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The Relevance Appraisal Matrix: Evaluating Others' Relevance

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People seek to detect who facilitates and who impedes their goal pursuit. The resulting *relevance appraisals* of opportunity and threat, respectively, can strongly shape subsequent social judgment and behavior. However, important questions about the nature of relevance appraisals remain unanswered: Are relevance appraisals unidimensional or multidimensional? Are people evaluated as generally posing opportunities and/or threats, or as dynamically relevant depending on perceiver goals? We test two hypotheses. First, we propose that opportunity and threat are appraised *independently,* rather than as endpoints of a single dimension. If so, then others can be evaluated as (a) facilitating a goal, (b) impeding a goal, (c) both facilitating *and* impeding a goal, or (d) neither facilitating nor impeding a goal. Second, we hypothesize that relevance appraisals shift dynamically with perceiver goals. For example, a single person may be appraised as facilitating one's mate-seeking goal, but as neither facilitating nor impeding one's self-protection goal. In two studies, participants rated the extent to which a variety of targets (e.g., a doctor, a 5-year-old child) pose threats and opportunities to different goals. Confirmatory factor analyses support both hypotheses. We also explore relationships between the Relevance Appraisal Matrix and the stereotype content (Fiske et al., 2002) and ABC (Koch et al., 2016) models of stereotypes, finding evidence that relevance appraisals are distinct from stereotypes of group attributes. In sum, we provide a framework for understanding the structure of relevance appraisals: A central and consequential, yet dynamic and relatively understudied, aspect of social cognition.

Keywords: goal relevance, threat, opportunity, appraisals, motivation

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Interacting effectively with other people requires assessing what they are like. When encountering another person, we quickly and effortlessly infer that person's age, race, gender, attractiveness, and other attributes (Todorov et al., 2015). Of course, on their own, these cues do not tell us how to behave toward the person. Instead, these cues are useful only if they inform predictions about how the person is likely to behave. For example, on a dark street a physically large, unfamiliar man may be appraised as potentially dangerous, whereas a friendly acquaintance may be appraised as an ally. Our evaluations of whether a person is *relevant* in each context (i.e., as a potential danger or potential help), rather than our evaluations of these people's *cues* per se (physical size and familiarity), guide our social behavior, such as crossing the street to avoid contact or approaching with a smile (e.g., Fiske & Neuberg, 1990).

These assessments of whether another person is likely to help or hurt us—*relevance appraisals*—guide numerous aspects of social cognition and behavior (Eitam & Higgins, 2010; Moors et al., 2013). Targets appraised as relevant receive greater social attention and processing (e.g., Brewer, 1988; Neuberg & Fiske, 1987), are likely to elicit others' emotions (e.g., Moors, 2017; Moors et al., 2017), and can prompt distinct kinds of behavior tailored to managing their specific form of relevance. Indeed, numerous literatures spanning a diverse array of processes—including impres-

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sion formation, emotion, mental representation, stigmatization, and discrimination—emphasize the importance of relevance appraisals (Brewer, 1988; Cottrell & Neuberg, 2005; Cunningham et al., 2007; Eitam & Higgins, 2010; Fiske & Neuberg, 1990; Freeman & Ambady, 2011; Gawronski et al., 2010; Kawakami et al., 2017; Kunda & Thagard, 1996; Macrae & Bodenhausen, 2000; Moors et al., 2013; Zebrowitz & Montepare, 2006). In short, relevance appraisals are a lever upon which much of social cognition and behavior depends.

Despite their importance to many social phenomena, there is still much to learn about what relevance appraisals are and how they are made (Eitam & Higgins, 2010). In the current work, we present two studies that test the nature of relevance appraisals. First, we determine whether appraisals of help versus harm (i.e., affordances of opportunity vs. threat) are opposite ends of a single dimension, or distinct, independent appraisals. Take, for example, the goal of affiliating with others. If appraisals are unidimensional, then when we evaluate a person as *threatening* our goal to affiliate, we also evaluate them as *incapable of facilitating* our goal to affiliate. If, however, appraisals are independent, then some targets may be judged as both threatening *and* facilitating affiliation, and others judged as neither threatening nor facilitating affiliation. Second, we examine whether a person appraised as posing one type of affordance (i.e., of threat or opportunity) is evaluated as posing that same affordance across all contexts, or whether relevance appraisals change depending on the perceiver's goals. That is, if we appraise a person as threatening our affiliation goal, do we appraise that same person as also threatening our other goals (e.g., of self-protection, disease avoidance)? Third and finally, we explore whether relevance appraisals are, as we propose, distinct from stereotypes of a group's general attributes.

An Affordance-Management Approach to Social Perception

Affordance-management approaches to social perception highlight relevance appraisals' central role in social judgment and behavior. These perspectives posit that a person's *needs, motivations*, and *goals* shape how they will interact with the world (Gibson, 1979; McArthur & Baron, 1983; Neuberg et al., 2010; Zebrowitz & Collins, 1997; Zebrowitz & Montepare, 2006; see also Austin & Vancouver, 1996 for a review). We use the overarching term "motivation" to refer to many constructs that can manifest at various levels of specificity. For example, motivations to obtain a high-paying job versus to obtain high status are clearly related, but exist at different levels of analysis (see Emmons, 1992, for a related approach to variation across goals). With the current research we focus on recurrent, high-level fundamental motivations (e.g., to obtain high status) rather than their specific outcomes or manifestations (e.g., to obtain a high-paying job). Put more concretely, fundamental motivations are "systems shaped by our evolutionary history to energize, organize, and select behavior to manage recurrent social threats and opportunities to reproductive fitness" (McClelland, 1985; Neel et al., 2016, p. 887). Human sociality and interdependence have produced motivations to, for example, protect ourselves, form friendships, and belong to social groups (Anderson et al., 2015; Baumeister & Leary, 1995; Maner et al., 2005). With the current research we focus on a set of fundamental motivations that represent recurrent challenges humans have encountered when navigating their social environments: Protecting oneself from physical harm, avoiding disease, affiliating with others, seeking status, seeking and retaining romantic partners, and caring for one's children (Kenrick et al., 2010; Neel et al., 2016; Schaller et al., 2017). For simplicity, we broadly refer to these fundamental motivations as "goals" throughout the article. Relevance to these fundamental goals is consequential and has been shown to shape processes such as categorization and stereotyping (Maner et al., 2005, 2012; Sacco et al., 2014) and facial expression processing (Adams et al., 2017; Weisbuch & Adams, 2012).

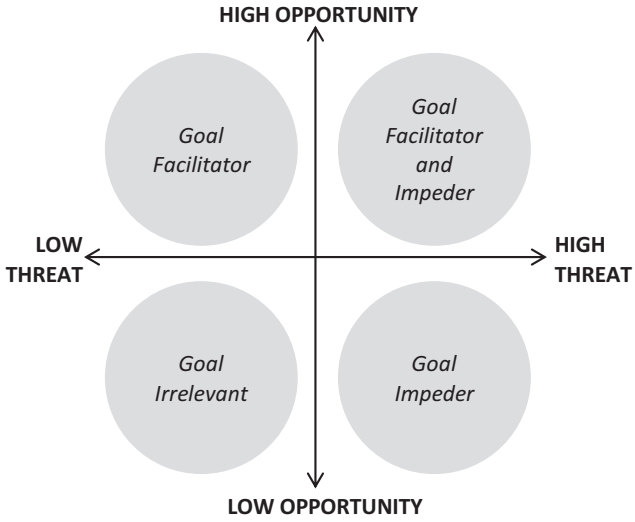
The Relevance Appraisal Matrix

Appraising the relevance of targets in one's environment involves determining whether those targets pose a threat and/or an opportunity to one's goals. Much research demonstrates how target cues and perceiver goals jointly produce relevance appraisals, and identifies relevance appraisals as key mechanisms linking stereotypes to downstream attentional/cognitive, emotional, and behavioral outcomes (see Neuberg et al., 2010). Specifically, Neuberg et al. (2010) articulate a model, which Neel and Lassetter (2019) refine, by which perceivers first detect targets' relevance-indicating cues. These cues range widely to include not only basic categorical information such as a target's race, age, and gender, but also more dynamic information such as their emotion expressions, body posture, and less visible attributes (if known) such as their relationship status or religion. Stereotypes help give meaning to these cues and inform the perceiver's assessment of the target's relevance. From these cues, the perceiver makes an appraisal of the extent to which a target poses threats and/or opportunities to their goals. Finally, the perceiver's appraisal of the target's goal-relevance guides the extent and nature of the perceiver's attention, emotion, and behavior toward the target. For example, a woman's goal to protect herself from physical harm guides how she interprets target cues (e.g., an approaching person's gender) as signaling relevance: If she stereotypes men as dangerous (e.g., Becker et al., 2007), she may evaluate an approaching man as impeding her self-protection goal. This appraisal, in turn, would produce feelings and behaviors that are geared to manage that perceived threat: She may pay more attention to him, fear him, and physically distance herself from him.

How are threat and opportunity appraisals related? One possibility is that threat and opportunity are opposite ends of a single dimension: That is, if the man in the example above is perceived as posing a threat, he will not be perceived as posing an opportunity, and vice versa. However, threat and opportunity may constitute independent dimensions of social judgment, rather than ends of a single dimension. Neel and Lassetter (2019) propose that appraisals of relevance are multidimensional rather than unidimensional, with threat and opportunity forming two independent axes as illustrated by the Relevance Appraisal Matrix (see Figure 1), but this claim has yet to be tested empirically.

In this formulation, as in a unidimensional model, targets may be appraised as high in threat and low in opportunity (*goal impeders*; the bottom right quadrant of Figure 1) or low in threat and high in opportunity (*goal facilitators*; the top left quadrant of Figure 1). However, the Relevance Appraisal Matrix highlights two additional possible appraisals: high in both threat and oppor-

Figure 1
The Relevance Appraisal Matrix (Neel & Lassetter, 2019)



tunity (i.e., *goal facilitators and impeders*; the top right quadrant of Figure 1) and low in both threat and opportunity (i.e., *goal irrelevant*; the bottom left quadrant of Figure 1).

If threat and opportunity are in fact independent, this would profoundly shape both how we understand these constructs, as well as how we should measure them. For example, dividing threat and opportunity appraisals into independent dimensions differentiates *goal facilitators and impeders* from *goal irrelevant* targets. A perceiver's judgment of a target as a goal facilitator and impeder likely will result in a suite of qualitatively distinct outcomes: The perceiver may pay attention to and/or actively monitor the target, they may feel both positive and negative emotions (e.g., prejudice) toward the target, and they may behave in certain ways toward (e.g., discriminate against) the target. In contrast, if the perceiver judges the target as goal irrelevant, they may not pay attention to the target, and they may express very little (if any) emotion toward the target (see Neel & Lassetter, 2019). These contrasting outcomes and downstream target experiences suggest that treating threat and opportunity as independent constructs opens new areas of inquiry in social judgment and behavior. With a unidimensional model, these distinctions are muddled at best and completely lost at worst. In addition, mapping threat and opportunity onto a single dimension would introduce conflation of qualitatively distinct judgments: The midpoint of a unidimensional measure could represent targets considered neither a threat nor an opportunity, as well as those considered *both* a threat *and* an opportunity. The empirical distinction between threat and opportunity is clearly consequential, but currently untested.

Several areas of social psychological inquiry have determined that bidimensional models often better describe phenomena previously assumed to be unidimensional (e.g., Russell, 2003). Bidimensional models of attitudes, for example, separate positive and negative valence into two dimensions, allowing for both indifference (the absence of positive and negative affect) and ambivalence (the presence of both positive and negative affect) to exist toward attitude objects. On a single dimension (i.e., a unidimensional model), indifference and ambivalence would both be operationalized at the midpoint of the scale, leading to the conflation of qualitatively distinct attitudes. Bidimensional models of attitudes avoid this confusion, and have become well-established in the present-day literature, garnering neuropsychological support (e.g., Cacioppo et al., 1996; Cunningham et al., 2005; Cunningham & Kirkland, 2014; Davidson & Fox, 1982; Ito et al., 1998). We propose that relevance appraisals are an additional domain requiring bidimensional, rather than unidimensional, conceptualization and measurement. Because relevance appraisals are the central mechanism of an affordance-management approach to social perception, understanding their structure is essential for determining how antecedent factors—such as target cues—ultimately lead to downstream outcomes—such as perceiver emotion and prejudice.

Target Cues Inform Relevance Appraisals

As discussed above, perceivers appraise targets on threat and opportunity *in reference to* specific goals. That is, a woman walking on a dark street who is concerned about her physical safety may appraise an approaching large and unfamiliar man as a potential threat to her self-protection. However, if the same woman is sitting on a bus and has a different goal, such as avoiding the flu, the same man will not necessarily be appraised as threatening her goal of avoiding disease. Appraisals of any particular target's relevance likely vary as a function of different goals.

Social perceivers use a variety of target cues to assess threat and opportunity to any particular goal (e.g., targets' social categories such as age, race, and sex; emotion expressions; height and posture; relationship to the perceiver). For example, men often are assumed to be more likely than women to pose a threat of physical aggression (e.g., Becker et al., 2007). Perceivers with a self-protection goal therefore may appraise men, compared with women, as more likely to threaten their goal to stay physically safe. Importantly, which cues are used will vary across one's goals (e.g., to avoid physical danger, to avoid disease). For example, whereas being a man may be considered informative of whether that person poses threats to one's physical safety, these same target cues may be considered relatively uninformative of potential disease threat. In sum, target cues inform relevance appraisals that perceivers make depending on the perceivers' specific motivations at any given time.

