MANKIND QUARTERLY 2018 58:3 466-500

Race Differences in Anxiety Disorders, Worry, and Social Anxiety: An Examination of the Differential-*K* Theory in Clinical Psychology

Heitor B. F. Fernandes*
University of Arizona, USA

Richard Lynn
University of Ulster, UK

Steven C. Hertler
College of New Rochelle, USA

*Corresponding author: Heitor B. F. Fernandes, Cognition and Neural Systems, Department of Psychology, School of Mind, Brain, and Behavior, College of Science, 1503 East University Boulevard, University of Arizona, Tucson, Arizona 85721-0068 USA; email: hbffernandes@email.arizona.edu

Differential-*K* theory, when applied to the study of anxiety disorders, predicts that slower life history (LH) racial groups exhibit higher levels of trait anxiety and worry, and higher prevalence of anxiety disorders, as both LH and anxiety experiences are future oriented. We predict that slower LH racial groups will exhibit an especially high prevalence of those anxiety disorders in which: (A) A central symptom is excessive worry rather than the anxious emotion only, as worry is an effortful cognitive phenomenon that involves mentally scrutinizing longer-term future threats and solutions; and (B) The central source of concern is social interactions, as the long-term maintenance of social relationships is one of the hallmarks of slow LH. We conducted an extensive search in international databases of scientific publications, with selection criteria chosen to reduce the possible effect of methods variance in the design and language of psychometric instruments and protocols, as well as

variance in psychological health services and sociopolitical conditions. In line with the evolutionary hypothesis, Whites exhibited a higher prevalence of worry-related and sociality-related anxiety disorders than African-Americans and Latinos. Self-report data on worry and social anxiety traits further supported the evolutionary hypothesis, with Northeast Asians reporting the highest average scores. Importantly however, Blacks exhibited higher rates of post-traumatic stress disorder, a stressor-related condition, lending partial support to the social psychology hypothesis. We review and discuss racial differences in propensity to seek professional help when experiencing distress, in emotional expression to health care workers, and in the validity of psychometric measures, and conclude they are unlikely explanations for the identified race differences. Future studies that test the evolutionary hypothesis on differences among populations within these broad racial groupings are necessary to further examine the predictive power of this theory.
Key Words: Anxiety disorders, Worry, Social anxiety, Life history theory, Race differences

Race differences in frequency and intensity of emotions are largely unexplored in evolutionary literatures, relative to the more common topics of intelligence and broad personality traits (e.g., Lynn, 2006; Rushton, 2000). The study of the emotion of anxious emotion and related processes (such as worry, a cognitive experience) is of essential value to the understanding of a broad range of behavioral race differences, as there are consistent negative associations of anxiety and worry with risk taking, impulsivity, and psychopathy (Lynn, 2002, in press; Sandvik et al., 2015), and positive associations of worry with consideration of the future, planfulness, and conscientiousness (Fernandes, Hutz, Figueredo et al., in preparation; Hertler, 2016). Anxiety and worry are essential adaptations for preparation against and avoidance of future threats, in fact being predictive of lower mortality rates (Fernandes, Hutz, Jacobs & Figueredo, in preparation).

While race differences in anxiety disorders are sometimes reported in public health and clinical fields, this is often conducted in an exploratory fashion, and with no theoretical discussion, with researchers and practitioners being left without an understanding of why differences exist. Examining and understanding the biodemographics of the epidemiology of psychiatric disorders and the distribution of underlying traits has a central role in the development of treatments, adding to the scientific relevance of this line of investigation. Here we

examine the case of race differences in the prevalence of anxiety disorders and in the distribution of traits underlying them, grounding this effort in theoretical predictions and comparing the plausibility of alternative explanations.

Evolutionary and social perspectives can lead to diverging hypotheses. According to Rushton's (1985, 2000) Differential-*K* evolutionary theory, human racial groups (i.e., major groups of populations with shared ancestry, which thus form genetic clusters of covarying traits) have each adapted to specific ecological conditions in the environments to which they have migrated in their history. They are thus expected to differ markedly in their phenotypes, including cognitive, emotional, and behavioral characteristics: While the factor structure of life history seems similar across populations (Figueredo et al., 2017a), the average speed (i.e. the factor *levels*) differ markedly (Figueredo et al., 2017b; Meisenberg & Woodley, 2013; Rushton, 1985, 2000). Differential-*K* theory attempts to explain the differences in terms of a common factor that underlies these phenotypic characteristics — the life history (LH) continuum (Ellis et al., 2009; Pianka, 1970; Stearns, 1992). In so-called slow LHs, allocation is made preferentially to long-term and continued investments for future goals, maintenance of stable relationships, risk avoidance and accumulation of resources, tendencies which are adapted for ecologies in which conditions are predictable and stable. Alternatively, in so-called fast LHs, allocation of resources is made preferentially to investments in immediate rewards, risk taking, inter-individual competition, and a preference for short-term relationships, among other associated characteristics which arguably facilitate adaptation in unpredictable and unstable ecologies.

A continuum of fast to slow LH involving the covariance among these traits has been proposed and observed not only in nonhuman animals but also among human individuals and populations (Figueredo, Cabeza de Baca & Woodley, 2013). As a rule of thumb, Northeast-Asian populations tend to exhibit a multitude of traits that characterize slow life history, whereas sub-Saharan African populations tend to exhibit signs of fast life history (Rushton, 2000). Other racial groups, such as Caucasians and Amerindians, appear to fall somewhere more toward the middle of this continuum, with the former being on average slower than the latter, and Latino populations (largely an admixture of White and Amerindian individuals) falling in between these two racial groups. Although differences exist among populations within these broad categories as well (e.g., Meisenberg & Woodley, 2013), the present paper will focus on comparisons between these broad groups as a first examination of the theoretical implications of Differential-*K* theory. This is due to the limitations of the psychiatric and psychometric data compiled in the "Review of Empirical Evidence" section.

When applied to the study of anxiety disorders, Differential-*K* theory should

predict that slower life history racial groups exhibit higher levels of trait anxiety and worry, and higher prevalence of anxiety disorders. The anxious emotion and worry are future oriented varieties of fear (Baumgartner et al., 2008) that direct attention and behavior to neutralize possible future threats in an anticipatory fashion (Mathews, 1990). The distinction between worry, the anxious emotion, and fear is essential from a functional evolutionary perspective. Fear, underlain by the fight-flight-freeze brain system, is the reactive emotional state that motivates one to avoid or defend against real, present threat. The anxious emotion, underlain by the behavioral inhibition brain system (Gray & McNaughton, 2000), is an anticipatory analog of fear. It motivates preparation for and avoidance of imagined threats that may or may not be real and imminent. Worry, on the other hand, is a highly effortful cognitive process of thinking about potential threats and solutions, involving situations that are usually in a more distant and more log-term future rather than possibly imminent (Stöber & Joormann, 2001). We predict that slower life history racial groups will specifically exhibit a higher prevalence of disorders with one or both of the following features:

1. A central symptom is excessive worry rather than affective anxiety only, with the central example being generalized anxiety disorder (GAD; American Psychiatric Association, 2000). This is because, unlike affective anxiety, worry is an effortful and rational cognitive capacity that permits mentally scrutinizing longer-term future threats and solutions, and has been empirically found to be more characteristic of slow life history individuals (Fernandes et al., in preparation; Figueredo et al., 2014).

2. The central focus of concern is social interactions, namely social anxiety disorder (SAD; Martel, 2014). Worries over one's social image and performance evaluation in contexts of social interaction should be more salient in racial groups in which one's reproductive success highly depends (or depended) on the success of group efforts and on maintaining relationships, one of the hallmarks of slow life histories (Janson & van Schaik, 1993).

These two predictions build upon and update the general prediction made by Del Giudice (2014, 2016) that, as the capacity for anxiety is a defense mechanism much like fever or cough that applies to diverse ecologies, it should be a feature of all life history strategies. Following the initiative of this author to propose a categorization of Obsessive Compulsive Disorder subtypes into fast- and slow-life history classes, here we propose that some anxiety conditions (i.e. those with prominent worry or focused on social interactions) can be hypothesized to be slower life history phenomena, as per Figueredo and colleagues (2014; c.f. Fernandes et al., in preparation) and Martel (2014). It follows from our specific

predictions that measures of worry levels and the magnitude of social anxiety, the underlying traits whose distribution extremes characterize these disorders, should also indicate higher scores for slower life history racial groups. Both predictions presented here rest on the observation that, like most other psychological traits and disorders, anxiety disorders have a moderate heritability (Hettema et al., 2001; Segal, 2012), thus having the potential of being influenced by natural selection pressures.

