection like caring targets, but the more explicit interest in facilitating prosocial behavior through caring could have provided an advantage for caring. With this study being conducted during the COVID-19 pandemic, discussion of demonstrating one's care for others included wearing masks to reduce disease transmission; this could have

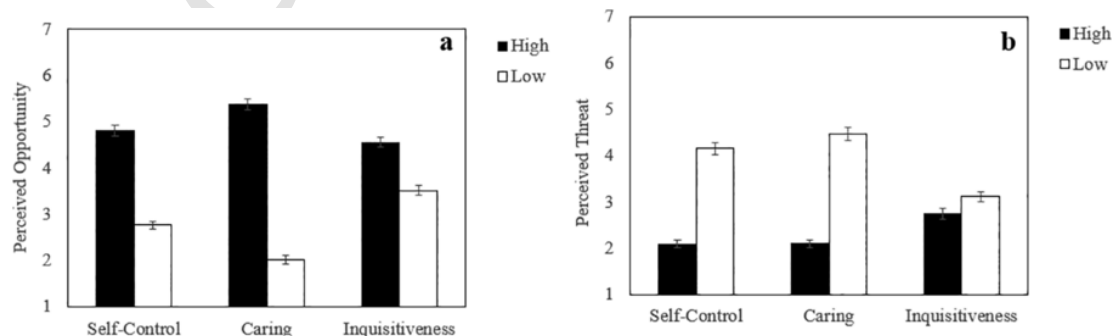


Fig. 2. Perceived opportunity (a) and threat (b) of targets for pathogen-avoidant motives across high and low levels of each virtue in Study 1 (with standard error bars).

alternatively led to caring being seen as more facilitative of pathogen avoidance than self-control. Nonetheless, high levels of self-control were certainly perceived as affording more opportunities than low levels of self-control, which likely reflects a prioritization of any cue to reticent behavior to reduce infection risk (Murray & Schaller, 2012).

With an understanding of these social affordances, it would prove advantageous to consider whether chronic activation of affiliative and pathogen-avoidant motives facilitate approach or avoidance toward targets based on their capabilities to satisfy salient motives (Zebrowitz & Montepare, 2006). I conducted Study 2 by considering individual differences in these motives in how they shape preferences for virtue.

5. Study 2

As Study 1 identified the specific affordance of each domain of virtue in affiliative and pathogen avoidance domains, Study 2 served to determine whether individual differences in motivational states would facilitate interpersonal preferences for these virtues. These predictions were tested in a paradigm assessing preferences for hypothetical interaction partners. In light of the affiliative opportunities afforded by caring targets in Study 1 and previous work indicating chronic activation of affiliative motives heightens preferences for gregarious conspecifics (Brown & Sacco, 2017), I predicted dispositionally heightened affiliative motives would be associated with a heightened preference for high-caring targets. Conversely, I predicted this heightened dispositional motive would similarly downregulate interest in low-caring targets.

I further predicted chronically activated pathogen-avoidant motives would similarly heighten preferences for low-inquisitive targets and reduce preferences for high-inquisitive targets based on the downregulation of intellectual domains in disease environments (Schaller & Murray, 2008). Finally, because of the perceptions of greater opportunities to facilitate pathogen avoidance among those high in self-control compared to those low, I predicted pathogen-avoidant motives would heighten preferences for high-self-control targets and reduce preferences for low-self-control targets.

5.1. Method

5.1.1. Participants

I recruited a sample of 132 undergraduates in exchange for course credit at a large public university in Southeastern U.S. using a similar Qualtrics dissemination at Study 1 (84 women, 48 men; $M_{Age} = 19.03$, $SD = 1.05$; 81.8% White). A sensitivity analysis indicated I was adequately powered to detect medium effects with three moderators (Cohen's $f = 0.26$, $1-\beta = 0.80$). No data warranted exclusion.

5.2. Materials and procedures

5.2.1. Affiliative motives

Participants indicated dispositional affiliative motives using the Need to Belong Scale (NTB; Leary, Kelly, Cottrell, & Schreindorfer, 2013). This 10-item measure operates along 7-point scales (1 = *Strongly Disagree*; 7 = *Strongly Agree*). Items displayed acceptable reliability ($M_{Grand} = 4.58$, $SD = 0.94$; $\alpha = 0.79$).

5.2.2. Pathogen-avoidant motives

Participants indicated dispositional motivations to avoid disease along the Perceived Vulnerability to Disease Scale (PVD; Duncan, Schaller, & Park, 2009). This 15-item measure consists of subscales assessing perceived infectability (PI; $M_{Grand} = 3.47$, $SD = 1.35$; $\alpha = 0.80$) and germ aversion (GA; $M_{Grand} = 3.79$, $SD = 0.90$; $\alpha = 0.66$) along 7-point scales (1 = *Strongly Disagree*; 7 = *Strongly Agree*). These sub-

scales' modest correlation ($r = 0.19$, $p = 0.025$) necessitated considering them separately in subsequent analyses.