Relevance Appraisals Guide Downstream Attention, Emotion, and Behavior

A wealth of research demonstrates that target relevance shapes perceiver attention and emotion (including prejudice) toward the target. Those who are seen as more relevant—as either a threat or opportunity—garner more attention from others (Brown-Iannuzzi et al., 2014; Eitam et al., 2013; Koivisto & Revonsuo, 2007; Most et al., 2005; Simons & Chabris, 1999; Trawalter et al., 2008). Many perspectives on emotion likewise identify goal-relevance as a key component guiding emotional experience (Carver, 2004; Frijda, 1987; Lench et al., 2015; Levine, 1996; Moors, 2017; Moors et al., 2017; Nesse & Ellsworth, 2009; Roseman et al., 1996; Scherer, 2005). This goal-relevance perspective has been applied to understand prejudicial emotions as well (Cook et al., 2018; Cottrell & Neuberg, 2005; Dasgupta et al., 2009; Ellsworth & Scherer, 2003; Pick & Neuberg, 2017, 2020; Pirlott & Cook,

2018; Schaller & Neuberg, 2012). For example, appraising a target group as posing a particular threat (e.g., believing that African Americans threaten safety) predicts functionally relevant emotions (e.g., feeling fearful toward African Americans; Cottrell & Neuberg, 2005).

A goal-relevance, affordance-management perspective thus posits that in order to functionally engage with other people, we must assess how they are relevant to our current needs and motivations, and then pay attention to, feel, and act toward them in ways that best manage their affordances to us (Neuberg et al., 2010). Focusing on relevance anticipates important nuance in how stereotypes produce emotions and prejudice; that is, people can hold the same stereotypes of a group, yet nonetheless feel very different emotions toward them depending on how the group is seen to fit the perceiver's goals. Indeed, a group of people who endorse the stereotype that Mexican immigrants are willing to work for low wages may nonetheless feel very differently: Those who want to use cheap labor feel positively toward Mexican immigrants, whereas those who may be competing with Mexican immigrants for those jobs feel negatively (Pick & Neuberg, 2017, 2020). Given the abundant work on how relevance relates to emotions and prejudice, we focus the current investigation on empirically testing the Relevance Appraisal Matrix itself; that is, determining whether threat and opportunity are independent dimensions of social judgment that vary across perceiver goals. Understanding the structure of these appraisals sets the stage for a more complete understanding of how relevance relates to emotions and prejudice.

The Relevance Appraisal Matrix Versus Other Theoretical Frameworks

How does the Relevance Appraisal Matrix differ from other models of social perception and judgment? The stereotype content model (Fiske et al., 2002) proposes that *warmth* and *competence* are the two key dimensions of social perception that guide downstream prejudices. The ABC model of stereotypes (Koch et al., 2016) introduces a third dimension—conservative-progressive beliefs (hereafter referred to as *progressive beliefs*)—in addition to agency/socioeconomic success (in line with the stereotype content model's *competence*) and communion (in line with the stereotype content model's *warmth*). Other well-known models propose dimensions of ability and willingness, agency and experience, dominance and trustworthiness, niceness and shyness, masculinity and femininity, and uniquely human and essentially human characteristics (Bem, 1974; Collova et al., 2019; Gray et al., 2007; Haslam, 2006; Hester et al., 2020; Martin & Slepian, 2020; Montoya & Horton, 2014; Todorov et al., 2008).

The Relevance Appraisal Matrix does not simply recapitulate these other models. Instead, it describes social judgments at a different level of analysis. Many of the models discussed above examine cultural stereotypes about general attributes (i.e., what do *most people* think *this group is like*?) whereas the Relevance Appraisal Matrix, as tested in the current studies, focuses on personally held beliefs about targets' goal-relevance (i.e., what do *you personally* think this target *affords you*?). This is not a minor distinction. People may believe that a group or target is highly competent, for example, but the group or target may be seen to *help* one's goals in a cooperative context, and to *hurt* one's goals in a competitive context (e.g., Cuddy et al., 2008; Russell & Fiske, 2008). Note that in this case, the same stereotype has produced qualitatively distinct relevance appraisals.

Another important distinction to be made is the level at which we appraise others as helping and/or harming us. As mentioned above, extant research on stereotype content (e.g., Fiske et al., 2002; Koch et al., 2016) and sociofunctional approaches to prejudice (e.g., Cottrell & Neuberg, 2005) often focus on cultural and group stereotypes, examining beliefs about and appraisals of social groups. We view the current research through more of a person perception (vs. group-based stereotypes) lens, focusing on appraisals of individual group members. The Relevance Appraisal Matrix may apply flexibly to both individual- and group-based appraisals (and outcomes). We discuss how this framework relates to both levels of analysis in more detail in the General Discussion section.

Our approach also diverges from previously established models in other ways. For example, some of these models presume a direct path from stereotypes to outcomes such as prejudice or discrimination. We argue that, in fact, stereotypes inform appraisals of goal relevance, which then may lead to prejudice and discrimination (Neel & Lassetter, 2019; Neuberg et al., 2010; Pick & Neuberg, 2017, 2020). For example, a perceiver may stereotype Black men as relatively low in competence (Fiske et al., 2002) and as physically threatening (Cottrell & Neuberg, 2005). If the perceiver is competing with the Black man for a job (i.e., she has an economic attainment motivation), her belief that Black men are incompetent may result in appraising the Black man as neither threatening nor facilitating—that is, as irrelevant to—her goal of obtaining the job. As such, she may not have a strong (if any) emotional response to him. However, if the perceiver is walking alone at night and sees the Black man approaching her, her belief that Black men are dangerous may result in appraising him as a threat to her self-protection goal, resulting in a unique affective response: fear. In other words, relevance appraisals likely serve as a mechanism determining when and in what manner stereotypes and prejudice influence behavior (Neel & Lassetter, 2019; Pick & Neuberg, 2017, 2020).

Empirically examining how relevance appraisals relate to these well-established dimensions of social judgment can ensure we are not recapitulating an existing framework or contributing to the *jangle fallacy* by giving the same construct a different name (see Flake & Fried, 2020; Kelley, 1927). Further, estimating the relationships between dimensions of the Relevance Appraisal Matrix (i.e., threat and opportunity across goals) and different stereotype content (e.g., warmth and competence) can help to illuminate how stereotypes may inform relevance appraisals. Our purpose here is not to replace these existing models of social judgment but rather to provide a framework that exists in tandem, making unique predictions. As such, we explore how dimensions of the Relevance Appraisal Matrix relate to the stereotype content model in Study 1, and to the ABC model in Study 2.

The Current Research

We conducted two studies to test two primary hypotheses. First, we hypothesize that threat and opportunity judgments are independent constructs. That is, rather than existing as two ends of the same dimension (and therefore being the inverse of each other), we propose that threat and opportunity appraisals are independent

dimensions (termed the Relevance Appraisal Matrix). Second, we hypothesize that threat and opportunity judgments of different social targets can be dynamic across different fundamental goals. For example, rather than appraising targets as facilitating and/or threatening all goals, we argue that appraisals are motivation-specific: Just because a perceiver evaluates a target as relevant (or irrelevant) to one goal, does not necessarily mean the perceiver will evaluate the target as relevant (or irrelevant) to another. Finally, we explored whether and how threat and opportunity appraisals might relate to other aspects of social judgments: Stereotypes as reflected in the stereotype content model (in Study 1), and the ABC model (in Study 2). Across studies, participants reported their relevance appraisals (assessments of threat and opportunity) of a variety of targets across several fundamental motivations.

The University of Iowa Institutional Review Board approved Study 1 and the University of Toronto Research Ethics Board approved Study 2. Study 1 was approved under "Social Invisibility" (Protocol #201511821) and Study 2 was approved under "Stereotypes of Groups' Relevance: Independent Judgments of Threat and Opportunity" (Protocol #37564). Both studies were conducted prior to the global coronavirus (COVID-19) pandemic of 2020.

Study 1

Undergraduate students appraised a variety of targets on their likelihood of facilitating (i.e., presenting an *opportunity* for) and impeding (i.e., posing a *threat* to) two goals: self-protection and disease avoidance. Study 1 thus affords an initial test of the two central hypotheses.[1] First, we test using confirmatory factor analysis (CFA) whether threat and opportunity are best characterized as independent dimensions of social perception. We expect that appraising a target as *threatening* one's goal does not necessitate appraising the target as *not facilitating* the goal; rather, we predict that threat and opportunity appraisals are made independently from one another and comprise two distinct dimensions. Second, we use CFA to test whether judgments that a target affords a threat and/or an opportunity vary across goals. We expect that a target's appraised relevance to one goal (e.g., threat to self-protection) will not necessarily indicate that the target poses the same form of relevance to another goal (e.g., threat to disease avoidance).

We focus on self-protection and disease avoidance goals for this initial test because both the threat of intergroup violence and of infectious disease had grave implications for survival in the ancestral environment, and are thought to have shaped human social evolution (e.g., Ferguson, 1984; Haas, 1990). As a result, humans' psychological systems for managing these problems can produce different forms of prejudice and stigmatization (Kurzban & Leary, 2001; Schaller & Neuberg, 2012). Different cues are used to assess whether someone poses a physical safety or disease threat, and thus different targets are seen to pose these threats. For example, outgroup men are seen to pose a threat of physical safety (Cottrell & Neuberg, 2005; McDonald et al., 2012) whereas people who are overweight (Crandall, 1994) and older people (Duncan & Schaller, 2009; Schaller & Neuberg, 2012) are heuristically associated with a threat of disease. Because different targets are assumed to pose threats of violence and disease, we expect that appraisals of a target's relevance—that is, whether they pose a threat and/or an opportunity to others—will vary across goals (i.e., self-protection, disease avoidance).

Study 1 also explored the relationship between the Relevance Appraisal Matrix (Neel & Lassetter, 2019) and the stereotype content model (Fiske et al., 2002). Although we argue that appraisals of threat and opportunity do not simply recapitulate warmth and competence, the precise relationship between these factors is unknown. Below we discuss several possibilities.

First, *competence* may inform appraisals for only some goals—for example, those in which ability to control one's actions amplifies goal threat. More specifically, a highly competent target may be appraised as capable of physically harming others and thus, as a threat to self-protection. However, a target may pose a threat of disease irrespective of their stereotyped competence, or alternatively, higher competence may even *reduce* the perceived threat of disease, as it may facilitate engaging in disease-reducing behaviors. Stereotypes of competence thus are likely to affect affordances differently across goals.

Second, threat appraisals may generally track *warmth*: Low warmth targets (compared with high warmth targets) may be appraised as more likely to threaten a perceiver's goals. Perceptions of warmth have often been described as an index of targets' intentions (e.g., Fiske et al., 2007; Reeder et al., 2002): Perceivers may believe that a target stereotyped as high warmth has greater intentions to help them. These intentions, however, are not always necessary to obstruct others' goals. For example, a close friend that a perceiver stereotypes as high warmth and friendly may be perceived as threatening the perceiver's goal of avoiding disease if that friend has the flu. Although relationships between the Relevance Appraisal Matrix and the stereotype content model are likely, we hypothesize that threat and opportunity appraisals do not map clearly onto warmth and competence.

Method

Participants

Data from as many participants as possible were collected until the academic term ended and the participant pool closed. Two-hundred and four undergraduate students completed the online survey for partial course credit (59 males, 145 females; M_{age} = 18.86 years, SD_{age} = 1.08 years; 14 Asian or Asian American, six Black or African American, eight Hispanic and/or Latinx, 153 White, 19 Multiracial, one other racial/ethnic identity, three declined to respond).

Procedure

Participants completed the study in-lab at individual computer workstations. After consenting to participate, participants appraised 12 (of 30) social group members (hereafter referred to as *targets*) on their likelihood of facilitating and impeding their (the participant's) self-protection and disease avoidance goals. Participants thus assessed 12 targets across two relevance dimensions

[1] Study 1 was preceded by a lower-powered pilot study (N = 107). Because Study 1 replicated the Pilot Study with a larger sample size and extended it by adding warmth and competence items, we report the Pilot Study in the online supplementary materials. Data patterns between the Pilot Study and Study 1 were nearly identical.

(threat and opportunity) and two goals (self-protection and disease avoidance). The order of all items was counterbalanced. Participants also completed items assessing targets' warmth and competence. Participants answered two sets of questions (in counterbalanced order) about different targets: one, the relevance appraisals, and the other, the warmth and competence items. Finally, participants completed demographic items and then were debriefed.

Materials and Measures

Social Group Targets. We created a list of commonly studied targets in the prejudice and stereotyping literature (e.g., a Muslim, a gay man, an obese person), people the participant would likely encounter in their everyday lives who may be relevant to social goals (e.g., your roommate, your parent), and people whom we judged as particularly likely to represent threats and/or opportunities to self-protection or disease-avoidance goals (e.g., a convicted murderer, a person with a cold or flu, respectively). We then selected 30 targets from that list that we believed would span divergent evaluations of threat and opportunity across the two focal goals (i.e., we wanted the final list of targets to account for a good portion of variance across the hypothesized two-dimensional space of the Relevance Appraisal Matrix; Neel & Lassetter, 2019). Table 1 lists the final selection of targets. To reduce survey length (and thus reduce participant fatigue and thoughtless responding) the 30 targets were randomly divided into three between-subjects conditions of 12 targets, with three targets repeated across all conditions to provide some consistency and comparability within between-subjects groups (a convicted murderer, a doctor, and a person with a cold or flu; italicized in Table 1).

