

# Toward Integration of the Niche Diversity Hypothesis With Other Explanations for Personality Covariation: Reply to Međedović's (2019) Commentary on Lukaszewski et al. (2017)

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## Abstract

The hypothesis of a human-universal personality structure is undermined by cross-cultural studies in small-scale societies. To explain cross-population differences in patterns of behavioral covariance, we proposed the *niche diversity hypothesis*, which holds that the degree of behavioral covariation within a population is inversely related to the number and diversity of niches within its socioecology. This hypothesis is formalized as a computational model, and its predictions have been supported empirically. Herein, we respond to several important issues regarding this line of research that were raised in a recent commentary: (1) the study of specific behavioral syndromes should be integrated into the niche diversity model; (2) environmental harshness might alternatively explain our cross-cultural findings regarding effects of niche diversity; and (3) better definitions of behavioral traits are needed for future research. We conclude that the niche diversity hypothesis can be integrated with other explanations for cross-cultural differences in personality covariation.

## Keywords

behavioral ecology, behavioral syndromes, niche diversity, personality, socioecological complexity

After decades in which evolutionary behavioral scientists ignored individual differences, there is now an explosion of research on the evolutionary and developmental causes of personality variation in humans and other animals (e.g., Buss & Hawley, 2010; Dingemanse, Kazem, Réale, & Wright, 2010; Nettle, 2006; Penke & Jokela, 2016; Sih et al., 2015). Patterns of behavioral covariation are foundational to human personality science, insofar as such covariation defines the population-level structure of personality, which is frequently employed to reveal basic psychological “traits” of the human mind (McCrae & Costa, 2008). Crucial for this paradigm is the assumption of a human-universal personality structure. It is problematic, therefore, that (1) most studies of human personality structure have been conducted on the narrow slice of humanity from complex modern settings (Gurven, 2018) and (2) the few studies conducted in small-scale populations (e.g., forager-horticulturalists) fail to reproduce the covariance structures (e.g., the Big Five) observed elsewhere (Bailey et al., 2013; Gurven et al., 2013; Saucier et al., 2014).

To explain these cross-cultural differences, our *niche diversity hypothesis* (Gurven, 2018; Lukaszewski, Gurven, von Rueden, & Schmitt, 2017; Smaldino, Lukaszewski, von Rueden, & Gurven, 2019) proposes that the degree of behavioral covariation within a population is an inverse function of its socioecological complexity—the number and diversity of niches within its

socioecology. Niches such as occupational or social roles can be defined as distinct incentive structures for behaving in certain ways. We recently formalized this hypothesis as a computational model (Smaldino et al., 2019), which shows how lower niche diversity leads to (1) greater behavioral covariation, (2) fewer observed personality factors, and (3) lower trait variance.

Our computational model helps to explain the higher degree of personality covariance in small-scale societies and also sheds light on personality structure variability across large-scale populations. Using empirical proxies for niche diversity at the nation level (e.g., sectoral diversity, urbanization), we found that, within societies under conditions of low (relative to high) estimated niche diversity, the Big Five personality

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dimensions (1) are more strongly intercorrelated (Gurven, 2018; Lukaszewski et al., 2017) and (2) exhibit reduced trait variance (Smaldino et al., 2019).

### Međedović's (2019) Commentary

Međedović's commentary broadly supports our evolutionary ecological approach and the logic of the niche diversity hypothesis. However, they also highlight several issues and suggest important future directions. Below, we summarize and briefly reply:

#### Issue #1: Integrating the Study of Specific Behavioral Syndromes Into the Niche Diversity Model

Međedović suggests that future research on ecological variation in personality structure should focus not only on explaining overall behavioral covariance but also on modeling "behavioral syndromes"—specific suites of behavioral characteristics that are correlated because of common causation, synergistic fitness benefits of multi-trait combinations, or other mechanisms (Sih, Bell, & Johnson, 2004). We agree that this is an important objective (see Gurven, von Rueden, Stieglitz, Kaplan, & Rodriguez, 2014), which will require elaboration of the baseline niche diversity model.

Regarding these goals, the niche diversity model currently only predicts that particular configurations of behavioral covariance will reflect local niche structure. If there are cross-cultural regularities in the multivariate profiles of trait optima that define niches, then there will also be directional regularities in the forms of behavioral syndromes.

However, it is unlikely that all consistent patterns of behavioral covariance are reflections of socioecology. Međedović usefully compares the impulsiveness–aggressiveness syndrome observed in other species to the conscientiousness–agreeableness syndrome evident in our human data. In this case, the niche diversity model can predict that the conscientiousness–agreeableness syndrome will be stronger in less complex societies. However, the fact that the conscientiousness–agreeableness association is reported to be consistently positive could be explained by multiple nonmutually exclusive evolutionary and developmental mechanisms, including, for example, genetic pleiotropy (Dingemans et al., 2010), common developmental calibration according to state-dependence (von Rueden, Lukaszewski, & Gurven, 2015), or niche structure. Testing between these explanations is crucial and will require both conceptual elaboration and corresponding cross-cultural research.

#### Issue #2: Niche Diversity or Environmental Harshness?

Međedović suggests that (1) cross-cultural variation in environmental harshness could also explain observed patterns of behavioral covariance and (2) the empirical nation-level proxies for niche diversity employed in our cross-cultural research might be better proxies for harshness than niche diversity.

We agree with the authors that this—and other—alternative hypotheses should be given focused evaluation. We add that effects of environmental harshness on behavioral covariance may interplay with those of niche diversity. Indeed, if harshness were a distal driver of a population's overall degree of trait covariation, it seems likely that harshness could operate *via* niche diversity. Under scarce ecological conditions, individuals tend to face a common set of challenges. This will limit opportunities for positive-sum exchange—and thereby incentives for individuals to specialize (Mises, 1966; Smith, 1776). Harsh environments can select for stronger cooperative norms (Gerkey, 2013; Smaldino, Schank, & McElreath, 2013), which in turn result in a more restrictive cultural milieu (Gelfand, Harrington, & Jackson, 2017). A predicted consequence of a harsh socioecology, in other words, may be low niche diversity (Figueredo et al., 2011).

The cross-cultural correlation between niche diversity and environmental harshness highlights the need for more precise specification and empirical proxies for these ecological concepts. In the meanwhile, perhaps it would be productive to test associations between niche diversity and behavioral covariance while controlling for specific proxies of harshness (e.g., mortality rates). We invite Međedović and others to collaborate in advancing these goals.

#### Issue #3: We Need Better Conceptual and Operational Definitions of Behavioral Traits

We agree. Personality science has relied on a method of trait identification in which ratings on lexical descriptors are factor analyzed in order to infer the existence of psychological traits. As we have argued (Lukaszewski, 2019; Lukaszewski et al., 2017; Smaldino et al., 2019), this method is ill-suited for cleaving phenotypic units of analysis that are appropriate for evolutionary functional analysis. What will be required going forward are more granular, theoretically based, measures that are not defined by our folk lexical categories of person perception.

### Concluding Remarks

The niche diversity hypothesis is a promising and empirically supported model to explain cross-cultural differences in personality structure. It should now be elaborated, tested further, and integrated with other evolutionary ecological models.

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