Consenting participants followed the same procedures from Study 1 in terms of evaluating the same six same-sex targets for an interdependent task in a randomized and counterbalanced order. This procedure differed insofar as participants were instructed to indicate the extent to which they think they would like each target (1 = *Not at All*; 7 = *Very Much*; Brown, Sacco, & Young, 2018). Participants provided responses to the PVD and NTB scales after these evaluations, which were also presented in a randomized order.

5.3. Results

I submitted data to a 3 (Virtue Domain: Self-Control vs. Caring vs. Inquisitiveness) \times 2 (Virtue Level: High vs. Low) repeated-measures custom ANCOVA using GA, PI, and NTB as custom covariates that functionally serve as moderators. This analytic strategy afforded me the opportunity to identify interactive effects between continuous predictors and within-subject factors on an omnibus level to reduce concerns of inflating the Type I Error rate (Brown, Sacco, & Medlin, 2019b; Sacco & Brown, 2018). A Virtue Level main effect indicated participants liked the high-virtue targets ($M = 5.61$, $SD = 1.24$) more than the low-virtue targets ($M = 2.72$, $SD = 1.25$), $F(1, 127) = 5.13$, $p = 0.025$, $\eta_p^2 = 0.039$. Effects were most superordinately qualified by a Virtue Domain \times Virtue Level \times NTB interaction, $F(2, 254) = 7.64$, $p < 0.001$, $\eta_p^2 = 0.057$.

I decomposed this interaction by conducting three subordinate one-way repeated ANCOVAs, one for each virtue with NTB as the moderator. A subordinate Virtue Level \times NTB interaction emerged for Caring, $F(1, 129) = 14.32$, $p < 0.001$, $\eta_p^2 = 0.100$. Subordinate bivariate correlations to decompose this interaction indicated a positive correlation between NTB and liking the high-caring target, indicating heightened affiliative motives were associated with heightened liking for high-caring ($r = 0.26$, $p = 0.003$). Conversely, a negative correlation emerged between NTB and liking the low-caring target, such that heightened affiliative motives were associated with a reduced preference for low-caring ($r = -0.28$, $p < 0.001$). A subsequent two-tailed sign test indicated these two correlations were magnitudinally different from each other ($Z = 4.44$, $p < 0.001$). The subordinate interactions for Self-Control and Inquisitiveness were not significant and decomposed no further, $F_s < 0.61$, $p_s > 0.439$. No other main effects or superordinate interactions emerged with GA and PI, prompting no further consideration of these variables, $F_s < 2.53$, $p_s > 0.114$.

5.4. Discussion

I found continued evidence for the affiliative affordances in the caring domain of virtue. Dispositionally heightened need to belong predicting preferences for high levels of caring and an aversion to low levels, results that align with previous work showing a preference for highly affiliative conspecifics when affiliative motives are salient (Bernstein et al., 2010; Brown et al., 2019a). More notably, preferences were not predicted by either component of pathogen-avoidant motives. This lack of effects for these motives could be rooted in a general aversion to interpersonal contact among those who are averse to disease (Mortensen et al., 2010). That is, regardless of one's ability to facilitate salient pathogen-avoidant goals, any interpersonal interactions could be deemed as particularly risky to individuals motivated to avoid disease, thus muting any possible association from emerging.

6. General discussion

Two studies identified how individuals infer the social affordances of virtue in satisfying affiliative and pathogen-avoidant motives. Most

consistently, the moral domain of virtue appeared most central in satisfying affiliative motives, be it through inferences of such a behavioral repertoire as providing opportunities or actual preferences among those motivated to identify affiliative opportunities. These findings contribute to a growing body of literature implicating virtue as being selected to facilitate group living (McGrath, *in press*; McGrath & Brown, 2020). The consistency with predictions for caring could reflect the pervasive importance of morality to group living and the necessity of identifying conspecifics capable of engaging in reciprocal altruism (Krebs, 2008), thereby heightening the primacy of the signals of caring.

Inquisitiveness was regarded as more costly among the high levels of virtues in facilitating pathogen avoidance in Study 1. This finding could reflect differing valuations of virtue across human populations. The intellectual domain of virtue appears to have the least cross-cultural consistency of the virtues (e.g., Gurven et al., 2013; McCrae & Terracciano, 2005), which could reflect the influence of pathogenic threat in shaping personality (Schaller & Murray, 2008). Nonetheless, chronic activation of pathogen-avoidant motives did not reduce this preference for inquisitiveness. The lack of association between pathogen-avoidant motives and interpersonal preferences could have been due to these studies being conducted during the COVID-19 pandemic, rendering disease constantly salient and reducing the likelihood of predicted effects being detected. Future work would benefit from conducting additional studies following the conclusion of the pandemic with a reduced baseline level of acute pathogen threat.