Relevance Appraisals. Participants responded to three items assessing each of the four relevance dimension × goal combinations (i.e., self-protection threat, self-protection opportunity, disease avoidance threat, and disease avoidance opportunity), resulting in 12 total items per target. Each item was anchored at 1 (*not likely at all*) and 7 (*extremely likely*). Table 2 shows all items.

To maximize rated differences between targets, we blocked Study 1 by item. That is, participants rated all 12 targets (in randomized order) on each item before moving onto the next item. Item order was counterbalanced.

Warmth and Competence Evaluations. Participants responded to stereotype content items from Fiske et al. (2002), rating each target on warmth (four items: tolerant, warm, good-natured, sincere) and competence (five items: competent, confident, independent, competitive, and intelligent) on 5-point Likert scales anchored at 1 (*not at all*) and 5 (*extremely*). Items for warmth (M Ω = .75, SD = .10, *range* = .47–.90) and competence (M Ω = .77, SD = .07, *range* = .59–.87) were separately combined into composites. See Table S4 in the online supplementary materials for McDonald's omegas, *N*s, means, and standard deviations for warmth and competence composites per target. We blocked warmth and competence questions by item. That is, participants rated all 12 targets (in randomized order) on each warmth and competence item before moving onto the next item. Participants rated the same targets on warmth and competence as they did for threat and opportunity.

Demographics. Participants reported their age, sex, race/ethnicity, sexual orientation, relationship status, whether or not they have children, socioeconomic status, income, academic major, native language, and zip code.

Table 1
Study 1 Social Group Targets

5-year-old child	Nurse
Bouncer at a night club	Obese person
Convicted murderer	Paramedic
Doctor	Your parent
Elderly stranger	*Person with a cold or flu*
Gay man	Person with schizophrenia
Your grandparent	Police officer
Healthy person	Professional athlete
Hippie	Your roommate
Homeless person	Security guard
Infectious disease nurse	Self-defense class instructor
Martial artist	Strong friend
Medical professional with a cold or flu	Terrorist
Middle-aged woman	Tourist
Muslim	Trusted male relative

Note. For items preceded by *Your*, participants were instructed to think of their own grandparent, parent, and roommate. If participants did not currently have a roommate, they were asked to make their best guess about how they would respond. All participants appraised the convicted murderer, doctor, and person with a cold or flu, regardless of condition (italicized).

Results

Analytical Strategy

We used CFA to test hypotheses. We collected data in a manner designed to minimize participant fatigue, and therefore the data structure was not suitable for fitting a single confirmatory factor model across all participants and targets. Instead, we built different confirmatory factor models for each type of target (e.g., a convicted murderer; a 5-year-old child), using participants' relevance appraisals. Specifically, we compared three theoretical models. The *hypothesized four-factor model* was built with independent latent factors of self-protection threat, self-protection opportunity, disease avoidance threat, and disease avoidance opportunity (see Panel A of Figure 2). We compared the hypothesized model with a *goal-specific two-factor model* with independent factors of self-protection and disease avoidance, as well as to an *appraisal-specific two-factor model* with independent factors of threat and opportunity (see Panels B and C, respectively, of Figure 2).

We interpreted superior model fit for the four-factor model as evidence in support of the hypothesis, which would indicate that the theoretically defined covariance matrix of the hypothesized four-factor model better matches the observed data than those of the alternative two-factor models. To conduct CFAs, we loaded all items onto the different latent factor solutions, allowing all latent factors to correlate with one another.

In addition to testing primary hypotheses with CFA, we explored relationships between the Relevance Appraisal Matrix and stereotype content model with correlational analyses.

Are Threat and Opportunity Appraisals Independent?

To test the first hypothesis, we compared the fit of the hypothesized model to the goal-specific model (see Panels A and B, respectively, of Figure 2). If, counter to predictions, the goal-specific model describes the data better than the hypothesized model, this would suggest that threat and opportunity appraisals

Table 2
Relevance Appraisal Items

Relevance appraisal	Goal	Item
Threat	Self-protection *Studies 1 and 2*	1. If you were to encounter this person, how likely is it that he/she would endanger your physical safety? 2. If you were to encounter this person, how likely is it that he/she would be physically dangerous to you? 3. If you were to encounter this person, how likely is it that he/she would physically hurt you?
	Disease avoidance *Studies 1 and 2*	1. If you were to encounter this person, how likely is it that he/she would increase your risk of physical illness? 2. If you were to encounter this person, how likely is it that he/she would give you a disease? 3. If you were to encounter this person, how likely is it that he/she would increase your risk of getting sick?
	Economic *Study 2 only*	1. If you were to encounter this person, how likely is it that he/she would take economic opportunities away from you? 2. If you were to encounter this person, how likely is it that he/she would decrease the economic opportunities available to you? 3. If you were to encounter this person, how likely is it that he/she would take a job that you want?
	Mate-seeking *Study 2 only*	1. If you were to encounter this person, how likely is it that he/she would make it harder for you to date someone? 2. If you were to encounter this person, how likely is it that he/she would keep you from meeting people to flirt with or date? 3. If you were to encounter this person, how likely is it that he/she would compete with you for a new romantic or sexual partner?
	Affiliation *Study 2 only*	1. If you were to encounter this person, how likely is it that he/she would socially exclude you? 2. If you were to encounter this person, how likely is it that he/she would reject you from a social group? 3. If you were to encounter this person, how likely is it that he/she would intentionally leave you out of plans and activities?
Opportunity	Self-protection *Studies 1 and 2*	1. If you were to encounter this person, how likely is it that he/she would protect your physical safety? 2. If you were to encounter this person, how likely is it that he/she would keep you safe from physical danger? 3. If you were to encounter this person, how likely is it that he/she would help you stay safe?
	Disease avoidance *Studies 1 and 2*	1. If you were to encounter this person, how likely is it that he/she would help you stay healthy? 2. If you were to encounter this person, how likely is it that he/she would keep you from getting sick? 3. If you were to encounter this person, how likely is it that he/she would help you avoid disease?
	Economic *Study 2 only*	1. If you were to encounter this person, how likely is it that he/she would provide economic opportunities to you? 2. If you were to encounter this person, how likely is it that he/she would increase the economic opportunities available to you? 3. If you were to encounter this person, how likely is it that he/she would help you obtain a job that you want?
	Mate-seeking *Study 2 only*	1. If you were to encounter this person, how likely is it that he/she would make it easier for you to date someone? 2. If you were to encounter this person, how likely is it that he/she would potentially be a person with whom you would flirt or date? 3. If you were to encounter this person, how likely is it that he/she would be someone you are interested in as a romantic or sexual partner?
	Affiliation *Study 2 only*	1. If you were to encounter this person, how likely is it that he/she would include you in social situations? 2. If you were to encounter this person, how likely is it that he/she would be friendly to you? 3. If you were to encounter this person, how likely is it that he/she would make you feel like you are accepted and belong?

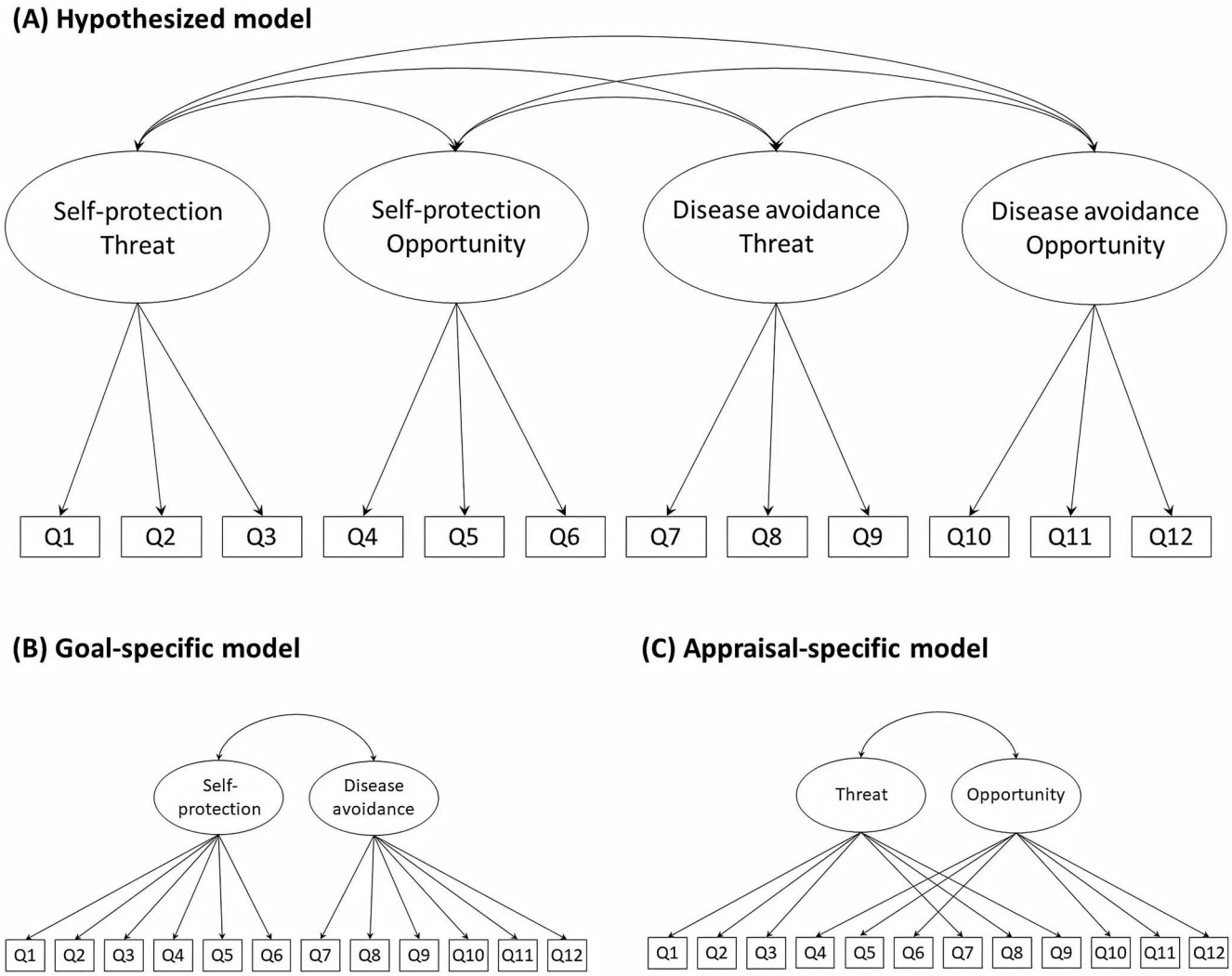
Note. Participants responded to all three items for each relevance dimension × goal combination. All items were anchored at 1 (*not likely at all*) and 7 (*extremely likely*). Self-protection and disease avoidance goals were measured in Studies 1 and 2. Economic, mate-seeking, and affiliation goals were measured only in Study 2.

are better characterized as opposite ends of a single dimension, rather than as two separate dimensions.

Models for all targets converged. We report the comparative fit index (CFI), the Tucker Lewis index (TLI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). The hypothesized model fit indices were superior when compared with those of the goal-specific model, which were far below recommended fit thresholds (Hu &

Figure 2

Study 1 Latent Factor Solutions: Hypothesized (Panel A), Goal-Specific (Panel B), and Appraisal-Specific (Panel C) Models



Note. Ovals represent latent factors. Boxes represent observed indicators. Single-headed arrows represent indicator loadings. Double-headed arrows represent correlations between latent factors.

Bentler, 1999; see Table 3 for fit indices averaged across targets and Table 4 for fit indices per target).

Specific comparisons of model fit, using change in chi-squared tests, echoed these descriptive observations (see Table 4). The data of all 30 targets were described significantly better by the hypothesized model than the goal-specific model.

As anticipated, the hypothesized model (which specified separate latent factors for self-protection and disease goals *and* threat and opportunity appraisals) described the data better than the goal-specific model, suggesting that threat and opportunity appraisals are better characterized as two separate dimensions, rather than two ends of a single dimension.

We demonstrate above that threat and opportunity appraisals each explain unique variance within Study 1's data. An open question remains: How *related* are threat and opportunity appraisals to each other? To explore this question, we examined the relationships between latent factors across confirmatory factor models. Standardized covariances between latent factors for the hypothesized and goal-specific models per target can be found in Table S5 in the online supplementary materials. Averaged across targets, the relationship between threat and opportunity appraisals (i.e., the latent factors of the goal-specific model) was negative, small in size, and highly variable ($M_\beta = -.10$, $SD_\beta = 0.43$, $range_\beta = -.78$–$.79$). The observed relationships between latent factors of the hypothesized model echoed this pattern. The average association between self-protection threat and self-protection opportunity was negative, small in size, and highly variable ($M_\beta = -.12$, $SD_\beta = 0.44$, $range_\beta = -.91$–$.87$), and the average association between disease avoidance threat and disease avoidance opportunity was very close to zero and highly variable ($M_\beta = .05$, $SD_\beta = 0.35$, $range_\beta = -.60$–$.64$). Of note, the high variability across these averaged associations suggests that the

Table 3
Study 1 Fit Indices Averaged Across Targets for Hypothesized, Goal-Specific, and Appraisal-Specific Models

Model	CFI	TLI	SRMR	RMSEA
Hypothesized				
M	**0.94**	**0.91**	**0.07**	**0.08**
Range	0.86, 1.00	0.81, 1.00	0.04, 0.10	0.00, 0.12
Goal-specific				
M	0.60	0.51	0.18	0.20
Range	0.34, 0.76	0.18, 0.70	0.10, 0.30	0.14, 0.27
Appraisal-specific				
M	0.80	0.75	0.11	0.13
Range	0.61, 1.00	0.51, 1.00	0.06, 0.17	0.00, 0.19

Note. The hypothesized model fit indices are bolded.

relationship between threat and opportunity varies considerably depending on the target, as well as the goal.