It is also essential to note that a higher prevalence of anxiety disorders in slower life history racial groups would be in line with the observation that impulsive, risk-taking, and psychopathic personality traits appear to be more prominent in faster life history groups (Figueredo, et al., 2006; Lynn, 2002, in press), as they facilitate the attainment of goals that necessitate short-term gains and individualism rather than long-term investments and the maintenance of social cooperation. Impulsive, risk-taking, and psychopathic characteristics are negatively associated with worry and anxiety, as they are characterized by emotional detachment (for a review, see Sandvik et al., 2015).

Alternatively, it is possible that ontogenetic pressures, such as socioeconomic and opportunity differences between racial groups in a country, are the main force behind differences between populations. Along this line of thought, it can be hypothesized that individuals of minority races, which arguably suffer more discrimination than others in multicultural countries such as the US, should have a higher prevalence of anxiety disorders (Harrell, 2000). In other words, anxiety and worry would be elicited by hardship, trauma, and social stress. This social effect of disfavored minorities may even become amplified through a feedback loop: those experiencing anxiety may fail to perform sufficiently academically, professionally, and socially because of hard conditions, thus experiencing further hardship and trauma, causing even more stress and anxiety.

Review of Empirical Evidence

Prevalence of anxiety disorders

An extensive search in international databases of scientific publications (PsycInfo, Scopus, Web of Science) for the terms “anxiety disorder(s)” combined with “prevalence” or “frequency(ies)” and with “race(s)” or “ethnicity(ies)” indicates that few published studies have compared multiple racial groups for the lifetime prevalence of anxiety disorders, but several more were found comparing only two or three (see Table 1). We only retained publications that (1) reported data for more than one racial group, rather than collating from multiple publications which each report data for one racial group only, and (2) in which the racial groups were assessed in the same country, rather than each from a different country. These

inclusion rules were implemented to increase the likelihood that in each selected study all individuals were assessed with a standardized diagnostic approach, with the assessment methodologies being homogeneously applied to all.

Importantly, this would in most instances not be the case if statistics estimated in a study in one country were compared to those estimated in a different study from another country, as psychometric and psychodiagnostic methods are not internationally standardized, but rather exhibit between-country methodological discrepancies (Holaway et al., 2006). The reasons for discrepancies are numerous, including variation in what signs and symptoms are included in diagnostic criteria, in the use of interview tools, in the settings used for assessment, translation problems in psychometric instruments, and nation-specific styles in inquiring about or reporting symptoms (Bandelow & Michaelis, 2015; van de Vijver & Leung 1997). Another well-known problem in comparing psychometric data from different countries is the frame-of-reference effect (Schmit et al., 1995), also known as the reference-group effect (Heine et al., 2008; Peng et al., 1997), in which individuals produce self-ratings relative to others in their society, not relative to a universal standard point of reference. Even when using the same instrument or interview data, cross-cultural inconsistencies in diagnosis occur. This is exemplified by videotaped interviews and written case histories that are analyzed by clinicians of different cultures, leading to considerably different diagnoses (Hofmann et al., 2010).

The search resulted in the final retention of 21 publications, with full disclose of prevalences and 13 publications with no prevalences disclosed but other forms of comparison (e.g. odds ratio) from the United States, and three publications with prevalence disclosure from other countries. Data for African-Americans and Caribbean Blacks were reported separately in part of the publications due to cultural differences, even though both groups are mostly of sub-Saharan African descent. Data for Northeast Asians were not reported separately from other Asian populations in any study. The publications found are listed in Table 1 in chronological order, and broken down by the anxiety disorders assessed. Note that, while obsessive-compulsive disorder and post-traumatic stress disorder have been removed from the anxiety disorders category in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013), most studies reviewed here were conducted prior to this change when these conditions were still included in the conceptual definition of anxiety disorders. Data on post-traumatic stress are especially relevant to consider because the social stress theory of psychopathology predicts that minorities should exhibit higher prevalence of disorders caused by exacerbated stress.

As can be observed, when anxiety disorders are grouped into a single category, slower life history populations tend to exhibit a higher prevalence. When they are broken down into specific disorders, it is apparent that generalized anxiety disorder (GAD) and social anxiety disorder (SAD) mostly conform to the predictions of the evolutionary hypothesis. Panic disorder appears to be in line with this trend in part of the studies as well. However, other anxiety disorders (agoraphobia without panic, specific phobias, and post-traumatic stress disorder) generally do not. This was especially the case for post-traumatic stress disorder, which exhibits similar or even higher frequencies in African Americans than in White Americans as it has a stress- rather than an anxiety-related etiology.

It is also observable that it was overwhelmingly in studies with primary care patients or individuals seeking help for other conditions, rather than in nationally representative general population samples, that support for the life history hypothesis of anxiety was only mixed. These results will be discussed from the Strategic Differentiation–Integration Effort theory perspective (Dunkel et al., 2014; Figueredo et al., 2013; Woodley & Fernandes, 2014).

Table 1. *Lifetime prevalence estimates of anxiety disorders by racial categories (percentages). All studies are with general population, nonclinical samples, except where noted.*

Anxiety disorder	Lifetime prevalence				
	African-American	Caribbean-Black	Latino	White	Asian
Hoppe at al., 1989[a]					
Generalized anxiety disorder (current prevalence)	4.6		6.5	10.0	
Compton et al., 2000[b]					
Generalized anxiety disorder	6.3		15.3		
Panic disorder	2.0		5.0		
Olfson et al., 2000[a]					
Generalized anxiety disorder	10.5		16.2	11.8	
Panic disorder	5.0		9.5	5.9	
Turner & Lloyd, 2004[d]					
Any	3.2		5.9	6.3	
Breslau et al., 2005					
Any	24.7			29.1	
Grant et al., 2005b					
Generalized anxiety disorder	3.0		2.8	4.6	1.9
Grant et al., 2005a					
Social anxiety disorder	3.5		3.2	5.5	3.3

Anxiety disorder	Lifetime prevalence				
	African-American	Caribbean-Black	Latino	White	Asian
Breslau et al., 2006					
Any	23.8		24.9	29.4	
Generalized anxiety disorder	5.1		4.8	8.6	
Social anxiety disorder	10.8		8.8	12.6	
Panic disorder	3.1		5.4	4.9	
Agoraphobia without panic	2.3		2.7	2.4	
Specific phobias	11.7		13.1	12.5	
Post-traumatic stress disorder	7.1		5.9	6.8	
Huang et al., 2006					
Any (one-year prevalence)[c]	10.4		8.8	11.7	6.9
Johnson et al., 2007[a]					
Panic disorder (one-year prevalence)	20.3			11.6	
Stinson et al., 2007					
Social anxiety disorder	9.1		7.4	9.9	5.9
Alegria et al., 2008					
Generalized anxiety disorder			4.1	8.6	
Social phobia			7.5	14.3	
Panic disorder			2.8	5.2	
Agoraphobia without panic			3.2	2.5	
Post-traumatic stress disorder			4.4	7.3	
Brenes et al., 2008[a]					
Generalized anxiety disorder	14.2			11.2	
Grubaugh et al., 2008[a]					
Any	26.2			21.2	
Himle et al., 2009					
Generalized anxiety disorder	3.3	2.7		5.9	
Social anxiety disorder	7.6	6.0		12.4	
Panic disorder	3.4	4.1		4.8	
Agoraphobia without panic	2.1	2.1		1.3	
Post-traumatic stress disorder	9.1	8.4		6.8	
Asnaani et al., 2010					
Generalized anxiety disorder	4.9		5.8	8.6	2.4
Social anxiety disorder	8.6		8.2	12.6	5.3
Panic disorder	3.8		4.1	5.1	2.1
Post-traumatic stress disorder	8.6		5.6	6.5	1.6

Anxiety disorder	Lifetime prevalence				
	African-American	Caribbean-Black	Latino	White	Asian
Byers et al., 2010[e]					
Any	13.1			11.2	
Soto et al., 2011					
Generalized anxiety disorder	4.5	2.7		7.4	
Woodward et al., 2012					
Any	11.0	11.5	15.2	16.8	7.9
Generalized anxiety disorder	2.4	3.6	6.2	7.1	2.6
Social anxiety disorder	1.6	5.6	5.6	8.0	2.0
Panic disorder	1.5	2.0	2.5	3.0	1.2
Agoraphobia without panic	1.4	2.0	1.8	1.7	0.6
Post-traumatic stress disorder	4.5	3.0	2.1	4.6	2.0
Koo et al., 2015[dc]					
Post-traumatic stress disorder (current prevalence)	30.3		29.8	28.4	
Other anxiety disorders (current prevalence)	12.3		14.6	16.2	
Watkins et al., 2015					
Generalized anxiety disorder	3.0	2.0		5.0	

[a, b, c, d, e] Studies conducted with samples of general medical practice patients, drug-dependent subjects, Iraq and Afghanistan veterans, young adults, and old adults respectively, and thus not aimed at being representative of the general population.