Although results indicated that high levels of virtue afforded different relative costs and benefits for perceivers in specific domains, low levels of virtue were ultimately deemed more costly in both studies compared to high levels of virtue. These results suggest an overall value of virtue for group living that could suggest low-virtue group members may not be as beneficial for facilitating successful group living despite potential benefits (McGrath & Brown, 2020). Discussions of the potential opportunities of low virtue may be more appropriate conceptualized when comparing only social targets with at low levels as means to minimize interpersonal costs when high-virtue targets are not present.

Nonetheless, high levels of virtue are not necessarily desirable in all domains (e.g., short-term mating goals), which should prompt further investigations into this desirability (Brown et al., 2020). For example, consider dark personality traits typified by aggression and emotional callousness, which could be seen as low levels of caring. Though typically undesirable in many contexts (e.g., long-term mating; Rauthmann & Kolar, 2013), these traits are predictive of success in domains that benefit from callousness (e.g., surgeons; Lilienfeld, Watts, & Smith, 2015). Dark personality traits are additionally desired when individuals are selecting members for coalitions to address intergroup threats despite understanding the potential risks of affiliating with these individuals (e.g., exploitation; Brown, Sacco, Lolley, & Block, 2017). This could implicate low levels of virtue as particularly desirable when self-protection concerns are salient. A future study could prime self-protection motives before tasking participants to indicate their preferences for virtues (Sacco, Lustgraaf, Brown, & Young, 2015), which could lead to predictions of low-caring targets being seen as advantageous in addressing outgroup threats.

6.1. Limitations and future directions

This research presents several limitations that necessitates future directions. Most notably, these descriptions of virtue were unidimensional and may not necessarily reflect the nuance of the different facets encompassing these factors. For example, the self-regulatory domain is represented by several different character strengths, including prudence and honesty, that could have their own unique affordances more difficult to identify when considered as a superordinate factor

(McGrath, 2015). The opportunities for pathogen-avoidant motives could be specific to prudence but not honesty. Future research would benefit from considering the individual character strengths comprising the virtues to clarify these findings. This work's focus on individual traits in isolation from each other also necessitates future work considering a constellation of virtues for social targets. Subsequent studies could assess desirability of targets described as exhibiting different levels of each virtue (see Mogilski, Vrabel, Mitchell, & Welling, 2019). This consideration would allow researchers to identify more nuance in the trade-off perceivers invoke. Such constellations may ultimately highlight the benefits of certain virtues across different domains. For example, the inferred pathogenic threat of high inquisitiveness may be more apparent among those whose exploratory behavior does not consider group members' wellbeing because of the potential risk it may pose. However, a highly inquisitive individual who also espouses high levels of care could be deemed as beneficial for group functioning when considering these exploratory behaviors as capable of improving group living (e.g., morbid curiosity; Scrivner, 2020).

Future research would additionally benefit from clarifying whether the overall desirability for high levels of virtue observed in these studies is specific to the descriptions generated from items on VIA-IS-V3 (McGrath, 2019) by generating descriptions of low levels of virtue as potentially being more capable of facilitating flourishing themselves. Although low-inquisitiveness was perceived as more facilitative of pathogen-avoidant motives than other low levels of virtue, it was nonetheless perceived as less beneficial than high-inquisitiveness. This high-virtue advantage for the VIA Model could impede an understanding of the benefits of low virtue, necessitating future research considering complementary models.

Although results from Study 2 demonstrated how dispositional affiliative motives influence preferences for virtue, such findings remain correlational. Future studies could assess causality through acutely activating affiliative motives through exclusion experiences that heighten preferences for affiliative conspecifics (Brown et al., 2019a), which could similarly heighten interest in caring. Additionally, future studies could consider priming pathogen-avoidant motives after the pandemic. This could involve immersing participants in a disgusting story while providing an equivocal negative experience not inducing disgust as a control condition (e.g., Brown & Sacco, 2020).

An additional outlet for future research could be tracking specific affiliative behaviors individuals employ toward virtuous targets if they could facilitate one's salient goals. A future study could specifically measure the preferred distance for interacting with a confederate espousing high or low levels of virtue, with a greater interest in affiliation being reflected through closer proximities during an interaction (Kawakami, Phills, Steele, & Dovidio, 2007). Other studies could additionally consider the degree to which individuals would allocate resources toward targets high and low in virtue to assess specific ingratiating behaviors (Murray & Schaller, 2012). Future studies could also consider the emotional displays indicative of interest (e.g., eye gaze, smiling) toward virtuous targets following an exclusionary experience or heightened salience of disease (Montoya, Kershaw, & Prosser, 2018).

7. Conclusion

With a growing understanding of the fundamental nature of virtue in facilitating individual and group wellbeing, the current program of research provides an additional step by considering how these traits can facilitate acquisition of affiliative and pathogen-avoidant goals. I found evidence for an overall benefit to caring, with unexpectedly nuanced findings for self-control and inquisitiveness. Future research is needed to clarify these inconsistencies to understand the role of virtue in social perceptions.

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