To visualize how average participant evaluations of Study 1's 30 targets map onto the two-dimensional Relevance Appraisal Matrix (see Figure 1), we created composite relevance appraisal ratings (by averaging the three items per goal and appraisal) for each target. We then plotted these composites on the Relevance Appraisal Matrix space (see Figure 3).

Note that whereas Study 1's primary analyses examined appraisals within groups (i.e., are appraisals of threat and opportunity independent for each specific group?), Figure 3 highlights differences in average appraisals *across groups* (i.e., where does each group fall on average appraisal of threat and opportunity?). Thus, these patterns do not speak to the primary CFA analyses we report and are for illustrative purposes only.

From the associations between latent factors for the disease avoidance goal, appraisals of threat and opportunity do not seem strongly related to one another. For a self-protection goal, however, appraisals of threat and opportunity appear to be negatively related: If a target is appraised as threatening self-protection, they are less likely to be appraised as facilitating self-protection. Crucially, however, threat and opportunity appraisals describe unique variance within Study 1's data (as demonstrated with the CFAs) and are best characterized as two separate dimensions rather than opposite ends of a single dimension.

Do Appraisals of a Target's Relevance Vary Dynamically Across Different Goals?

To test the second hypothesis, we compared the fit of the hypothesized model and the appraisal-specific model (see Panels A and C, respectively, of Figure 2). If, counter to the second hypothesis, the appraisal-specific model describes the data better than the hypothesized model, then this would suggest that threat and opportunity appraisals may be independent dimensions (in line with the first hypothesis), but that they *do not vary across goals*.

Models for all targets converged. The hypothesized model fit indices were superior to those of the appraisal-specific model. Of the 30 targets, the data of 29 were described significantly better by the hypothesized model than the appraisal-specific model, which were far below recommended fit thresholds (Hu & Bentler, 1999). Data for only the middle-aged woman were described equally poorly by both models. See Table 3 for fit indices averaged across targets, and Table 4 for model-fit comparisons and fit indices for each of the 30 targets.

We again examined relationships between latent factors across confirmatory factor models. Standardized covariances between latent factors for the hypothesized and appraisal-specific models per target can be found in Table S5 in the online supplementary materials. Averaged across targets, the relationship between appraisals for self-protection and disease avoidance goals (i.e., the latent factors of the appraisal-specific model) was positive, large in size, and highly variable ($M_\beta = .62$, $SD_\beta = 0.43$, $range_\beta = -.79–1.00$). The observed relationships between latent factors of the hypothesized model echoed this pattern. The average association between self-protection threat and disease avoidance threat was positive and large, with high variability ($M_\beta = .64$, $SD_\beta = 0.22$, $range_\beta = .10–.96$), as was the association between self-protection opportunity and disease avoidance opportunity ($M_\beta = .71$, $SD_\beta = 0.25$, $range_\beta = .05–1.00$). Once again, the wide ranges of the latent correlations between threat and opportunity suggest that the relationship varies considerably across both targets and goals.

In sum, threat appraisals for self-protection and disease avoidance goals and opportunity appraisals for both goals were positively related to each other: If a target was appraised as posing a threat or opportunity in one domain, they were increasingly likely to be appraised as posing a threat or opportunity in another domain. Even though these appraisals were related to each other, they still described unique variance within Study 1's data: In line with the second hypothesis, the hypothesized model described the data better than the appraisal-specific model.

How Do Threat and Opportunity Appraisals Relate to Judgments of Warmth and Competence?

We next explored how relevance appraisals related to warmth and competence at the target level (see Table 5). Like above, we collected data in a way to minimize participant fatigue, and were unable to fit a single confirmatory factor model across all participants and targets, including both relevance appraisal items and stereotype content items. Thus, we approached this exploratory question with correlations conducted on composites. We combined the four items for warmth and five items for competence into composite scores and examined their associations with composites for each relevance dimension × goal combination (i.e., self-protection threat, self-protection opportunity, disease avoidance threat, and disease avoidance opportunity).

Across both goals, opportunity appraisals correlated positively with both warmth ($rs \geq .68$, $ps < .001$) and competence ($rs \geq .72$, $ps < .001$) and these associations were large in size. The correlation between self-protection threat appraisals and warmth was large and negative, $r = -.84$, $p < .001$. All other associations between threat appraisals and warmth and competence were small-to-medium in size ($rs \leq -.29$, $ps > .11$).

These correlations suggest that opportunity appraisals relate to both warmth and competence stereotypes at the target level: The warmer and more competent a target is evaluated to be, the more likely they will be appraised as facilitating one's goal. However,

Table 4

Study 1 Model Fit Comparisons Between Hypothesized Model and Comparison Models, and Model Fit Indices for All Three Models

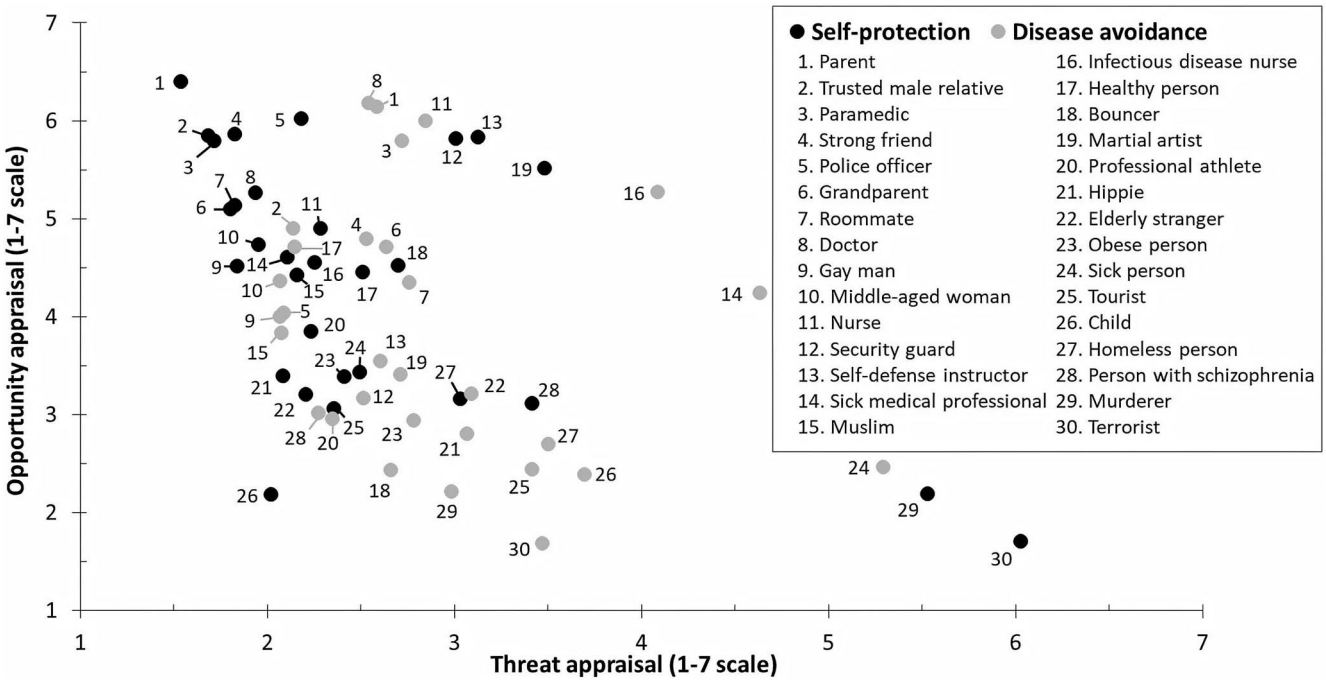
	Model comparisons		Model fit indices													
	Hypothesized versus goal-specific	Hypothesized versus appraisal-specific	Hypothesized model					Goal-specific model					Appraisal-specific model				
Target	$\Delta\chi^2$ ($\Delta df = 5$)	$\Delta\chi^2$ ($\Delta df = 5$)	χ^2 ($df = 48$)	CFI	TLI	RMSEA	SRMR	χ^2 ($df = 53$)	CFI	TLI	RMSEA	SRMR	χ^2 ($df = 53$)	CFI	TLI	RMSEA	SRMR
5-year-old child	42.76***	27.59***	99.16***	0.86	0.81	0.13**	0.08	141.92***	0.76	0.70	0.16***	0.10	126.75***	0.80	0.75	0.14***	0.10
Bouncer	121.55***	101.51***	75.58**	0.91	0.88	0.09†	0.08	197.13***	0.54	0.43	0.20***	0.17	177.09***	0.61	0.51	0.19***	0.17
Doctor	278.15***	138.40***	68.99*	0.98	0.97	0.05	0.04	347.14***	0.67	0.59	0.17***	0.14	207.39***	0.83	0.78	0.12***	0.09
Elderly stranger	81.50***	35.97***	70.45*	0.93	0.90	0.08	0.07	151.95***	0.69	0.62	0.17***	0.15	106.42***	0.83	0.79	0.12**	0.09
Gay man	197.94***	20.93***	73.66*	0.96	0.94	0.09†	0.06	271.60***	0.63	0.54	0.25***	0.24	94.59***	0.93	0.91	0.11**	0.09
Grandparent	171.61***	15.37**	74.07**	0.92	0.89	0.09†	0.08	245.68***	0.42	0.28	0.23***	0.24	89.44**	0.89	0.86	0.10*	0.08
Healthy person	126.05***	18.12**	65.84*	0.94	0.92	0.07	0.07	191.89***	0.55	0.44	0.20***	0.18	83.96**	0.90	0.88	0.09*	0.10
Hippie	144.38***	30.40***	77.46**	0.90	0.87	0.10*	0.08	221.84***	0.45	0.31	0.22***	0.22	107.86***	0.82	0.78	0.13**	0.10
Homeless person	204.26***	19.41**	63.00†	0.97	0.95	0.07	0.07	267.26***	0.50	0.38	0.24***	0.26	82.41**	0.93	0.92	0.09†	0.08
Infectious disease nurse	89.22***	48.23***	60.62	0.97	0.96	0.06	0.07	149.84***	0.75	0.69	0.17***	0.12	108.85***	0.86	0.82	0.13***	0.10
Martial artist	105.32***	67.90***	70.40*	0.92	0.89	0.08	0.09	175.71***	0.58	0.48	0.18***	0.16	138.29***	0.71	0.64	0.15***	0.13
Medical professional with a cold or flu	112.43***	82.96***	79.68**	0.90	0.87	0.10*	0.09	192.11***	0.58	0.47	0.20***	0.18	162.64***	0.67	0.58	0.17***	0.16
Middle-aged woman	183.82***	10.45†	37.59	1.00	~1.00	0.00	0.05	221.41***	0.63	0.54	0.21***	0.23	48.04	1.00	~1.00	0.00	0.06
Murderer	310.69***	245.44***	53.69	0.99	0.99	0.02	0.04	364.38***	0.70	0.63	0.17***	0.15	299.13***	0.76	0.71	0.15***	0.15
Muslim	208.63***	58.07***	54.35	0.99	0.98	0.04	0.05	262.98***	0.58	0.48	0.24***	0.24	112.42***	0.88	0.85	0.13***	0.10
Nurse	140.93***	72.67***	61.99†	0.95	0.94	0.07	0.08	202.93***	0.51	0.40	0.20***	0.20	134.66***	0.74	0.67	0.15***	0.14
Obese person	109.58***	17.85**	78.50**	0.93	0.90	0.10*	0.06	188.09***	0.67	0.59	0.19***	0.13	96.36***	0.90	0.87	0.11**	0.08
Paramedic	80.44***	42.17***	59.75	0.95	0.94	0.06	0.08	140.19***	0.65	0.57	0.16***	0.16	101.92***	0.81	0.76	0.12**	0.11
Parent	81.90***	52.58***	84.91**	0.91	0.88	0.11*	0.07	166.81***	0.73	0.67	0.18***	0.13	137.49***	0.80	0.75	0.16***	0.11
Person with a cold or flu	181.84***	169.38***	82.93**	0.95	0.93	0.06	0.06	264.77***	0.69	0.61	0.14***	0.12	252.31***	0.71	0.63	0.14***	0.14
Person with schizophrenia	281.25***	42.54***	75.33**	0.94	0.92	0.09†	0.07	356.58***	0.35	0.18	0.29***	0.30	117.87***	0.86	0.83	0.13***	0.11
Police officer	128.46***	93.08***	55.85	0.98	0.98	0.05	0.05	184.31***	0.70	0.62	0.19***	0.15	148.94***	0.78	0.73	0.16***	0.13
Pro athlete	64.89***	29.21***	79.40**	0.88	0.83	0.10*	0.10	144.29***	0.65	0.56	0.16***	0.13	108.61***	0.79	0.73	0.13***	0.10
Roommate	146.42***	99.29***	61.78†	0.97	0.96	0.06	0.07	208.20***	0.66	0.58	0.21***	0.19	161.07***	0.76	0.71	0.17***	0.12
Security guard	89.55***	69.72***	72.76*	0.91	0.87	0.09†	0.08	162.31***	0.59	0.49	0.17***	0.14	142.48***	0.66	0.58	0.16***	0.16
Self-defense class instructor	104.72***	67.65***	82.79**	0.88	0.83	0.10*	0.09	187.51***	0.53	0.42	0.19***	0.16	150.44***	0.66	0.58	0.16***	0.13
Strong friend	110.82***	65.74***	71.79*	0.93	0.90	0.09†	0.07	182.61***	0.60	0.51	0.19***	0.16	137.52***	0.74	0.68	0.16***	0.12
Terrorist	181.10***	72.02***	65.95†	0.95	0.94	0.07	0.07	247.05***	0.46	0.32	0.24***	0.26	137.97***	0.76	0.70	0.16***	0.14
Tourist	99.95***	38.73***	82.52**	0.88	0.84	0.10*	0.08	182.47***	0.55	0.44	0.19***	0.17	121.25***	0.76	0.71	0.14***	0.11
Trusted male relative	111.71***	60.60***	63.88†	0.97	0.95	0.07	0.05	175.59***	0.74	0.68	0.18***	0.15	124.47***	0.85	0.81	0.14***	0.11