Few publications report anxiety data for Native Americans. Their position in the fast-slow continuum is not well known either, although it is suggested, based on indirect data (Meisenberg & Woodley, 2013) and on higher fertility rates than other races (Snipp, 1997), that they concentrate on the fast pole, similarly to Blacks. If this is indeed the case, it is paradoxical that Native Americans appear to have high rates of anxiety disorders. Grant and colleagues (2005a,b) report a lifetime prevalence of 6.3% and 8.6% for generalized and social anxiety disorders, with the rate for the latter being even higher in the estimates of Stinson and colleagues (2007). For any anxiety disorder, Huang and colleagues (2006) report a lifetime prevalence of 15.3%. Anxiety disorders also appear frequent among Native American children and adolescents (Manson et al., 1997), and they exhibit slightly higher anxiety sensitivity than European youth (Zvolensky et al., 2001). This would make Native Americans the racial group with the highest

anxiety disorder rates and anxious disposition, countering the life history hypothesis and requiring alternative explanations. It must be noted, however, that a strong conflation has been observed specifically among Native Americans between alcohol dependence and anxiety proneness (for a review, see Gilder et al., 2004), and that substance-induced anxiety syndromes are a common feature of alcohol dependence (Schuckit & Hesselbrock, 1994), further confounding possible conclusions that can be drawn for this racial group and necessitating further research effort to disentangle these variables.

Other lines of evidence retained in the systematic review of the literature include papers for which no prevalence per se was reported, with race differences detailed in other ways. Independent data collected by Schwartz et al. (2015) show support for the notion that White Americans exhibit a higher prevalence of anxiety disorders than African Americans, even though the authors have not disclosed the percentages. Analyses included generalized anxiety disorder, panic disorder, post-traumatic stress disorder, and obsessive-compulsive disorder. Similarly, Horwath et al. (1994) found that, compared to Whites, Blacks reported a greater number of symptoms during full-blown panic attacks, and higher rates of anxiety once socioeconomic status was controlled. In the same vein, a study of the Social Phobia and Anxiety Inventory for Children found that White children diagnosed with social phobia exhibit higher scores than Black children on that instrument (Beidel et al., 2000); and White American children in treatment with anxiety disorders in an outpatient mental health facility were identified in a study to exhibit higher clinical severity than Blacks (Last & Perrin, 1993), even though sociodemographically and in terms of symptomatic features they were indistinguishable. In a sample of college students, Barrera and colleagues (2010) reported that scores on the Panic Disorder Severity Scale and the Beck Anxiety Inventory showed a racial rank order of Asians, Whites, Latinos, and Blacks, as per the life history hypothesis of anxiety. In a nationally representative study with normative values for the Social Phobia and Anxiety Inventory, the White-Black difference in scores was large and in the direction predicted by the hypothesis, even though no difference was observed for the agoraphobia subscale (Gillis et al., 1995).

Certain studies report only odds ratio, rather than raw (or weighted) prevalence estimates. These can be used to compare the commonality of anxiety disorders across races as well, especially as they are nationally representative samples of the general US population. Lifetime prevalence of generalized anxiety disorder, according to the DSM-III-R criteria, was found by Wittchen and colleagues (1994) to have a 1.43 odds ratio for Whites and 0.74 for Blacks compared to Latinos. For panic disorder, odds ratio was 1.30 for Whites and 0.85

for Blacks compared to Latinos in a study by Eaton and colleagues (1994). For any anxiety disorder, lifetime prevalence had an odds ratio of .77 for Blacks and of .90 for Latinos relative to Whites in a study by Kessler and colleagues (1994), and as per the DSM-IV criteria, an odds ratio of .80 for Blacks and .70 for Latinos relative to Whites (Kessler et al., 2005). All of these results support the life history hypothesis of race differences in anxiety.

Mixed results exist in other literatures as well, however. In a study of university students in the American Midwest assessed with the Patient Health Questionnaire, Blacks had an odds ratio of .68 for panic disorder or generalized anxiety disorder relative to Whites (conforming to the life history hypothesis of anxiety); however, Latinos had an odds ratio of 1.73, and Asians or Pacific Islanders of .95 (Eisenberg, Golberstein & Gollust, 2007; Eisenberg, Gollust et al., 2007). Moreover, for adolescents assessed with DSM IV criteria, Blacks exhibited an odds ratio of 1.3 and Latinos of 1.1 for anxiety disorders relative to Whites (Merikangas et al., 2010).

Further data from other countries are also available, although much more limited. Pertinez Mena and colleagues (2002) reported a lifetime prevalence of anxiety disorders among Spanish Whites of approximately 26.8%, but of only 17.9% among ethnic minorities (including North African Arabs, East Indians, and Latin Americans), although they failed to break down the "minorities" category into their respective racial groups for clarity. These are populations that have been identified as exhibiting faster life histories than the average of Spain (e.g. Meisenberg & Woodley, 2013). In studies of anxiety disorder prevalence in primary care in the UK, Shaw and colleagues (1999) reported a weighted one-month prevalence of 9% for Whites but only 3% for Afro-Caribbeans, and Bhui and colleagues (2004) reported a weighted prevalence of 8.3% for Whites and 2.5% for Punjabi. These results are largely consistent with the general pattern identified in the US.

Psychometric measures of anxiety and worry

Similar searches in international databases for the terms "worry" combined with "race(s)" or "ethnicity(ies)", following the same exclusion rules as specified above for racial comparisons in the prevalence of anxiety disorders, identified four studies in which race-specific means and standard deviations were reported for validated self-report psychometric scales for the assessment of worry in nonclinical samples. Another study was found including a racial breakdown of self-report on intolerance of uncertainty, a construct that is central in the activation of worry bouts (Dash et al., 2013) and thus informative for the present hypothesis. All the publications retained were American studies, and are listed in Table 2 in

chronological order.

Table 2. *Self-report scores on worry and worry-related constructs by racial category.*

Measure	Mean (*SD*)				Source
	African-American	Latino	White	East Asian	
Worry Domains Questionnaire	26.8 ± 18.9		35.1 ± 21.1	38.6 ± 20.4	Scott et al. (2002)
Penn State Worry Questionnaire	42.5 ± 10.6		46.0 ± 12.3		Carter et al. (2005)
Penn State Worry Questionnaire	44.8 ± 14.8		50.9 ± 15.2		Chapman et al. (2009)
Penn State Worry Questionnaire	45.9 ± 14.2		48.7 ± 14.2	50.2 ± 12.1	Hambrick et al. (2010)
Intolerance of Uncertainty Scale[a]	52.7 ± 20.0	55.5 ± 18.1	54.2 ± 17.7	57.5 ± 19.5	Norton (2005)
Generalized Anxiety Disorder Questionnaire	4.5 ± 3.4		5.1 ± 3.6	5.4 ± 3.2	Robinson et al., (2009)

[a] The Asian category refers to Southeast Asians in this study.

