



Figure 2. (Jonason & Schmitt). National machiavellianism levels related to distance from the equator across 54 nations from the International Sexuality Description Project 2 (Schmitt 2015).

are manifested from recurrent adaptive person × ecology interactions.

To add to and improve on the authors’ argument, and the data brought to bear on the CLASH model, we highlight here findings from the International Sexuality Description Project 2 (see Schmitt 2015). ISDP-2 was a collaboration of more than 100 psychologists around the world in which surveys were administered to 36,314 people across more than 50 nations. As part of ISDP-2, participants were administered measures of narcissism (e.g., NPI [Raskin & Terry 1988]), machiavellianism (e.g., MACH-20 [Christie & Geis 1970]), and psychopathy (e.g., SRPPIII [Paulhus et al. 2009]). (More details about ISDP-2 methods and samples are available on request.)

At the national level, the shorter the distance from the equator, the higher were the national narcissism levels ($r(51) = -0.25, p < .05$) (Fig. 1). In contrast, machiavellianism become more evident the greater the distance from the equator ($r(52) = 0.24, p < .05$) (Fig. 2). Psychopathy was not sensitive to variation in distance from the equator ($r = 0.01$). The results in the target article, therefore, might be a function of these Dark Triad adaptations for survival under varying levels of climatological threat. That is, the Dark Triad traits – particularly high narcissism and low machiavellianism – may serve as survival mechanisms when the organism is under threat, the time when prioritizing oneself is most important. Prioritizing oneself over and/or at the cost of others is at the core of these traits.

These findings represent a climate-specific, adaptationist view of Dark Triad traits, which is in contrast to most work that has focused on sexual selection arguments of the Dark Triad (Jonason et al. 2009). Our assertions here might conflict with the pathological view of antisocial traits (Hare 1985). Such psychological survival adaptations may be pseudopathologies (Jonason et al. 2015a) that confer benefits to the person at the cost of the group (Crawford & Anderson 1989).

In conclusion, we agree with the thrust of the CLASH hypothesis, but feel the authors have not presented the best tests of their climate-linked hypotheses. We have presented evidence here that we feel better tests their assertions by examining ostensible psychological preconditions and adaptations for survival. We encourage future work to not conflate manifestations of psychological

adaptations with the adaptations themselves because, after all, it is called evolutionary *psychology* for a reason.

Warm coffee, sunny days, and prosocial behavior

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Abstract: This commentary discusses the research finding that warmer temperatures are associated with more prosocial outcomes. It calls for future research and theory on climate-related variables and social behavior to allow for both positive *and* negative emotional and behavioral responses to warmer temperatures.

In the target article, Van Lange et al. go beyond the documentation of interesting temperature-aggression effects and try to explain such findings with their theoretical model. However, there are some critical points for further consideration. First, the CLASH model focuses only on “hot” (i.e., reactive) aggression and does not try to explain “cold” aggression, the kind of calculated, planful aggression that takes a degree of self-control and future orientation to execute. A parsimonious model of the role of climate-related variables in aggression and violence should explain both types of aggression. Would “cooler” aggressive behaviors be more likely to occur in cooler climates and/or those with more seasonal variation in temperature? How does their model address such types of aggression?

Second, and worthy of further elaboration, the CLASH model does not account for the research finding that warmer temperatures (and the concept of warmth more generally) are also associated with increased prosocial behaviors and that both hot *and* cold temperatures have been found to reduce self-control (Gailliot 2014). These results, at first glance, seem to contradict the

CLASH model; however, it may be possible for the authors to revise it to encompass this broader set of findings.

There are significantly more publications examining how temperature and climate-related factors are associated with aggressive outcomes, rather than prosocial outcomes (see target article). However, one can also make a case for the role of temperature in promoting prosocial outcomes. Future researchers should add to this literature and revise their theoretical models to include a fuller picture of climatological effects that include prosocial outcomes.

Starting in the realm of everyday language use and metaphor, people commonly talk about their “warm feelings” toward loved ones or shunning by way of giving the “cold shoulder.” Images of warmth and coldness are thus central to discussions of relationship closeness and connection, similar to the importance of images of heat when discussing anger and aggression (e.g., “red hot” anger or “fiery temper”). Social psychologists have long been aware that the concepts of psychological warmth (vs. coldness) are of central importance to people’s judgments about others (Asch 1946; Fiske et al. 2007; Kelley 1950). Indeed, scholars have suggested that noticing others’ potential warmth could provide a survival advantage by helping to identify trustworthy partners (Fiske et al. 2007). Attachment theorists link physical warmth to early experiences of parental bonding and care (e.g., Bowlby 1969). These lines of research all place the concept of warmth (whether psychological or physical) as fundamental to bonding and social regulation. Metaphorical links between physical and psychological warmth have substantive implications for behavior (for a discussion see Bargh & Shalev [2012]).