Note. In several cases TLIs above 1.00 were returned; we treated these as statistical artifacts and report these TLIs as 1.00 (denoted in the table with ~ preceding the 1.00). In a single case a standardized covariance (between latent factors) above 1.00 was returned for the terrorist target; we also treated this as a statistical artifact and reran the model, fixing the covariance to 1.00. The degrees of freedom for this specific model therefore vary slightly from what is reported below: $\text{Hypothesized}_{df} = 49$; $\Delta df = 4$ for both model comparisons.

† $p < .100$. * $p < .050$. ** $p < .010$. *** $p < .001$.

Figure 3

Plot of Study 1's Targets on the Two-Dimensional Relevance Appraisal Space for a Self-Protection Goal (Black Markers) and a Disease Avoidance Goal (Gray Markers)



Note. Each target appears twice (once for each goal) on the plot. Target labels depicted in the legend have been shortened; see Table 1 for full labels.

threat appraisals are less strongly related to warmth and competence, and in some cases are entirely unrelated.

Discussion

Study 1 tested two focal hypotheses. We first examined whether threat and opportunity appraisals are independent from each other, existing as two separate dimensions rather than two ends of the same dimension. A latent factor solution separating relevance appraisals from each other *and* goals from each other described the data better than a solution separating only goals from each other. Study 1 therefore suggests that threat and opportunity appraisals of Study 1's 30 targets may be better described as two independent dimensions.[2] We next examined whether threat and opportunity appraisals vary across self-protection and disease avoidance goals. Once again, a factor solution separating relevance appraisals from each other *and* goals from each other described the data better than a solution separating only relevance appraisals from each other. In line with the second hypothesis, Study 1's data suggest that relevance appraisals for the 30 selected targets vary dynamically across self-protection and disease avoidance goals.

We also examined relationships between the latent factors within Study 1's confirmatory factor models. Patterns demonstrated a small, negative association between threat and opportunity appraisals. Further, threat appraisals made in relation to a self-protection and disease avoidance goal, and opportunity appraisals made in relation to those same two goals, were positively related to each other. Taken together, the data patterns of Study 1 suggest that although there likely exist relationships between threat and opportunity appraisals, at least for the two goals and across the targets tested in Study 1, threat and opportunity appraisals are best treated as distinct dimensions.

Table 5

Pearson Correlations Between Threat and Opportunity Appraisals, and Warmth and Competence Stereotype Content

Relevance appraisal	Goal	Warmth	Competence
Threat	Self-protection	$-.84^{***}$	$-.29$
	Disease avoidance	$-.18$	$-.29$
Opportunity	Self-protection	$.68^{***}$	$.78^{***}$
	Disease avoidance	$.81^{***}$	$.72^{***}$

*** $p < .001$.

[2] Data patterns should be interpreted as evidence that threat and opportunity appraisals can be thought of as independent constructs. Of course, the generality of this conclusion is constrained by the extent to which the items we used cover the full constructs of threat and opportunity for each goal. We generated three items per appraisal × goal combination that sought both to adequately cover the goal construct and to maximize internal consistency. Although this likely enhanced reliability, it may have impaired construct validity to the extent these items miss important content for additional aspects of the goals. Future work can examine whether there are other important aspects of threat and opportunity for these goals not covered by our items, and if so, test the extent to which the Relevance Appraisal Matrix describes relevance appraisals that are operationalized at a broader level.

Finally, we explored the relations between relevance appraisals and stereotype content. If the Relevance Appraisal Matrix simply recapitulates the stereotype content model, warmth and competence evaluations should map onto appraisals of threat and opportunity. The data patterns of Study 1 suggest that this is unlikely. Both warmth and competence evaluations were associated to a large extent with opportunity appraisals across self-protection and disease avoidance goals. In contrast, competence evaluations were not associated with threat appraisals, and warmth evaluations were associated negatively with only self-protection threat. This evidence is consistent with the possibility that warmth and competence inform, rather than comprise, relevance appraisals. With Study 2, we conduct correlations at the participant level to further explore the relationship between the Relevance Appraisal Matrix and stereotype content.

Study 2

Study 1 provides initial support for the two primary hypotheses: (a) that threat and opportunity appraisals are independent dimensions; and (b) that relevance appraisals vary dynamically across two different goals. Study 2 seeks to conceptually replicate Study 1 with a different sample population and with higher power at the participant level.

In addition, because people evaluate the relevance of others to numerous social goals beyond self-protection and disease avoidance, Study 2 examines the nature of relevance appraisals across a larger set of goals than in Study 1. In Study 2, participants rate the likelihood that six targets facilitate and impede *five* fundamental goals: Economic attainment (or status-seeking), mate-seeking, and affiliation, as well as self-protection and disease avoidance. Each of these goals represents recurrent adaptive problems experienced in our evolutionary past that likely shaped human social psychology (Kenrick et al., 2010). Further, these particular goals have been studied extensively as a set (e.g., Beall & Schaller, 2014; Brown et al., 2015; Krems et al., 2017; Neel et al., 2016; Sacco et al., 2014) and targets may be appraised as differently relevant across these goals (Maner et al., 2005, 2012).

In addition to testing the two primary hypotheses outlined above, Study 2 extends Study 1's exploration of how relevance appraisals relate to stereotype content. Koch et al.'s (2016) measure was developed with a representative sample of targets and rated attributes and settled on three fundamental dimensions of stereotype content: agency/socioeconomic success (similar to the stereotype content model's *competence*), communion (similar to the stereotype content model's *warmth*), and progressive beliefs.

Study 2 participants appraised targets on their likelihood of posing an opportunity and a threat to self-protection, disease avoidance, economic attainment, mate-seeking, and affiliation goals. Participants also evaluated each target on agency, communion, and progressive beliefs. Study 2 was preregistered (https://osf.io/m82kh/).

Method

Participants

To adequately power studies with planned CFAs, we followed Hoyle's (2012) recommendation of 400 observations per item. Because all participants saw every question in Study 2, we aimed for a sample of 400 participants. We embedded within the study three separate attention checks and preregistered them as a priori exclusions. After removing participants who failed these attention checks ($N = 356$), 405 Amazon Mechanical Turk (MTurk) workers from the United States completed Study 2 (249 males, 155 females, one other gender identity; $M_{age} = 36.13$ years, $SD_{age} = 10.77$ years; four American Indian or Alaska Native, 26 Asian or Asian American, 42 Black or African American, 12 Hispanic and/or Latinx, 302 White, 15 Biracial, two other racial and/or ethnic identities, two declined to respond).

The strict inclusion criteria based on Study 2's preregistered attention checks resulted in a very high attention check failure rate (46.8% of the total sample of $N = 761$). This high failure rate was primarily attributable to the third and final attention check: A demographic question asking about religious affiliation that participants were instructed to leave blank. A total of 219 participants (28.8% of the full sample) failed this attention check but passed the other two checks. Adopting a multiverse approach (Steegen et al., 2016), we conducted primary analyses on the dataset with the preregistered exclusions as well as two additional versions that used looser inclusion criteria: (a) a version in which we ignored the third attention check described above, removing only participants who failed the first two attention checks or provided incomplete data ($N = 624$ included); and (b) a version in which we ignored all three attention checks, removing only incomplete responses ($N = 708$ included). Data patterns of both versions were nearly identical to the results reported below on the preregistered sample of 405 participants, and results are robust to participant exclusion criteria. We report results according to the preregistered exclusions below. See online supplementary materials for additional detail and full multiverse analyses.

Procedure

Participants completed the study at their personal computers. After consenting to participate, participants answered two sets of questions (in counterbalanced order) about six different targets. In the first set, participants appraised targets on their likelihood of facilitating and impeding five different fundamental goals. The second set of questions asked participants to assess the same six targets on agency/socioeconomic success, progressive beliefs, and communion (Koch et al., 2016). The order of all individual items was counterbalanced. Participants completed demographic items and were then debriefed.

Materials and Measures

Social Group Targets. Participants answered questions about six targets: a 5-year-old child, a police officer, a gay man, an elderly woman, a homeless person, and an Asian woman. We chose these targets with two aims in mind: To create a set of targets (a) with whom participants were likely familiar and have had some degree of social contact, and (b) who likely vary in their relevance to the five fundamental goals examined in this study.

Relevance Appraisals. Participants appraised targets on five different goals: Self-protection and disease avoidance (as in Study 1), economic attainment, mate-seeking, and affiliation. This created 10 relevance dimension × goal combinations. Three items for each combination resulted in 30 total items per target (see Table 2).

Each item was anchored at 1 (*not likely at all*) and 7 (*extremely likely*). To maximize differences between targets, we blocked Study 2 by item. That is, participants rated all targets (in randomized order) on a single item before moving onto the next item. All items were randomized and participants responded to all items.

Agency, Progressive Beliefs, and Communion Evaluations. Using Koch et al.'s (2016) items, participants rated each target on agency/socioeconomic success (hereafter referred to as *agency*; six items), progressive beliefs (four items), and communion (six items). Participants were provided with 0 to 100 slider scales, the anchors of which were two different words (e.g., for agency: *powerless* [0] to *powerful* [100]; for progressive beliefs: *traditional* [0] to *modern* [100]; for communion: *cold* [0] to *warm* [100]). Participants indicated where they believed each target fell on the slider scale. Individual items for agency ($M\ \Omega = .86$, $SD = .04$, *range* = .82–.91), progressive beliefs ($M\ \Omega = .52$, $SD = .28$, *range* = .02[3]–.76), and communion ($M\ \Omega = .88$, $SD = .04$, *range* = .80–.92) were combined into separate composites (see Table S8 in the online supplementary materials for McDonald's omegas, *N*s, means, and standard deviations for agency, progressive beliefs, and communion composites).

Demographics. Demographic items were identical to those in Study 1.

Results

Analytical Strategy

As in Study 1 we focused on CFAs to address the primary hypotheses. To explore relationships between the Relevance Appraisal Matrix and the ABC model, we examined correlations between the dimensions at the participant level.

Are Threat and Opportunity Appraisals Independent?

In Study 1, we tested this hypothesis with CFAs for one target at a time on two measured goals. In Study 2, because of the complexity of comparing the hypothesized model (specifying that the 30 observed items load onto threat and opportunity factors for each of five goals, or 10 latent factors) to the alternative model (specifying that 30 observed items load onto one appraisal factor for each of five goals, or five latent factors), we chose to simplify. We built different confirmatory factor models for each target (of which there were six), and also for each goal (of which there were five). The hypothesized two-factor appraisal-specific model was built with independent latent factors (which we allowed to correlate) of threat and opportunity (Panel A of Figure 4). We compared this model to the alternative appraisal-general model, in which all items loaded onto a single latent factor (Panel B of Figure 4). Critically, this simplified test still addressed the focal hypothesis of whether threat and opportunity are best characterized as different ends of a single dimension, or, as hypothesized, as differentiable constructs. That is, if the appraisal-specific model describes the data better than the appraisal-general model, this would suggest that threat and opportunity appraisals are better characterized as two separate dimensions. We thus interpreted superior model fit for the appraisal-specific model as evidence in support of the hypothesis.

All models converged. The hypothesized appraisal-specific model fit indices were superior to the alternative appraisal-general model (see Table 6 for fit indices averaged across targets). Tests of model-fit comparison echoed these observations (see Table 7 for model fit comparisons and model fit indices per Target × Goal combination). Of the 30 different Target × Goal combinations, the data of 29 were described significantly better by the hypothesized appraisal-specific model than the alternative appraisal-general model, which were far below recommended fit thresholds (Hu & Bentler, 1999). The one exception was the model of the 5-year-old child in relation to a mate-seeking goal, for which both models fit equally poorly.