All but one mean score (that for Latinos, by Norton, 2005) for the racial groups conformed to the ranks proposed in the evolutionary hypothesis, lending stronger support to this theory than lifetime prevalence estimates of anxiety disorders. Races differed in total scores on the Worry Domains Questionnaire [$F(2, 475) = 10.61$, $p<.05$] , with a Cohen's d value of .60 between East Asians and African Americans, .42 between Whites and African Americans, and .17 between Asians and White Americans in the data of Scott and colleagues (2002). Carter et al. (2005) and Chapman, Kertz & Woodruff-Borden (2009) identified higher scores for Whites than for African Americans (d = .31 and .41, respectively) in another worry measure, the Penn State Worry Questionnaire [$t(359) = 2.95$, $p<.05$; $t(220) = 3.028$, $p<.05$]. Races also differed in the data of Hambrick and colleagues (2010) for the same questionnaire [$F(2, 2658) = 14.86$, $p<.05$], with Whites and Asians scoring higher than Blacks (d = .20 and .33, respectively), and Asians scoring higher than Whites (d = .13). Carter et al. (2005) noted, however, that differences on a trait anxiety measure, the State-Trait Anxiety Inventory (Trait form), were trivial (d = .005) and non-significant,

suggesting that it is worry, and not the emotion of anxiety, that is the main locus of race differences. Finally, intolerance of uncertainty, an important predictor of worry intensity (Dash et al., 2013), exhibited scores whose rank order among racial groups almost perfectly conformed to that found on worry measures in accordance with the evolutionary hypothesis, even though no significant overall race effect was identified. The size of differences between groups was small, with the exception of that between East-Asians and African Americans (d = .24). On a sample examined using the Generalized Anxiety Disorder Questionnaire, no significant (p<.05) overall race effect was found (Robinson et al., 2009), however the rank order is consistent with that found on the other measures reported in Table 2 and with the evolutionary hypothesis, with differences being non-negligible in size between African Americans and East-Asian Americans (d = .26), and between African Americans and White Americans (d = .19).

Psychometric measures of social anxiety

These ranks in racial differences are also supported in social anxiety self-report scores. A recent meta-analysis of studies comparing East Asian and Caucasian individuals on this variable indicated a weighted mean effect size of d = .47, ranging from -.02 to 1.13, with East Asians exhibiting higher scores as expected based on the evolutionary hypothesis (Woody et al., 2015). Most of these studies were conducted in the United States, but studies conducted elsewhere (including in China, Japan, and Korea) also supported this effect, suggesting that the race differences identified are not caused by the local conditions to which they are exposed. This paper has the desirable feature of specifying subdivisions of Asian populations, permitting a comparison of Northeast Asians against others, as per Differential-*K* theory, and supporting the hypothesis of higher social anxiety in Northeast Asians. Considering the recency and breadth of this published review and meta-analysis no need exists for a reanalysis of updated data, however it is important to point out that a more recent study comparing adolescents of multiple racial groups on self-reported social anxiety further supports the evolutionary hypothesis, with African-Americans exhibiting the lowest and East-Asian Americans exhibiting the highest scores both among males and females, with Latino and White Americans reporting intermediate scores (Brice et al., 2015).

Discussion

We have reviewed data on the prevalence of anxiety disorders and psychometric scores on worry and worry-related constructs across racial groups. Contrary to the expectation that minority racial groups would be socially driven

towards anxiety and worry, and mostly in line with the evolutionary hypothesis of race differences based on life history speed, Whites in general had a higher prevalence of worry-related and sociality-related anxiety disorders than African-Americans and Latinos. Self-report data on worry and social anxiety provided additional support for this evolutionary hypothesis, as in these psychometric measures not only did Blacks and Latinos in general exhibit lower scores than Whites, but East Asians reported the highest scores. Importantly, the social hypothesis of psychopathology etiology, which is mostly stress-related, in fa ct found partial support in the observation that Blacks exhibited higher frequencies of post-traumatic stress disorder (a stress rather than an anxiety disorder, as per recent psychiatric nosology; American Psychiatric Association, 2013).

A major limitation of this review is the lack of specificity for the Asian category. In all nationally-representative general population studies and most psychometric studies of worry or related constructs, it includes Northeast, Southeast, South (i.e. Indian), and West (i.e. Arab) Asians, whereas slow life history is expected mostly for Northeast Asians (Meisenberg & Woodley, 2013; Rushton, 1991, 2000) and not for South or Southeast Asians, who evolved under ecological conditions favoring intermediate or faster life history (Figueredo et al., 2017b). No study was found in the first reported systematic search that broke down the East Asians into the Northeast and the Southeast, not permitting a direct test of the life history hypothesis as it pertains to East Asians. We therefore refrain from speculating about anxiety disorder prevalence in Northeast Asians. Importantly, however, the psychometric studies of worry and of social anxiety, for which Northeast Asians were in fact analyzed separately, showed consistent support for the life history hypothesis and in line with the higher neuroticism observed for this racial group (Rushton, 1985). Another important limitation is the presence of a strong conflation between alcohol dependence, alcohol-induced anxiety, and the high prevalence of anxiety disorders among the apparently faster life history Native Americans. Future research that permits controlling for alcohol dependence effects upon anxiety and therefore examining the independent relation between race and symptomatology in this group is necessary, in addition to further information on their life history speed.

Discrepancies between general population and primary care or clinical samples

Noticeable incongruity could be observed when comparing the results of nationally-representative general population samples with those of primary care centers or other clinical samples in terms of disorder prevalence. Especially noticeable were the commonly higher frequencies of anxiety disorders (including the worry-focused generalized anxiety disorder) among Blacks than Whites in the

latter samples. This pattern was also not in line with the psychometric data on worry and related constructs.

From a social psychology perspective, it would be difficult to account for this discrepancy: Why would minority individuals not exhibit high frequencies of anxiety disorders when assessed from the general population, but rather only when examined in medical centers? We believe a recently demonstrated life history phenomenon can account for this discrepancy. The Strategic Differentiation–Integration Hypothesis (Figueredo, Woodley et al., 2013; Woodley & Fernandes, 2014) posits that individuals and populations with faster life history exhibit higher correlations among traits. This prediction has received vast support, including the finding that mental health and medical comorbidities are more frequent among faster life histories (Fernandes et al., 2016; Figueredo et al., 2013; Woodley of Menie et al., 2015). Importantly, support for this hypothesis has been extended to race differences (Dunkel et al., 2014), such that Blacks, more than Whites, and the latter more than Asians, have been shown to exhibit strong interrelations among psychological traits. It is plausible, therefore, that studies of specifically clinical samples (individuals who have sought medical help for health problems) reviewed in Table 1 would identify a higher prevalence of disorders in demographics in which comorbidities are a frequent occurrence. These findings from clinical samples thus do not necessarily conflict with the more widespread finding that faster life history racial groups tend to exhibit less frequent worry- and sociality-focused anxiety disorders and lower levels of worry- and social-anxiety-related psychometric measures.

Measurement and diagnostic validity of anxiety assessment as a possible explanation for race differences in anxiety disorder prevalence and levels

Several researchers (e.g. Hunter & Schmidt, 2010; Schwartz et al., 2015) have proposed that the lower rates of most anxiety disorders for Blacks can be explained by their awareness and fear of racism, which are argued to prevent them from seeking help and admitting to symptoms that are still stigmatized and thus possibly seen as signs of weakness or inferiority. As such, they are hypothesized to avoid confirming racial stereotypes by preventing others from recognizing their worries and anxious feelings. Thus, African American patients are argued to frequently attribute tachycardia to heart disease, for example, rather than to a possible diagnosis of panic disorder (e.g. Asnaani et al., 2009). A common explanation posited by researchers proposes that true race differences exist not in the presence or severity of anxiety, worry or related constructs, but rather in the validity and psychometric properties of inventories used (e.g., Scott et al., 2002). According to this, items or questions used in the commonly

employed scales may be valid for one race but might not validly reflect the response style or the factor structure of symptoms in another race.