Indeed, not only has some laboratory research found that high temperatures can actually *inhibit* aggressive behavior (e.g., Baron 1972), but also other studies have found that they *promote* prosocial behaviors. Warmer temperatures can enhance relational mindsets (IJzerman & Semin 2009) and affiliative motivation (Fay & Maner 2012), but also making people see others as interpersonally warmer and closer to the self. For example, participants who were holding a warm object (such as a hot coffee), compared with those holding a cold object, felt closer to a loved one (IJzerman & Semin 2009) and judged others as being friendlier (Williams & Bargh 2008). Warmer temperatures can also affect prosocial behaviors, making people more likely to give a gift (Williams & Bargh 2008) or share money with others (Kang et al. 2010; Storey & Workman 2013). The effects of warm temperature on prosocial behavior seem to be especially pronounced for those who have a secure attachment style (IJzerman et al. 2015b).

Of course, laboratory experiments on the effects of temperature on prosocial outcomes may not translate to the role of broader climatological variables. Thus, field studies on how weather variations are associated with behaviors are also informative. Although these studies do indicate a role for temperature in promoting prosocial behaviors, they find that other climatological factors are also important (Cunningham 1979; Guéguen & Lamy 2013; Lagacé-Séguin & d’Entremont 2005). For example, studies find that sunshine is associated with increased positive moods, more helping behaviors, and less aggression (Cunningham 1979; Guéguen & Lamy 2013; Lagacé-Séguin & d’Entremont 2005), with one study finding that the effects of sunshine are stronger than temperature itself (Cunningham 1979). In addition, studies have pointed to the role of humidity, rather than temperature itself, in predicting increased aggression and decreased prosocial behavior in children (Ciucci et al. 2011; Lagacé-Séguin & d’Entremont 2005), suggesting that Van Lange et al. also need to disentangle temperature from humidity effects.

To date there have been limited cross-national studies examining how climate-related variables are associated with prosocial outcomes. Using data from the World Values Survey, one study found that people from cultures with demanding hot or cold climates (represented as deviations from a comfortable 22°C), especially those from the richest cultures, held more cooperative values (Van de Vliert et al. 2009). People from poorer cultures

with demanding climates held more egoistic values (Van de Vliert et al. 2009). Another study by the same authors finds similarly complex relationships between climate, wealth, and prosocial behavior (Van de Vliert et al. 2004). Although these studies did not report main effects of average annual climatological variables such as temperature and sunshine, they suggest another lens of analysis for Van Lange et al.

There is some evidence that increases in temperature can lead to both increased aggression, as the target article suggests, and increased prosocial outcomes, although this is based on a smaller literature. Thus, a theory on climate and social behavior must allow for both positive *and* negative emotional and behavioral responses to warmer temperatures. There may be evidence for a more general argument, namely, that warmer temperatures influence *emotional reactivity* in general—both positivity and negativity. Future theories and research studies must address why some people react with more hostility and aggression in warmer temperatures, whereas others react more prosocially with similar situational triggers. Moreover, this future work should go beyond temperature itself and consider the psychological and behavioral implications of other climate-related variables.

More than just climate: Income inequality and sex ratio are better predictors of cross-cultural variations in aggression

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Abstract: Van Lange et al. argue that variations in climate explain cross-societal variations in violence. We suggest that any approach seeking to understand cross-cultural variation in human behavior via an ecological framework must consider a wider array of ecological variables, and we find that income inequality and sex ratio are better predictors than climate of cross-societal variations in violence.

Van Lange et al. present a model wherein ecological variations (climate) predict cross-societal variation in aggression. We agree with Van Lange et al. that an ecological framework can provide ultimate explanations for such variation in aggression, as well as a wide variety of other human behaviors. However, any approach seeking to understand cross-cultural variation in human behavior via an ecological framework would do well to consider a wider array of theoretically relevant ecological variables (e.g., Grossmann & Varnum 2015; Varnum & Grossmann 2016a; 2016b).

To illustrate our point, we draw on established work in behavioral ecology, evolutionary biology, and animal behavior to identify two ecological features that might play a role equal to if not larger than that of climate in explaining cross-cultural variation in the frequency of two types of aggression (e.g., Clutton-Brock & Parker 1995; Daly & Wilson 2001; Emlen & Oring 1977; Fisher 1930; Griskevicius et al. 2012). Here we focus on *income inequality* (a marker of the distribution of resources in an ecology) and *adult sex ratio* (the adult male-to-female ratio in an ecology) as predictors of homicide (typically male-male violence) and rape (typically male-female violence).

Income inequality has been touted as arguably the best predictor of variability in violence across nations, with greater inequality linked to greater (typically male-perpetrated) violence (e.g., Daly & Wilson 2001; Kenrick & Gomez Jacinto 2013; Ouimet 2012; Wilson & Daly 1997). Because males experience greater fitness