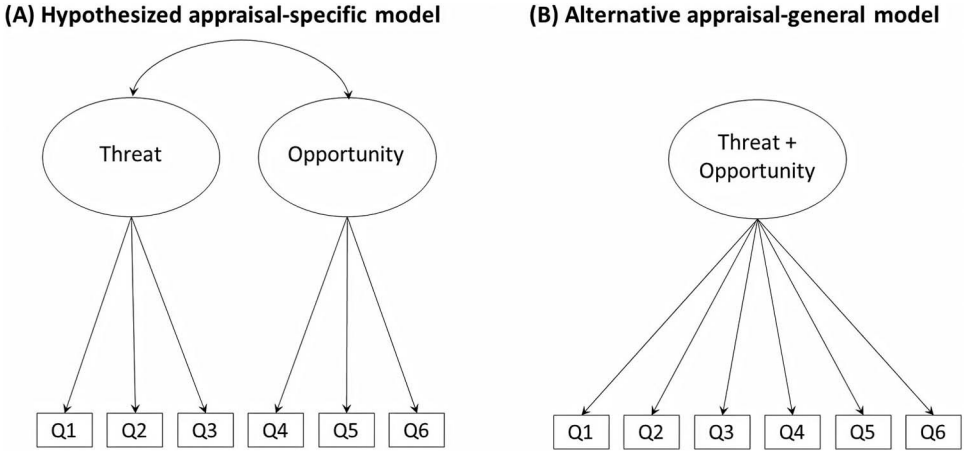
As in Study 1, we examined the relationships between latent factors for the two-factor appraisal-specific model. Standardized covariances per target can be found in Table S9 in the online supplementary materials. Averaged across targets, the relationship between threat and opportunity appraisals was positive and medium in size, but highly variable ($M_\beta = .32$, $SD_\beta = 0.48$, $range_\beta = -.49–.97$). This pattern is notably different from what we saw in Study 1, in which the average relationships between latent factors for threat and opportunity tended to be small and negative. This difference could be due to the larger variety of goals on which Study 2 participants appraised targets or the very different set of targets on which participants made their relevance appraisals. Study 2's data allowed us to explore both potential explanations.

First, to examine whether the lack of convergence across studies was due to the different sets of goals, we examined Study 2's averaged standardized covariances for only self-protection and disease avoidance goals (mirroring Study 1's design). For both goals the relationship between threat and opportunity appraisals for Study 2 was positive and medium in size (self-protection: $M_\beta = .36$, $SD_\beta = 0.49$, $range_\beta = -.44–.85$; disease avoidance: $M_\beta = .28$, $SD_\beta = 0.15$, $range_\beta = .05–.44$). These patterns still do not replicate those seen in Study 1, suggesting that the lack of replication may not be due to the goals on which participants appraised targets.

Four of Study 2's targets were included in both Studies 1 and 2: the 5-year-old child, the gay man, the homeless person, and the police officer. Unique to Study 2 were the Asian woman and the elderly woman. To examine whether the lack of convergence in the relationship between threat and opportunity appraisals across studies was due to the specific targets appraised, we examined the individual standardized covariances, separately for a self-protection and disease avoidance goal, for the targets that repeated across Studies 1 and 2. We also compared the elderly stranger from Study 1 with the elderly woman from Study 2. Table 8 displays these standardized covariances. The general pattern of associations between threat and opportunity replicated across Studies 1 and 2 for certain targets (i.e., the elderly stranger/elderly woman and the homeless person) but were somewhat mixed for others. For example, standardized covariances were consistent across studies for a self-protection goal (but not a disease avoidance goal) for the 5-year-old child and police officer.

[3] The progressive beliefs composite for the 5-year-old child had an unusually low McDonald's omega compared with the other composites. See Table S8 in the online supplementary materials. It's likely that participants were unsure how to place a 5-year-old child on the progressive beliefs scales (i.e., traditional to modern; religious to science-oriented; conventional to alternative; conservative to liberal) as these group-level stereotypes are typically associated with adults.

Figure 4
Study 2 Hypothesized Appraisal-Specific and Alternative Appraisal-General Latent Factor Solutions



Note. Models were run *per target, per goal*. Ovals represent latent factors. Boxes represent observed indicators. Single-headed arrows represent indicator loadings. Double-headed arrows represent correlations between latent factors.

These follow-up analyses suggest that the divergent patterns across Studies 1 and 2 may not necessarily be about the differences in *goals* on which targets were appraised but more about the differences in *targets* that were appraised. Although the patterns of latent correlations observed in Study 2 do diverge from those observed in Study 1, the primary conclusions of Studies 1 and 2 are entirely consistent: Threat and opportunity appraisals are best described as two independent dimensions.

Do Appraisals of a Target's Relevance Vary Dynamically Across Different Goals?

In Study 1, we tested this hypothesis for one target at a time, creating confirmatory factor models with latent factors for threat and opportunity (see Panels A and C of Figure 2). In Study 2, again due to the complexity of comparing the hypothesized model (specifying that 30 observed items load on 10 latent factors) to the alternative model (specifying that 30 observed items load on two factors, one for threat and one for opportunity), we chose to simplify. We built different confirmatory factor models for each target (of which there were six), and for each appraisal (of which there were two: threat and opportunity). The hypothesized goal-specific model was built with five independent latent factors (allowed to correlate) per goal (see Panel A of Figure 5). We compared this model with the alternative goal-general model, in which we collapsed all items onto a single latent factor (see Panel B of Figure 5). If, as predicted, the goal-specific model describes the data better than the goal-general model, this would suggest that relevance appraisals vary across goals: Just because a target is appraised as threatening one goal does not necessarily mean that they will be appraised as threatening other goals. We thus interpreted superior model fit for the hypothesized goal-specific model as evidence in support of the hypothesis.

All models converged. The hypothesized goal-specific model fit indices were superior as compared with the alternative goal-general model, which were far below recommended fit thresholds (Hu & Bentler, 1999). See Table 9 for fit indices averaged across targets and Table 10 for fit indices of both models for all target × appraisal combinations. Across the 12 appraisal × target combinations, all data were better described by the hypothesized goal-specific model. Study 2's data patterns again replicate those of Study 1: The extent to which a particular target is seen as a threat and as an opportunity varies dynamically across the five different goals.

We again examined the relationships between latent factors for the five-factor goal-specific model (the goal-general model comprised only one latent factor). Standardized covariances per target can be found in Table S10 in the online supplementary materials. These relationships tended to be positive and large in size, again with high variability, for both threat appraisals (M_β = .63, SD_β = 0.17, $range_\beta$ = .35–1.00) and opportunity appraisals (M_β = .53, SD_β = 0.25, $range_\beta$ = .01–.97), suggesting that for the six targets, appraisals of threat and opportunity were positively related to each other across different

Table 6
Study 2 Fit Indices Averaged Across Targets for Hypothesized Appraisal-Specific and Alternative Appraisal-General Models

Model	CFI	TLI	SRMR	RMSEA
Appraisal-specific				
M	**0.96**	**0.93**	**0.05**	**0.09**
Range	0.84, 1.00	0.72, 1.00	0.02, 0.17	<0.01, 0.23
Appraisal-general				
M	0.73	0.54	0.14	0.27
Range	0.48, 0.92	0.13, 0.87	0.05, 0.26	0.16, 0.40

Note. The averaged appraisal-specific model (the hypothesized model) fit indices are bolded.

Table 7
Study 2 Model Fit Comparisons Between Hypothesized Appraisal-Specific and Alternative Appraisal-General Models, and Model Fit Indices for Both Models

		Model comparison	Model fit indices									
			Appraisal-specific model					Appraisal-general model				
Target	Goal	$\Delta\chi^2(\Delta df = 1)$	$\chi^2(df = 8)$	CFI	TLI	RMSEA	SRMR	$\chi^2(df = 9)$	CFI	TLI	RMSEA	SRMR
5-year-old child	Affiliation	207.87***	5.53	1.00	~1.00	0.00	0.02	213.39***	0.68	0.46	0.24***	0.14
	Disease avoidance	356.56***	30.41***	0.97	0.95	0.08*	0.05	386.97***	0.55	0.25	0.32***	0.21
	Economic	4.84*	124.01***	0.92	0.86	0.19***	0.05	128.85***	0.92	0.87	0.18***	0.06
	Mate-seeking	<0.01	186.96***	0.85	0.72	0.24***	0.11	186.96***	0.85	0.75	0.22***	0.11
	Self-protection	134.95***	33.71***	0.99	0.97	0.09*	0.02	168.66***	0.91	0.85	0.21***	0.05
Asian woman	Affiliation	228.22***	11.79	1.00	0.99	0.03	0.02	240.01***	0.72	0.53	0.25***	0.15
	Disease avoidance	331.66***	12.35	1.00	0.99	0.04	0.02	344.01***	0.65	0.41	0.30***	0.17
	Economic	152.88***	19.56*	0.99	0.98	0.06	0.03	172.44***	0.83	0.72	0.21***	0.09
	Mate-seeking	502.87***	104.57***	0.92	0.84	0.17***	0.12	607.44***	0.48	0.13	0.41***	0.17
	Self-protection	278.82***	12.10	1.00	0.99	0.04	0.02	290.92***	0.76	0.60	0.28***	0.11
Elderly woman	Affiliation	192.38***	3.67	1.00	~1.00	0.00	0.02	196.05***	0.71	0.51	0.23***	0.13
	Disease avoidance	318.46***	4.86	1.00	~1.00	0.00	0.02	323.32***	0.63	0.39	0.29***	0.18
	Economic	135.26***	17.58*	0.99	0.98	0.05	0.03	152.84***	0.84	0.74	0.20***	0.08
	Mate-seeking	11.00**	151.00***	0.86	0.74	0.21***	0.08	162.00***	0.85	0.76	0.20***	0.09
	Self-protection	144.62***	23.64**	0.99	0.98	0.07	0.03	168.26***	0.87	0.78	0.21***	0.08
Gay man	Affiliation	302.61***	13.94†	0.99	0.99	0.04	0.03	316.55***	0.67	0.45	0.29***	0.16
	Disease avoidance	308.54***	13.87†	0.99	0.99	0.04	0.03	322.41***	0.67	0.45	0.29***	0.19
	Economic	132.90***	37.17***	0.96	0.93	0.09**	0.05	170.06***	0.79	0.65	0.21***	0.10
	Mate-seeking	26.58***	102.68***	0.90	0.81	0.17***	0.08	129.26***	0.87	0.78	0.18***	0.09
	Self-protection	478.43***	14.46†	0.99	0.99	0.04	0.03	492.89***	0.54	0.23	0.36***	0.21
Homeless person	Affiliation	252.22***	15.07†	0.99	0.98	0.05	0.03	267.29***	0.59	0.31	0.27***	0.17
	Disease avoidance	515.39***	21.68**	0.99	0.98	0.06	0.04	537.06***	0.53	0.22	0.38***	0.25
	Economic	70.84***	26.65**	0.98	0.97	0.08†	0.03	97.49***	0.92	0.86	0.16***	0.06
	Mate-seeking	18.46***	151.69***	0.88	0.77	0.21***	0.09	170.15***	0.86	0.77	0.21***	0.10
	Self-protection	590.02***	6.22	1.00	~1.00	0.00	0.02	596.23***	0.51	0.19	0.40***	0.26
Police officer	Affiliation	303.69***	26.35**	0.98	0.96	0.08†	0.03	330.04***	0.66	0.44	0.30***	0.15
	Disease avoidance	292.85***	23.29**	0.98	0.97	0.07	0.04	316.14***	0.67	0.46	0.29***	0.16
	Economic	105.98***	67.31***	0.94	0.88	0.14***	0.07	173.29***	0.82	0.71	0.21***	0.10
	Mate-seeking	190.75***	104.32***	0.89	0.80	0.17***	0.12	295.07***	0.69	0.48	0.28***	0.15
	Self-protection	519.36***	32.23***	0.99	0.97	0.09*	0.04	551.59***	0.67	0.45	0.39***	0.20

Note. In several cases TLIs above 1.00 were returned; we treated these as statistical artifacts and report these TLIs as 1.00 (denoted in the table with ~ preceding the 1.00).
† $p < .100$. * $p < .050$. ** $p < .010$. *** $p < .001$.

fundamental goals: If a target was appraised as impeding a particular goal, it's likely that they'd be appraised as impeding a different goal.

How Do Threat and Opportunity Appraisals Relate to Judgments of Agency, Progressive Beliefs, and Communion?

We next explored how participants' appraisals of a target's relevance related to their evaluations of that target's agency/socioeconomic success, progressive beliefs, and communion (Koch et al., 2016). At the participant level, we examined correlations between the composites for agency, progressive beliefs, and communion, and the composites of each relevance dimension × goal × target combination. This resulted in a total of 180 correlations (see Table S11 in the online supplementary materials). For interpretive ease, we summarize the general patterns below in text and in Table 11. Because Study 2 was well-powered and correlations were reliably estimated at the participant level, we rely on the benchmarks recently published by Funder and Ozer (2019) to interpret correlation size (i.e., small: $r = .10$; medium: $r = .20$; large: $r = .30$).