By the 1980s, the discussion over whether races present symptoms differently was already long-standing. Approaches and instruments to measure and diagnose anxiety levels and disorders had for decades appeared inappropriate for minorities (Gynther, 1972). Evidence for that assertion was "scanty, piecemeal, and inconclusive" (Adebimpe, 1981). While it must not be ignored that there is some evidence that measurement invariance fails to be found across races for some anxiety measures (comparing African and White Americans on the Anxiety Sensitivity Index, for instance; Carter et al., 1999; see also Asnaani et al., 2015; Lewis et al., 2012), the weight of the evidence that has accumulated in recent decades is in favor of high comparability of psychometric and diagnostic properties of anxiety assessment among races. Overwhelmingly, it appears that the psychometric properties of psychometric and diagnostic instruments that assess anxiety levels and symptoms are highly similar or even indistinguishable across races including, for example:

1) The Beck Anxiety Inventory, comparing Black and White Americans (Chapman, Williams et al., 2009).
2) The Revised Children's Manifest Anxiety Scale, with Blacks and Whites compared (Reynolds & Paget, 1981).
3) The Revised Children's Manifest Anxiety Scale total scale and subscales, with Whites and Latinos compared (Pina et al., 2009).
4) The Screen for Childhood Anxiety and Related Emotional Disorders (SCARED) scale, with four races compared (Skriner & Chu, 2014).
5) The Penn State Worry Questionnaire, comparing Whites and Blacks, with the difference in factorial structure residing in two items only (Carter et al., 2005).
6) The Penn State Worry Questionnaire and the Social Interaction Anxiety Scale (Hambrick et al., 2010)
7) The Generalized Anxiety Disorder Screener (GAD-7), with three races compared (Kroenke et al., 2010).
8) The National Anxiety Disorder Screening Day instrument, comparing five races (Ritsher et al., 2002)
9) The Multidimensional Anxiety Scale for Children used in adolescent Black Americans, compared to the original psychometric properties of the scale published for Whites, with similar factor structure and validity though somewhat lower internal consistency (Kingery et al., 2009).

Moreover, a comparison of White and Black psychiatric patients in a sample of individuals diagnosed with anxiety disorders identified that very few symptoms (of a list of 64 symptoms in the Initial Evaluation Form) were different in intensity between the two races. These differences mostly concentrated not on anxiety or mood symptomatology, but rather on patterns of social interactions (Fabrega et al., 1988). Furthermore, a study by Cole and colleagues (1998) with Black and White American school children indicated that self-report, peer nomination, and teacher rating assessments of anxiety symptoms exhibited equal validity for both racial groups, and manifested convergent and discriminant validity indistinguishably for both groups.

Even though previous studies identified that Blacks experience anxiety mainly through somatic symptoms, this appears to be true for White Americans as well (Chapman, Williams et al., 2009). Similarly, Zhang and colleagues (1998) have identified that, "contrary to common assumptions, Asian Americans claim somatic discomfort as frequently as White Americans do" (p. 317).

Thus the race differences on anxiety symptomatology appear not to be robust, and should not be relied upon as the cause of race differences in prevalence of anxiety disorders or on mean scores on psychometric instruments that assess anxiety.

Even if psychometric and diagnostic instruments had lower reliability or validity for a race or for minorities, it is unclear why, according to this view, minority races would consistently score lower (indicating the presence of a bias) rather than simply in a less precise manner and thus with more variance (indicating the presence of measurement error). Moreover, even if specific symptoms or indicators were more prominently expressed by one ethnic group than another, the between-race comparisons reviewed in the present paper take place at the aggregate level; that is, the latent factor level. Taking the Beck Anxiety Inventory, for example, even if, hypothetically, Blacks experienced anxiety in a more somatic form (e.g. accelerated heart rate, perspiration), and Whites in a more subjective, emotional form (e.g. feeling scared, uneasy), this race specificity in experience would not matter to the between-race comparison in the total (aggregate) anxiety score, which is the average of the somatic and subjective domains. Furthermore, confidential participation in self-report studies on worry and related constructs, which does not entail the risk of damage to one's social image based on the responses (as compared to seeking clinical help when in distress), led to the same pattern of race differences as the disorder prevalence data when comparing Blacks to the majority race in the US.

To go even further, we argue that the way psychometric and diagnostic inventories are currently constructed, they actually reduce the magnitude of race

differences reported in this review. The Worry Domains Questionnaire, for example, is considerably biased toward self-related problems, not giving any consideration to the sometimes frequent and intense concerns about others' wellbeing (e.g., Becker et al., 2003; Eysenck & van Berkum, 1992; Schwartz & Melech, 2000). Slow life history individuals, due to their altruistic nature, exhibit worry not only about the self, but also about family members, friends, and even society in general (Fernandes et al., in preparation). Thereby worry scores are artificially reduced in slower life history populations if this is not taken into consideration.

Race differences in mental health help-seeking propensity as a possible explanation for race differences

It could be thought possible that the observed race differences reviewed in the present paper are explained by dissimilarities across races in how much they seek or disclose to mental health professionals. However, several studies have failed to find the much suspected race difference in the use of health services or mental health services that would disfavor minorities, or in the rate of patients seeking help for anxiety, when comparing Whites and Blacks for example (for a review, see Tarricone et al., 2012). Other studies found that, in fact, minority races are more likely than Whites in the US to seek help from mental health professionals (Neighbors, 1988). Thus the race differences summarized in this paper are unlikely to be due to race differences in propensity to seek professional help when experiencing anxiety-related distress. Moreover, this is especially true if we consider that, in the many nationally-representative general population samples reviewed in Table 1 and psychometric studies of worry and related constructs reviewed in Table 2, diagnostic assessment was conducted not based on demand from individuals (i.e. active help seeking on the part of participants), but based on all sociodemographic categories as part of the research design involving representative random sampling. Prevalence would thus not be biased from race differences in help seeking. The only exception to this are the studies of primary care or other clinical samples reviewed in Table 1, which permitted biased representativeness of sociodemographic categories and thus, not surprisingly, exhibited mixed results.

Convergent lines of evidence for the validity of the life history hypothesis of anxiety

Racial variations in biomarkers of anxiety are also in line with the life history hypothesis and the general pattern of anxiety disorder prevalences and psychometric levels of worry reviewed in the present paper. Examples include

autonomic cardiac function (Liao et al., 1995), electrodermal activity (Janes et al., 1978) and baseline cortisol (Samuel et al., 2016). Furthermore, a plethora of research on the biological underpinnings of anxiety support the race differences reviewed here. In lieu of a comprehensive review that would quickly exceed the bounds of the present discussion, below we provide four examples of such biological mediators: one genetic, one anatomical, and two hormonal.

Psychiatric genetic markers are only beginning to show their vast potential. Nevertheless, there are myriad candidates. Taking serotonin transporter polymorphisms by way of example, 5-HTTLPR (5-HT transporter long promoter repeat) has thus far differentiated between anxiety levels more often than not (for meta-analyses see Munafò et al., 2008; Sen et al., 2004; see also Cerasa et al., 2013; Gonda, 2008; Narasimhan et al., 2011; Reinelt et al., 2014; Zhao et al., 2016), especially in those studies not exclusively relying on structured psychiatric screening (Minelli et al., 2011). In turn, racial differences in 5-HTTLPR have been documented (Causadias, 2017; Goldman et al., 2010; Noskova et al., 2008; Odgerel et al., 2013), with Blacks overall exhibiting lower frequencies of the allele associated with higher anxiety, and more frequent homozygosity for the low-anxiety allele (Odgerel et al., 2013).

Moving on to the anatomical indicator: Partially stemming from racial variation in 5-HTTLPR, there is emerging research suggesting commissural fibers connecting the prefrontal cortex and the amygdala are racially divergent, with the consequence of predisposing Northeast Asians to anxiety (Isamah et al., 2010; Long et al., 2013; Zhang et al., 2015). These race differences in amygdala volume are paralleled by sex differences (Pardini et al., 2014) in line with the well-established sex differences in anxiety (Bekker & van Mens-Verhulst, 2007). The relevance of such racial variation comes from the amygdala's status as a limbic structure whose connectivity and volume are associated with apperceived anxiety levels (Qin et al., 2014).

Finally, for the hormonal indicators: While free circulating testosterone itself may serve as an exception (Ellis & Nyborg, 1992; Ewing & Rouse, 1978), racial differences in the predicted direction have been documented for sex hormone-binding globulin SHBG (Winters et al., 2001) and the adrenal androgens dehydroepiandrosterone sulfate and androstenedione (Lookingbill, et al., 1991). Moreover, sampled Asian American populations show reduced endogenous androgen receptors for testosterone (Zitzmann & Nieschlag, 2001) and possibly also less 5α-reductase, an enzyme converting testosterone into more active dihydrotestosterone (Greaves, 2001). Rates of prostate cancer (Rushton, 2000; Santner et al., 1998), body hair (Ewing & Rouse, 1978), skeletal muscle mass (Hull et al., 2011; Rushton, 2000; Silva et al., 2010) and related anatomical

corollaries of testosterone progress from high to low from African to European and Northeast Asian populations (Dutton et al., 2016; Hertler, 2015a,b). Evolved racial differences seem to have acted on testosterone's functional effects, rather than its mere presence.