Agency. Correlations between evaluations of agency, and threat and opportunity appraisals across goals and targets, were generally positive and medium-to-large in size ($M_r = .21$, $SD_r = 0.20$, $range_r = -.28$–$.61$). Targets evaluated as more agentic were appraised as more likely to pose a threat *and* an opportunity across the five different goals. One exception to this pattern is that agency evaluations of the police officer were correlated with only self-protection opportunity (positively and small in size; $r = .18$, $p < .001$) and disease avoidance threat (negatively and medium in size; $r = -.28$, $p < .001$). All other correlations between agency and appraisals of the police officer were very small and not significant.

Progressive Beliefs. Correlations between evaluations of progressive beliefs, and threat and opportunity appraisals across goals and targets were generally positive and small-to-medium in size ($M_r = .13$, $SD_r = 0.17$, $range_r = -.23$–$.55$). For only one target were these correlations mostly negative: As gay men were evaluated as more progressive, they tended to be appraised as less of a threat and opportunity across goals.

Table 8
Standardized Covariances Between "Threat" and "Opportunity" Factors of Studies 1 and 2

Target	Goal	Standardized covariances	
		Study 1	Study 2
5-year-old child	Self-protection	**.87**	**.85**
	Disease avoidance	**.48**	**.18**
Elderly stranger (S1); Elderly woman (S2)	Self-protection	**.53**	**.74**
	Disease avoidance	**.42**	**.34**
Gay man	Self-protection	*−.15*	**.33**
	Disease avoidance	*.07*	**.27**
Homeless person	Self-protection	*−.01*	*.06*
	Disease avoidance	*−.01*	*.05*
Police officer	Self-protection	**−.61**	**−.44**
	Disease avoidance	*.04*	**.44**

Note. Bolded covariances were significant at $p < .050$. Italicized covariances were not significant. S1 = Study 1. S2 = Study 2. These data were pulled from Table S5 (Study 1) and Table S9 (Study 2) in the online supplementary materials.

Correlations between progressive beliefs and affiliation threat and opportunity were less consistent: The correlation between progressive beliefs and affiliation threat was medium in size and positive for elderly women, $r = .21$, $p < .001$, but not significant for any other target. Further, the correlation between progressive beliefs and affiliation opportunity was small-to-medium in size and positive for the child, gay man, and police officer ($rs \geq .12$, $ps \leq .012$) but not significant for the Asian woman, the elderly woman, and the homeless person.

Communion. Finally, correlations between evaluations of communion and threat appraisals across goals and targets were typically small-to-medium in size and *negative* ($M_r = -.17$, $SD_r = 0.14$, $range_r = -.50$–$.12$), whereas correlations between evaluations of communion and opportunity appraisals were medium-to-large in size and *positive* ($M_r = .27$, $SD_r = 0.22$, $range_r = -.10$–$.66$). Correlations between communion and affiliation opportunity were notably large and positive across targets. Communion's correspondence to mate-seeking threat was less consistent, with small negative correlations only for elderly women, $r = -.14$, $p = .003$, and gay men, $r = -.13$, $p = .010$.

In sum, as targets are judged as more agentic or as holding more progressive beliefs, they are appraised as more likely to both impede and facilitate the five fundamental motives examined in Study 2. Additionally, targets evaluated as low communion were appraised as more likely to impede fundamental motives whereas targets appraised as high communion were appraised as more likely to facilitate motives.

Discussion

With Study 2 we aimed to conceptually replicate Study 1 with a different and larger sample of over 400 U.S. MTurk workers. Rather than examining how relevance appraisals apply to only two goals, we broadened the scope by including five different goals. In general, we replicate the data patterns of Study 1, providing evidence for the two primary hypotheses across both in-lab (Study 1) and online data collection (Study 2). The data patterns of both studies suggest that for Study 1's and 2's targets, threat and opportunity appraisals are independent from each other, best represented as two separate dimensions rather than as two endpoints of a single continuum. Further, results across studies suggest that these relevance appraisals of different targets vary across a variety of goals.

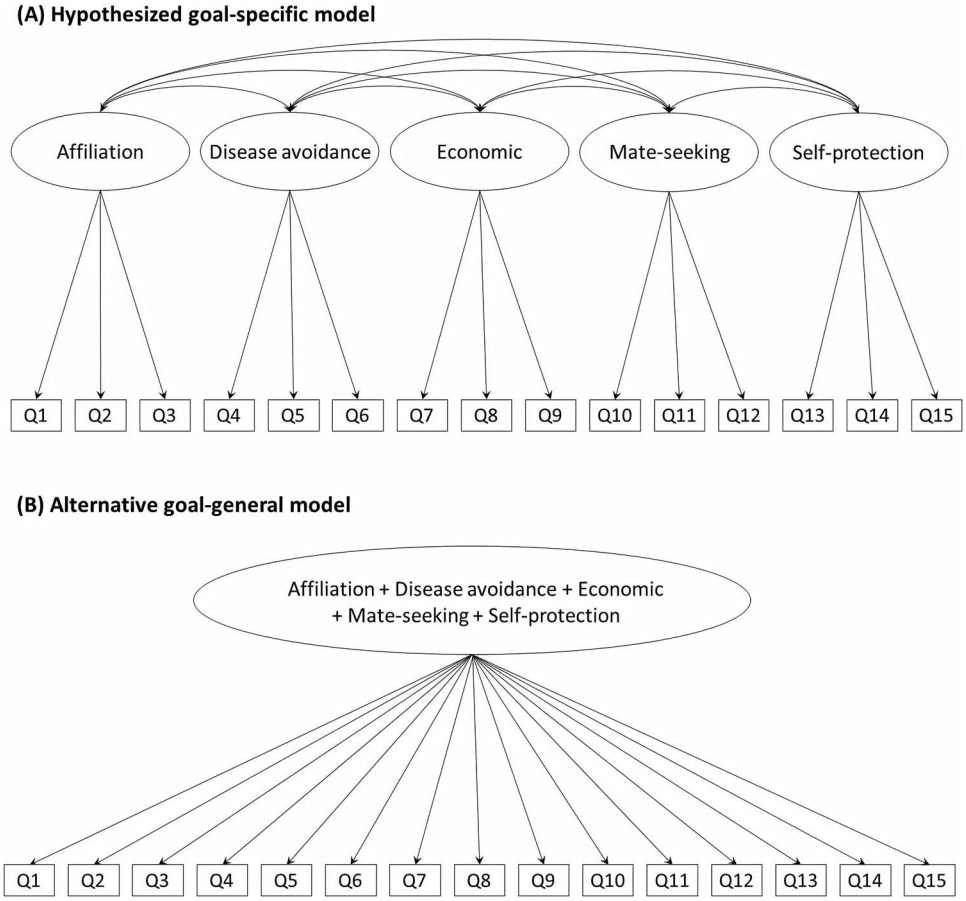
A consistent trend emerged throughout Study 2's data that deserves further discussion: In testing the first primary hypothesis the CFA models did not fit the data particularly well when participants appraised targets on a mate-seeking goal. As a reminder, we compared the hypothesized appraisal-specific model (including two latent factors: threat vs. opportunity) with the alternative appraisal-general model (collapsing threat and opportunity items onto a single latent factor). Models were run per target, per goal. In all cases but one (appraisals of the child on the mate-seeking goal), the hypothesized appraisal-specific model described data better than the appraisal-general model. Of note, fit indices for models conducted on mate-seeking appraisals represented the poorest six (of 30) appraisal-specific model fits.[4]

We expect these poor fits may be due to a restriction of range: Study 2's participants likely didn't appraise Study 2's targets as particularly relevant to a mate-seeking goal. Indeed, upon examining threat appraisal means across targets, we see low mean values ranging from 1.90 to 2.41 on a 7-point scale. Opportunity appraisals were also quite low, ranging from 1.45 to 3.20 (see Table S12 in the online supplementary materials). A large proportion of participants indicated a 1 out of 7 response (indeed, the modal value was 1 across all appraisals for mate-seeking), suggesting low overall variance. We note that Study 2's data patterns for mate-seeking differ substantially from those for other goals assessed in the same study. As a comparison, affiliation threat means across targets ranged from 2.52 to 3.43 (though as for mate-seeking the modal response was 1 out of 7 across targets), and affiliation opportunity means across targets ranged from 3.33 to 4.69, with a modal response of 4 or 5, depending on the target.

[4] See Table 7. Across all thirty groups, the appraisal-specific model fit indices were as follows: The average CFI and TLI were around 0.95 (CFI: $M = 0.96$, $range_{CFI}$: 0.84–1.00; TLI: $M = 0.93$, $range_{TLI}$: 0.72–1.00), the average SRMR was 0.05 ($range_{SRMR}$: 0.02–0.17), and the average RMSEA was 0.09 ($range_{RMSEA}$: <0.01–0.23), indicating adequate model fit. Fit indices for models on mate-seeking appraisals were as follows: CFIs ranged from 0.84 to 0.92, TLIs ranged from 0.73 to 0.84, SRMRs ranged from 0.08 to 0.17, and RMSEAs ranged from 0.17 to 0.23.

Figure 5

Study 2 Hypothesized Goal-Specific and Alternative Goal-General Latent Factor Solutions



Note. Models were run *per target, per appraisal* (i.e., separately for threat and for opportunity). Ovals represent latent factors. Boxes represent observed indicators. Single-headed arrows represent indicator loadings. Double-headed arrows represent correlations between latent factors.

These patterns are likely a function of both Study 2's participant sample and selected targets: For example, given that the majority (86.4%) of Study 2's sample identified as heterosexual, many may not have appraised a gay man as particularly relevant to a mate-seeking goal. Because social affordances emerge from how others fit with one's needs and motivations, characteristics of the perceiver, such as their sexual orientation, will introduce some heterogeneity in relevance appraisals that we do not measure here (Gibson, 1979; McArthur & Baron, 1983; Zebrowitz & Montepare, 2006). We return to this point in the General Discussion section.

Study 2 also provides evidence of relationships between dimensions of the Relevance Appraisal Matrix and Koch et al.'s (2016) model of stereotype content. Evaluating a target as higher in agency and progressive beliefs predicted appraising that target as increasingly likely both to facilitate and impede one's goals. Evaluating a target as high in communion positively predicted opportunity appraisals, and negatively predicted threat appraisals. These patterns converge to some extent with the findings of Study 1: Appraisals of opportunity are positively associated with evaluations of both communion (warmth) and agency (competence). Importantly, the data pattern still supports distinguishing between stereotype content and relevance appraisals.

Table 9

Study 2 Fit Indices Averaged Across Targets for Hypothesized Goal-Specific and Alternative Goal-General Models

Model	CFI	TLI	SRMR	RMSEA
Goal-specific				
M	**0.94**	**0.93**	**0.06**	**0.07**
Range	0.89, 0.98	0.86, 0.97	0.03, 0.09	0.05, 0.10
Goal-general				
M	0.72	0.67	0.10	0.15
Range	0.58, 0.82	0.51, 0.78	0.08, 0.13	0.13, 0.20

Note. The averaged goal-specific model (the hypothesized model) fit indices are bolded.

General Discussion

Across two studies, we investigated how relevance appraisals—a central component of social judgment and behavior—are structured.

Table 10

Study 2 Model Fit Comparisons Between Hypothesized Goal-Specific and Alternative Goal-General Models, and Model Fit Indices for Both Models

		Model comparison	Model fit indices									
			Goal-specific model					Goal-general model				
Appraisal	Target	$\Delta\chi^2(\Delta df = 10)$	$\chi^2(df = 80)$	CFI	TLI	RMSEA	SRMR	$\chi^2(df = 90)$	CFI	TLI	RMSEA	SRMR
Opportunity	5-year-old child	289.11***	199.77***	0.97	0.96	0.06*	0.06	488.88***	0.90	0.88	0.10***	0.08
	Asian woman	1057.25***	300.06***	0.93	0.90	0.08***	0.10	1357.31***	0.58	0.51	0.19***	0.12
	Elderly woman	701.72***	225.48***	0.94	0.93	0.07**	0.07	927.20***	0.68	0.62	0.15***	0.11
	Gay man	686.50***	275.14***	0.93	0.91	0.08***	0.09	961.64***	0.69	0.64	0.15***	0.10
	Homeless person	540.47***	221.72***	0.96	0.95	0.07**	0.04	762.18***	0.82	0.78	0.14***	0.08
	Police officer	1217.52***	339.36***	0.93	0.90	0.09***	0.08	1556.88***	0.58	0.51	0.20***	0.13
Threat	5-year-old child	635.46***	443.89***	0.89	0.86	0.11***	0.07	1079.34***	0.71	0.66	0.16***	0.12
	Asian woman	570.09***	166.89***	0.97	0.97	0.05	0.03	736.98***	0.80	0.77	0.13***	0.08
	Elderly woman	452.78***	299.66***	0.93	0.91	0.08***	0.05	752.44***	0.79	0.76	0.13***	0.08
	Gay man	620.37***	198.12***	0.96	0.95	0.06†	0.04	818.49***	0.75	0.71	0.14***	0.08
	Homeless person	917.18***	295.11***	0.93	0.91	0.08***	0.06	1212.29***	0.63	0.56	0.18***	0.13
	Police officer	939.59***	154.12***	0.98	0.97	0.05	0.04	1093.70***	0.66	0.60	0.17***	0.11

Note. In a single case a standardized covariance (between latent factors) above 1.00 was returned for the opportunity appraisal model of the 5-year-old child; we treated this as a statistical artifact and reran the model, fixing the covariance to 1.00. The degrees of freedom for this specific model therefore vary slightly from what is reported below: goal-specific model$_{df}$ = 81; $\Delta df = 9$ for the model comparison.
† $p < .100$. * $p < .050$. ** $p < .010$. *** $p < .001$.

First, we tested whether appraisals that a target can help or hurt one's goals are best described as endpoints of a single dimension, or as two separate dimensions. In line with recent theorizing (Neel & Lassetter, 2019) we find that structuring threat and opportunity appraisals as separate dimensions consistently described data better than collapsing the appraisals onto a single dimension. The correlations between the latent factors in the models show that for some targets appraisals of threat and opportunity can be related to each other (i.e., they are not always orthogonal), but that these correlations vary across goals. Within the current studies, threat and opportunity appraisals clearly each describe unique variance in relevance judgments.

We also examined whether perceiving a target as relevant to one goal predicts perceiving that same target as relevant *in the same way* to another goal. For example, if a perceiver believes that a target threatens their self-protection goal, is the target also seen as threatening the perceiver's disease avoidance, economic attainment, and mate-seeking goals? We hypothesized that, in fact, relevance appraisals vary dynamically across perceiver goals. We found support for this hypothesis across two studies and in total, five different fundamental motivations.

Comparing the Relevance Appraisal Matrix to Other Models of Social Perception

Our theoretical perspective posits that stereotypes and relevance appraisals are not the same. Rather, perceivers may use stereotypes to help appraise relevance to current goals (Neel & Lassetter, 2019; Pick & Neuberg, 2017, 2020). We expected that although dimensions of stereotype content might correlate with threat and opportunity appraisals, stereotype content dimensions and relevance appraisals would not be identical. We explored whether and how the Relevance Appraisal Matrix relates to two well-established models of stereotypes: the stereotype content model (Fiske et al., 2002; tested in Study 1) and the ABC model (Koch et al., 2016; tested in Study 2).

Table 11

General Pattern of Associations Between Threat and Opportunity Appraisals, and Agency, Progressive Beliefs, and Communion

	Appraisal	
Stereotype	**Threat**	**Opportunity**
Agency	***Effect direction***: Positive ***Effect size***: Medium-to-large ***Exception***: Police officer (often not sig)	Same patterns as **Threat** appraisal
Progressive beliefs	***Effect direction***: Positive ***Effect size***: Small-to-medium ***Exceptions***: Gay man (negative in direction); Affiliation goal (often not sig)	Same patterns as **Threat** appraisal
Communion	***Effect direction***: Negative ***Effect size***: Small-to-medium ***Exception***: Mate-seeking goal (often not sig)	***Effect direction***: Positive ***Effect size***: Medium-to-large ***Exception***: Affiliation goal (consistently large effects)

Study 1 examined target-level correlations between stereotype content (i.e., warmth and competence) and relevance appraisals (i.e., threat and opportunity to two goals). Although dimensions of the Relevance Appraisal Matrix and the stereotype content model were related, there was no clear one-to-one mapping between, for example, threat appraisals and competence, and opportunity appraisals and warmth (or vice versa). Both warmth and competence evaluations tended to positively associate with opportunity appraisals. This suggests that targets rated as high warmth and/or high competence are more likely to be evaluated as facilitating one's goals. In contrast, associations between stereotype content and threat appraisals were smaller and more variable: Only warmth evaluations were associated (negatively) with self-protection threat.

Study 2 examined how the Relevance Appraisal Matrix relates to dimensions represented in Koch et al.'s (2016) ABC model. Data patterns generally converged with those of Study 1: Communion and agency evaluations (in line with the stereotype content model's warmth and competence, respectively) tended to associate positively with opportunity appraisals. Further, communion evaluations associated negatively with threat appraisals and agency evaluations associated positively with threat appraisals. Evaluations of targets' progressive beliefs tended to correlate positively with both threat and opportunity, though this pattern did not generalize across all goals.

Determining the precise relationship between these variables will require further testing, and future research may also examine how relevance appraisals of threat and opportunity relate to a target's combined warmth and competence evaluations. For example, targets judged as both competent and warm may be more likely to be appraised as facilitating multiple goals, whereas those judged as competent but cold may be appraised as more likely to impede multiple goals. We note, however, that this should only apply to a particular goal to the extent that general intentions (warmth) or capacities (competence) can inform relevance to that goal. More specific intentions and capacities (skills, relationship to the perceiver, etc.) not captured by warmth and competence are likely to inform relevance appraisals as well. The data patterns of Studies 1 and 2 support the notion that threat and opportunity evaluations cannot be reduced to basic dimensions of stereotype content, but further research is needed to fully articulate the ways in which stereotypes of warmth and competence may inform relevance appraisals.

Additional Theoretical and Practical Implications

The current research provides the first empirical test of the Relevance Appraisal Matrix proposed by Neel and Lassetter (2019). This matrix builds on frameworks within numerous social psychological literatures (i.e., sociofunctional approaches to social perception and judgment, the stigma and prejudice literatures, motivational approaches to social cognition). Separating threat and opportunity as independent dimensions of social judgment points to the different ways that a person or group can be judged: Whereas some may be judged as helping or hindering goals, others may be seen at the same time as *both* helping and hindering goals, and still others may be seen as completely irrelevant to goals. The Relevance Appraisal Matrix provides scaffolding for future research seeking to further test the role of relevance appraisals in downstream social judgment and behavior.

Because relevance appraisals can serve as a mechanism between perceived characteristics of a target (e.g., stereotype content) and downstream attentional, emotional, and behavioral outcomes, they can help to explain how stereotypes lead to prejudice and discrimination (Pick & Neuberg, 2017, 2020). A perceiver who stereotypes Asian men as high achieving may in fact feel anger toward an Asian man when they're competing with him for a job. However, a perceiver concerned about their self-protection rather than economic advancement may appraise the Asian man as irrelevant to their current concerns, given that Asian men are not necessarily stereotyped as dangerous (Galinsky et al., 2013). The Asian man may thus experience interpersonal invisibility, which is very different from threat-based discrimination (Neel & Lassetter, 2019). Locating relevance appraisals as a mechanism between stereotypes and prejudice allows researchers to predict important nuances in targets' experiences, such as when they will experience active discrimination versus passive neglect.

Recognizing and differentiating threat from opportunity suggests that consequential interpersonal outcomes of relevance appraisals, such as stigma and prejudice, can take different forms (Neel & Lassetter, 2019). Importantly, then, not all target experiences of prejudice and stigma will be the same, either within or between targets. Being feared or aggressed against are qualitatively different experiences from being ignored and neglected. We hope that future work will examine the situations that lead to these distinct forms of devaluation and the strategies that people might use to manage these experiences.

Future Directions

The current research provides the first empirical test of the Relevance Appraisal Matrix, initially theorized by Neel and Lassetter (2019), establishing that relevance appraisals of threat and opportunity are independent dimensions of social judgment that vary across perceiver goals. We highlight six (of many) potential directions for future research.

First, future research can examine in more depth whether and why target characteristics may produce stronger or weaker correlations between threat and opportunity appraisals. The current research included a variety of targets that differed across many characteristics (e.g., age, occupation, closeness to the participant) but did not vary characteristics systematically across all targets (e.g., we specified the gender and race identities of the Asian woman, but not the 5-year-old child). To fully articulate the predictive power of the Relevance Appraisal Matrix, future work can examine which specific target characteristics moderate the association between threat and opportunity, and why, ultimately building toward a taxonomy of targets that reveals how their characteristics shape threat and opportunity correlations for different fundamental goals. For example, because perceivers may form richer and more complex appraisals for targets with whom they interact frequently, are close, and have a lot of information, perceivers' appraisals of threat and opportunity may be less tightly linked for these targets. In sum, because relevance appraisals are multiply determined, future research should examine which target characteristics affect the richness and complexity of relevance appraisals, as well as the association between appraisals of threat and opportunity.

Second, appraising relevance for some goals may require more information than for other goals. For example, a perceiver may

quickly appraise a target as a health threat the moment the target sneezes or coughs (Michalak et al., 2020). On the other hand, because people are quite selective when it comes to romantic partners (e.g., Buss, 1989; Buss & Schmitt, 2019), perceivers may require a wealth of information (e.g., about the target's relationship status, health, attractiveness, intelligence, values) to appraise a target as a potential mate. Supporting the possibility of a comparatively high threshold for mating relevance, people have "deal-breakers" in assessing mate value—even if a target has all the qualities a perceiver desires, a single deal-breaker (e.g., dishonesty) may keep a perceiver from appraising the target as an opportunity (Jonason et al., 2015). Thus, certain goals may simply require more information than others to see the target as relevant.

Third, we focused our studies on individual-level rather than group-level appraisals. The current framework suggests several ways that group-level processes inform and intersect with individual-level appraisals. Group stereotypes help give meaning to target cues—whether those targets are individuals or groups—and thus likely shape both individual- and group-level relevance appraisals. For example, if a woman stereotypes Asian men as competent (e.g., Butz & Yogeeswaran, 2011) she may appraise Asian men—the social group—as threatening her ability to gain economic status in certain domains. This could lead her to support institutional or governmental policies that affect Asian men as a group in order to manage the threats she perceives Asian men to pose (Cottrell & Neuberg, 2005; Pick & Neuberg, 2017, 2020). However, if the woman is up for a promotion and her competitor is an Asian man, she may apply the same group stereotype to this individual, leading her to appraise her competitor as a threat (e.g., Cantor & Mischel, 1979; Fein & Hilton, 1992; Fiske et al., 1987). As a result, she may behave in discriminatory ways toward him, specifically. We suspect that the current studies' novel insights about relevance appraisals of individual targets (i.e., independent appraisals of opportunity and threat; different appraisals across goals) would generalize to the group level, but this awaits empirical test.

Fourth, the degree of independence between threat and opportunity may vary across goals. For example, in Study 1 the latent variable correlations between self-protection threat and self-protection opportunity were, on average, negative and approximately double the size of correlations between disease avoidance threat and disease avoidance opportunity. If replicable, this suggests that self-protection motivations may produce more "bipolar appraisals," so to speak, than do appraisals for other goals: If a target is appraised as likely to physically hurt you, they also may be appraised as unlikely to protect you. One reason for this pattern may be that for a self-protection goal, the same information may be seen as highly informative of both threat and opportunity appraisals. For example, a target's nefarious intentions may be seen to indicate both high threat and low opportunity for a self-protection goal. In contrast, intentions may be perceived as less informative for threat and opportunity to other goals, such as a disease avoidance goal, in which a target could easily be a threat regardless of their intentions. However, we note that whereas this idea is supported by Study 1's latent variable correlations, it is not well supported by Study 2's latent variable correlations: For Study 2, the relationships between threat and opportunity for both self-protection and disease avoidance goals were on average small and positive, though the association between threat and opportunity was stronger for self-protection than disease avoidance. Follow-up analyses suggested that the divergent patterns across Studies 1 and 2 may be due to the different sets of targets participants appraised across studies. Future work should test whether and when the relationship between threat and opportunity differs in strength across different fundamental goals and for different targets.

Fifth, the current theoretical framework focuses on target cues and perceiver goals as antecedents of relevance appraisals. Perceiver characteristics—for example, age, gender, sexual orientation, beliefs, ideologies—also shape relevance appraisals, as relevance appraisals must be made in reference to the perceiver (Gibson, 1979; McArthur & Baron, 1983; Zebrowitz & Montepare, 2006).[5] For example, a person's gender and sexual orientation combine with a target's gender and sexual orientation to produce appraisals of romantic opportunity and/or threat. A straightforward next step of the current research would be a replication study that is well-powered to detect moderation by participant gender, sexual orientation, or age. Future research can more directly examine how perceiver characteristics shape relevance appraisals (see Pick & Neuberg, 2017, 2020).

Finally, as for any study, the extent to which our conclusions generalize beyond the current studies' specific targets, goals, items, and participants is not yet known. We selected a set of targets that drew in part from work using more representative group samples (e.g., Fiske et al., 2002; Koch et al., 2016) that nonetheless does not represent every possible target group. We found support for our hypotheses across a variety of different targets, and the current patterns of results should be interpreted in reference to the set of targets used in these studies. We also aimed to capture the breadth of threat and opportunity appraisals for each goal, but note that the specific items used in Studies 1 and 2 do not necessarily cover all possible appraisals for these goals (see Footnote 2). For example, as operationalized in these studies, appraising a target as an economic threat includes viewing them as a competitor for a desirable job, and as taking away or reducing economic opportunities. However, economic threat could also involve perceiving a target group as taking away jobs from one's ingroup, specifically, or costing citizens tax money by relying on government assistance. Future research can consider other operationalizations of appraisals for these goals, as well as the relation of threat and opportunity across a broader selection of targets and participants.

Conclusion

Two studies examined evaluations of others' goal-relevance and suggest that threat and opportunity are separate appraisals, rather than two endpoints of a single dimension. Threat and opportunity appraisals also vary dynamically across goals: Targets appraised as relevant to one goal are not necessarily appraised as relevant to a different goal. Finally, although relevance appraisals relate to stereotype content, they are clearly distinct, supporting the contention that stereotype content informs, rather than encompasses, relevance appraisals. The current studies empirically test the Relevance Appraisal Matrix, providing a framework for understanding how other people influence goal pursuit and illuminate a mechanism—relevance appraisals—through which goals may guide attention, emotion, and social behavior.

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