All of this is important to the present thesis because testosterone and anxiety are inversely correlated. These racial correlations are bolstered by sex correlations wherein females, relative to males, possess more anxiety and less testosterone (Giltay et al., 2012; McHenry et al., 2014). Finally, animal experimentation suggests causality behind this correlation (Aikey et al., 2002; Edinger & Frye, 2005), which is in turn partially supported by experimentation with human subjects (van Honk et al., 2005). Another hormone importantly associated with anxiety and anxiety disorders is cortisol. Its blood levels are not only cross-sectionally but also longitudinally associated with anxiety and its disorders, with past levels especially predicting present diagnosis of social anxiety disorder (Adam et al., 2014). Cortisol levels appear to be lower in Blacks compared to Whites in studies of American samples, both during normal day to day life (Bennett et al., 2004) and also in important life events such as during pregnancy (Glynn et al., 2007). British data also suggest that cortisol level is higher in Whites than in South Asian (Indian, Bangladeshi, and Pakistani) immigrants in spite of their minority status (Meisenberg & Woodley, 2013).

These biological mediators are interpretable explanations of race differences in anxiety when considering human evolutionary history. The waves of late Pleistocene and early Holocene migrants which eventually diverged into extant racial populations utterly altered their morbidity and mortality regimes by leaving Africa and entering Eurasia (Harcourt, 2012). At the risk of grossly simplifying for the sake of brevity, the most potent source of mortality transitioned from parasite burden to seasonal cold following northward migration (Bar-Yosef & Belfer-Cohen, 2001). Parasites are the exemplar of extrinsic mortality, a form of mortality that could neither be predicted nor controlled; whereas seasonal cold (Lynn, 1991; Miller, 1991; Rushton, 2000) is the exemplar of intrinsic mortality, which could be predicted and controlled. This post-migration inversion of the mortality regime made the future at once more certain, and more certainly harsh, with the general effect of slowing life history. While both parasites and cold can kill, humans could effectively neutralize only the latter. Building shelters, gathering and storing food, finding and concentrating combustibles, and manufacturing clothes are among the many behaviors that change winter from lethal to merely unpleasant (Campbell, 1972). Augmented anxiety and worry may well be the emotional and cognitive disposition which broadly actuates such future-directed precautionary behaviors, being related to risk avoidance and planfulness

(Bateson et al., 2011; Dash et al., 2013).

Concluding remarks

We argue that explanations of race differences in anxiety that rely mainly on hypotheses of social causation or problems in measurement styles are generally not supported and thus do not invalidate the predominantly biological explanation for the data reviewed. The evolutionary framework offers a more compelling alternative explanation wherein racial differences in anxiety logically co-vary with a constellation of biological and behavioral traits, all of which vary as a function of ancestral ecological conditions. This does not mean that race differences in psychometric validity of assessment instruments or in help-seeking behavior do not exist at all, but rather that they do not appear to be consistent and to be the main explanation of the race differences in anxiety identified. This also does not mean that social stress has no psychopathological consequences, and is not concentrated on minorities, as it is possible that the differences identified in post-traumatic stress disorder (a stress, rather than an anxiety, disorder) are attributable to stress arising from the many difficulties experienced by minorities in Western countries.

Future studies should examine whether the patterns of race differences reviewed in this paper replicate in other countries. The examples highlighted in the Results section suggest that, in the European countries studied, White populations exhibit higher rates of anxiety disorder than minorities such as Blacks, South Asians, Arabs, and Latin Americans, in line with the main findings from the American literature. Studies from other countries would help shed light on whether the effects reported here are a generalizable phenomenon.

It is important to note that, even though between-country comparisons in variables that rely on psychodiagnosis and psychometric measurement are likely to be somewhat biased by country specificities in methodology and in response style (as detailed in the “Review of Empirical Evidence” section), a recent review and meta-regression of international prevalence of anxiety disorders largely agrees with the pattern described in the present review (Baxter et al., 2013). Future efforts to standardize and control for sources of methodological and response style variance would help determine to what degree the patterns observed in within-nation and cross-nation approaches in fact replicate.

A final cautionary note about the ethical use of the information reviewed in this paper is needed. These findings cannot be used to justify reducing initiatives or effort to address anxiety or any psychopathological issues in races that, on average, exhibit lower disorder prevalence. Importantly, even though in Blacks anxiety disorders appear to be less common, they typically have a more chronic

course (Breslau et al., 2005, 2006), perhaps because of more difficult access to or opportunity for continued evidence-based treatment. This warrants further attention from the mental health community. Furthermore, Soto et al. (2011) identified that, even though Whites in their sample exhibited higher rates of generalized anxiety disorder than African Americans and Afro-Caribbeans, racial discrimination was an important predictor of onset of the disorder in the two Black groups but (as expected) not for Whites, suggesting that social effort to address prejudice has essential consequences and should be taken seriously.

References

Adam, E.K., Vrshek-Schallhorn, S., Kendall, A.D., Mineka, S., Zinbarg, R.E. & Craske, M.G. (2014). Prospective associations between the cortisol awakening response and first onsets of anxiety disorders over a six-year follow-up. *Psychoneuroendocrinology* 44: 47-59.

Adebimpe, V.R. (1981). Overview: White norms and psychiatric diagnosis of Black patients. *American Journal of Psychiatry* 138: 279-285.

Aikey, J.L., Nyby, J.G., Anmuth, D.M. & James, P.J. (2002). Testosterone rapidly reduces anxiety in male house mice (*Mus musculus*). *Hormones and Behavior* 42: 448-460.

Alegría, M., Canino, G., Shrout, P.E., Woo, M., Duan, N., Vila, D., ... & Meng, X.L. (2008). Prevalence of mental illness in immigrant and non-immigrant US Latino groups. *American Journal of Psychiatry* 165: 359-369.

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition. Washington, DC: Author.

American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition. Washington, DC: Author.

Asnaani, A., Gutner, C.A., Hinton, D.E. & Hofmann, S.G. (2009). Panic disorder, panic attacks and panic attack symptoms across race-ethnic groups: Results of the Collaborative Psychiatric Epidemiology Studies. *CNS Neuroscience & Therapeutics* 15: 249-254.

Asnaani, A., Richey, J.A., Dimaite, R., Hinton, D.E. & Hofmann, S.G. (2010). A cross-ethnic comparison of lifetime prevalence rates of anxiety disorders. *Journal of Nervous and Mental Disease* 198: 551-555.

Asnaani, A., Aderka, I.M., Marques, L., Simon, N., Robinaugh, D.J. & Hofmann, S.G. (2015). The structure of feared social situations among race-ethnic minorities and Whites with social anxiety disorder in the United States. *Transcultural Psychiatry* 52: 791-807.

Bandelow, B. & Michaelis, S. (2015). Epidemiology of anxiety disorders in the 21st century. *Dialogues in Clinical Neuroscience* 17: 327.

Bar-Yosef, O. & Belfer-Cohen, A. (2001). From Africa to Eurasia—early dispersals. *Quaternary International* 75: 19-28.

Barrera, T.L., Wilson, K.P. & Norton, P.J. (2010). The experience of panic symptoms across racial groups in a student sample. *Journal of Anxiety Disorders* 24: 873-878.

Bateson, M., Brilot, B. & Nettle, D. (2011). Anxiety: An evolutionary approach. *Canadian Journal of Psychiatry* 56: 707-715.

Baumgartner, H., Pieters, R. & Bagozzi, R.P. (2008). Future-oriented emotions: Conceptualization and behavioral effects. *European Journal of Social Psychology* 38: 685-696.

Baxter, A.J., Scott, K.M., Vos, T. & Whiteford, H.A. (2013). Global prevalence of anxiety disorders: A systematic review and meta-regression. *Psychological Medicine* 43: 897-910.

Becker, E.S., Goodwin, R., Hölting, C., Hoyer, J. & Margraf, J. (2003). Content of worry in the community: What do people with generalized anxiety disorder or other disorders worry about? *Journal of Nervous and Mental Disease* 191: 688-691.

Beidel, D.C., Turner, S.M., Hamlin, K. & Morris, T.L. (2000). The Social Phobia and Anxiety Inventory for Children (SPAI-C): External and discriminative validity. *Behavior Therapy* 31: 75-87.

Bekker, M.H. & van Mens-Verhulst, J. (2007). Anxiety disorders: Sex differences in prevalence, degree, and background, but gender-neutral treatment. *Gender Medicine* 4: S178-S193.

Bennett, G.G., Merritt, M.M. & Wolin, K.Y. (2004). Ethnicity, education, and the cortisol response to awakening: A preliminary investigation. *Ethnicity and Health* 9: 337-347.

Bhui, K., Bhugra, D., Goldberg, D., Sauer, J. & Tylee, A. (2004). Assessing the prevalence of depression in Punjabi and English primary care attenders: The role of culture, physical illness and somatic symptoms. *Transcultural Psychiatry* 41: 307-322.

Brenes, G.A., Knudson, M., McCall, W.V., Williamson, J.D., Miller, M.E. & Stanley, M.A. (2008). Age and racial differences in the presentation and treatment of generalized anxiety disorder in primary care. *Journal of Anxiety Disorders* 22: 1128-1136.

Breslau, J., Kendler, K.S., Su, M., Aguilar-Gaxiola, S. & Kessler, R.C. (2005). Lifetime risk and persistence of psychiatric disorders across ethnic groups in the United States. *Psychological Medicine* 35*:* 317-327.

Breslau, J., Aguilar-Gaxiola, S., Kendler, K.S., Su, M., Williams, D. & Kessler, R.C. (2006). Specifying race-ethnic differences in risk for psychiatric disorder in a USA national

sample. *Psychological Medicine* 36*:* 57-68.

Brice, C., Warner, C.M., Okazaki, S., Ma, P.W.W., Sanchez, A., Esseling, P. & Lynch, C. (2015). Social anxiety and mental health service use among Asian American high school students. *Child Psychiatry & Human Development* 46: 693-701.

Byers, A.L., Yaffe, K., Covinsky, K.E., Friedman, M.B. & Bruce, M.L. (2010). High occurrence of mood and anxiety disorders among older adults: The National Comorbidity Survey Replication. *Archives of General Psychiatry* 67*:* 489-496.

Campbell, B. (1972). *Sexual Selection and the Descent of Man 1871-1971*. Chicago, IL: Aldine.

Carter, M.M., Miller Jr., O., Sbrocco, T., Suchday, S. & Lewis, E.L. (1999). Factor structure of the Anxiety Sensitivity Index among African American college students. *Psychological Assessment* 11: 525-533.

Carter, M.M., Sbrocco, T., Miller Jr., O., Suchday, S., Lewis, E.L. & Freedman, R.E. (2005). Factor structure, reliability, and validity of the Penn State Worry Questionnaire: Differences between African-American and White-American college students. *Journal of Anxiety Disorders* 19: 827-843.

Causadias, J.M., Telzer, E.H. & Gonzales, N.A. (2017). *Handbook of Culture and Biology*. New York: Wiley & Sons.

Cerasa, A., Quattrone, A., Piras, F., Mangone, G., Magariello, A., Fagioli, S., ... & Spalletta, G. (2013). 5- HTTLPR, anxiety and gender interaction moderates right amygdala volume in healthy subjects. *Social Cognitive and Affective Neuroscience* 9: 1537-1545.

Chapman, L.K., Kertz, S.J. & Woodruff-Borden, J. (2009). A structural equation model analysis of perceived control and psychological distress on worry among African American and European American young adults. *Journal of Anxiety Disorders* 23: 69-76.

Chapman, L.K., Williams, S.R., Mast, B.T. & Woodruff-Borden, J. (2009). A confirmatory factor analysis of the Beck Anxiety Inventory in African American and European American young adults. *Journal of Anxiety Disorders* 23: 387-392.

Cole, D.A., Martin, J.M., Peeke, L., Henderson, A. & Harwell, J. (1998). Validation of depression and anxiety measures in White and Black youths: Multitrait–multimethod analyses. *Psychological Assessment* 10: 261.

Compton, W.M., Cottler, L.B., Abdallah, A.B. et al. (2000). Substance dependence and other psychiatric disorders among drug dependent subjects: Race and gender correlates. *American Journal on Addictions* 9: 113-125.

Dash, S.R., Meeten, F. & Davey, G.C. (2013). Systematic information processing style and perseverative worry. *Clinical Psychology Review* 33: 1041-1056.

Del Giudice, M. (2014). An evolutionary life history framework for psychopathology. *Psychological Inquiry* 25: 261-300.

Del Giudice, M. (2016). The life history model of psychopathology explains the structure of psychiatric disorders and the emergence of the p factor: A simulation study. *Clinical Psychological Science* 4*:* 299-311.

Dunkel, C.S., De Baca, T.C., Woodley, M.A. & Fernandes, H.B. (2014). The General Factor of Personality and general intelligence: Testing hypotheses from Differential-K, Life History Theory, and strategic differentiation–integration effort. *Personality and Individual Differences* 61: 13-17.

Dutton, E., van der Linden, D. & Lynn, R. (2016). Population differences in androgen levels: A test of the Differential K theory. *Personality and Individual Differences* 90*:* 289-295.

Eaton, W.W., Kessler, R.C., Wittchen, H.U. & Magee, W.J. (1994). Panic and panic disorder in the United States. *American Journal of Psychiatry* 151*:* 413-420.

Edinger, K.L. & Frye, C.A. (2005). Testosterone's anti-anxiety and analgesic effects may be due in part to actions of its 5α-reduced metabolites in the hippocampus. *Psychoneuroendocrinology* 30: 418-430.

Eisenberg, D., Golberstein, E. & Gollust, S.E. (2007). Help-seeking and access to mental health care in a university student population. *Medical Care* 45: 594-601.

Eisenberg, D., Gollust, S.E., Golberstein, E. & Hefner, J.L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students. *American Journal of Orthopsychiatry* 77: 534-542.

Ellis, B.J., Figueredo, A.J., Brumbach, B.H. & Schlomer, G.L. (2009). Fundamental dimensions of environmental risk. *Human Nature* 20: 204-268.

Ellis, L. & Nyborg, H. (1992). Racial/ethnic variations in male testosterone levels: A probable contributor to group differences in health. *Steroids* 57: 72-75.

Ewing, J.A. & Rouse, B.A. (1978). Hirsutism, race and testosterone levels: Comparison of East Asians and Euroamericans. *Human Biology* 50: 209-215.

Eysenck, M.W. & van Berkum, J. (1992). Trait anxiety, defensiveness, and the structure of worry. *Personality and Individual Differences* 13: 1285-1290.

Fabrega, H., Mezzich, J. & Ulrich, R.F. (1988). Black-white differences in psychopathology in an urban psychiatric population. *Comprehensive Psychiatry* 29: 285-297.

Fernandes, H.B.F., Black, C.J., Kennair, L.E.O., Kruger, D.J., Aamelfot, E., Bakken, R. & Hutz, C.S. (2016, April). The integration among anxiety components is stronger in more anxious and more neurotic individuals. Oral presentation, Second World Conference on Personality, Armação dos Búzios, Rio de Janeiro, Brazil.

Fernandes, H.B.F., Hutz, C.S., Jacobs, W.J. & Figueredo, A.J. (in preparation). The adaptive value of anxiety and worry: An evolutionary perspective.

Fernandes, H.B.F., Hutz, C.S., Figueredo, A.J., Kennair, L.E.O., Aamelfot, E., Bakken, R., … & Kruger, D.J. (in preparation). The roles of anxiety and worry in life history strategies: Cross-national sequential effects and mediators.

Figueredo, A.J., Cabeza de Baca, T. & Woodley, M.A. (2013). The measurement of human life history strategy. *Personality and Individual Differences* 55: 251-255.

Figueredo, A.J., Woodley, M.A. & Fernandes, H.B. (2014). Life history selection and phenotypic diversification. *Psychological Inquiry* 25: 325-329.

Figueredo, A.J., Vásquez, G., Brumbach, B.H., Schneider, S.M., Sefcek, J.A., Tal, I.R., ... & Jacobs, W.J. (2006). Consilience and life history theory: From genes to brain to reproductive strategy. *Developmental Review* 26: 243-275.

Figueredo, A.J., Woodley, M.A., Brown, S.D. & Ross, K.C. (2013). Multiple successful tests of the Strategic Differentiation-Integration Effort (SD-IE) hypothesis. *Journal of Social, Evolutionary, and Cultural Psychology*, 7: 361.

Figueredo, A.J., Garcia, R.A., Menke, J.M., Jacobs, W.J., Gladden, P.R., Bianchi, J., ... & Jiang, Y. (2017a). The K-SF-42: A New Short Form of the Arizona Life History Battery. *Evolutionary Psychology* 15: 1474704916676276.

Figueredo, A.J., Cabeza de Baca, T., Fernandes, H.B.F., Black, C.J., Peñaherrera-Aguirre, M., Hertler, S., ... & Meisenberg, G. (2017b). A sequential canonical cascade model of social biogeography: Plants, parasites, and people. *Evolutionary Psychological Science* 3: 40-61.

Gilder, D.A., Wall, T.L. & Ehlers, C.L. (2004). Comorbidity of select anxiety and affective disorders with alcohol dependence in Southwest California Indians. *Alcoholism: Clinical and Experimental Research* 28: 1805-1813.

Gillis, M.M., Haaga, D.A. & Ford, G.T. (1995). Normative values for the Beck Anxiety Inventory, Fear Questionnaire, Penn State Worry Questionnaire, and Social Phobia and Anxiety Inventory. *Psychological Assessment* 7: 450-455.

Giltay, E.J., Enter, D., Zitman, F.G., Penninx, B.W., van Pelt, J., Spinhoven, P. & Roelofs, K. (2012). Salivary testosterone: Associations with depression, anxiety disorders, and antidepressant use in a large cohort study. *Journal of Psychosomatic Research* 72: 205-213.

Glynn, L.M., Schetter, C.D., Chicz-DeMet, A., Hobel, C.J. & Sandman, C.A. (2007). Ethnic differences in adrenocorticotropic hormone, cortisol and corticotropin-releasing hormone during pregnancy. *Peptides* 28: 1155-1161.

Goldman, N., Glei, D.A., Lin, Y.H. & Weinstein, M. (2010). The serotonin transporter polymorphism (5-HTTLPR): Allelic variation and links with depressive

symptoms. *Depression and Anxiety* 27: 260-269.

Gonda, X. (2008). The serotonin transporter gene and personality: Association of the 5-HTTLPR s allele, anxiety, depression and affective temperaments. *Orvosi Hetilap* 149: 1569-1573.

Grant, B.F., Hasin, D.S., Blanco, C., Stinson, F.S., Chou, S.P., Goldstein, R.B., ... & Huang, B. (2005a). The epidemiology of social anxiety disorder in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry* 66: 1351-1361.

Grant, B.F., Hasin, D.S., Stinson, F.S., Dawson, D.A., Ruan, W.J., Goldstein, R.B., ... & Huang, B. (2005b). Prevalence, correlates, co-morbidity, and comparative disability of DSM-IV generalized anxiety disorder in the USA: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychological Medicine* 35: 1747-1759.

Gray, J.A. & McNaughton, N. (2000). *The Neuropsychology of Anxiety: An Enquiry into the Functions of the Septo-Hippocampal System*, 2nd edition. New York: Oxford University Press.

Greaves, M. (2001). *Cancer: The Evolutionary Legacy*. Oxford University Press.

Grubaugh, A.L., Slagle, D.M., Long, M., Frueh, B.C. & Magruder, K.M. (2008). Racial disparities in trauma exposure, psychiatric symptoms, and service use among female patients in Veterans Affairs primary care clinics. *Women's Health Issues* 18: 433-441.

Gynther, M.D. (1972). White norms and black MMPIs: A prescription for discrimination? *Psychological Bulletin* 78: 386.

Hambrick, J.P., Rodebaugh, T.L., Balsis, S., Woods, C.M., Mendez, J.L. & Heimberg, R.G. (2010). Cross-ethnic measurement equivalence of measures of depression, social anxiety, and worry. *Assessment* 17: 155-171.

Harcourt, A.H. (2012). *Human Biogeography*. Los Angeles, CA: University of California Press.

Harrell, S.P. (2000). A multidimensional conceptualization of racism-related stress: Implications for the well-being of people of color. *American Journal of Orthopsychiatry* 70: 42-57.

Heine, S.J., Buchtel, E.E. & Norenzayan, A. (2008). What do cross-national comparisons of personality traits tell us? The case of conscientiousness. *Psychological Science* 19: 309-313.

Hertler, S.C. (2015a). Migration load, ecological opportunity, and obsessive compulsive personality disorder etiology: Obsessive character as an adaptation to seasonality. *Evolutionary Psychological Science* 1: 52-67.

Hertler, S.C. (2015b). Toward a biology of collectivism: Reducing the East-West divide to

its physical and physiological substrates. *SAGE Open* 5*:* 2158244015590161.

Hertler, S.C. (2016). The biology of obsessive-compulsive personality disorder symptomatology: Identifying an extremely K-selected life history variant. *Evolutionary Psychological Science* 2: 1-15.

Hettema, J.M., Neale, M.C. & Kendler, K.S. (2001). A review and meta-analysis of the genetic epidemiology of anxiety disorders. *American Journal of Psychiatry* 158: 1568-1578.

Himle, J.A., Baser, R.E., Taylor, R.J., Campbell, R.D. & Jackson, J.S. (2009). Anxiety disorders among African Americans, blacks of Caribbean descent, and non-Hispanic whites in the United States. *Journal of Anxiety Disorders* 23: 578-590.

Hofmann, S.G., Asnaani, A. & Hinton, D.E. (2010). Cultural aspects in social anxiety and social anxiety disorder. *Depression and Anxiety* 27: 1117-1127.

Holaway, R.M., Rodebaugh, T.L. & Heimberg, R.G. (2006). The epidemiology of worry and generalized anxiety disorder. In: G.C.L. Davey & A. Wells (eds.), *Worry and Its Psychological Disorders: Theory, Assessment and Treatment*, pp. 4-20. Chichester, UK: Wiley.

Hoppe, S.K., Leon, R.L. & Realini, J.P. (1989). Depression and anxiety among Mexican Americans in a family health center. *Social Psychiatry and Psychiatric Epidemiology* 24: 63-68.

Horwath, E., Johnson, J. & Hornig, C.D. (1994). Epidemiology of panic disorder. In: S. Friedman (ed.), *Anxiety Disorders in African Americans*, pp. 53-64. New York: Springer.

Huang, B., Grant, B.F., Dawson, D.A., Stinson, F.S., Chou, S.P., Saha, T.D., ... & Pickering, R.P. (2006). Race-ethnicity and the prevalence and co-occurrence of Diagnostic and Statistical Manual of Mental Disorders, alcohol and drug use disorders and Axis I and II disorders: United States, 2001 to 2002. *Comprehensive Psychiatry* 47: 252-257.

Hull, H.R., Thornton, J., Wang, J., Pierson, R.N., Kaleem, Z., Pi-Sunyer, X., ... & Gallagher, D. (2011). Fat-free mass index: Changes and race/ethnic differences in adulthood. *International Journal of Obesity* 35: 121-127.

Hunter, L.R. & Schmidt, N.B. (2010). Anxiety psychopathology in African American adults: Literature review and development of an empirically informed sociocultural model. *Psychological Bulletin* 136: 211-235.

Isamah, N., Faison, W., Payne, M.E., MacFall, J., Steffens, D.C., Beyer, J.L., ... & Taylor, W.D. (2010). Variability in frontotemporal brain structure: The importance of recruitment of African Americans in neuroscience research. *PLoS One* 5: e13642.

Janes, C.L., Hesselbrock, V. & Stern, J.A. (1978). Parental psychopathology, age, and race as related to electrodermal activity of children. *Psychophysiology* 15: 24-34.

Janson, C.H. & van Schaik, C.P. (1993). Ecological risk aversion in juvenile primates: Slow and steady wins the race. In: M.E. Pereira & L.A. Fairbanks (eds.), *Juvenile Primates*, pp. 367-415. New York, NY: Oxford University Press.

Johnson, M.R., Hartzema, A.G., Mills, T.L., De Leon, J.M., Yang, M., Frueh, C. & Santos, A. (2007). Ethnic differences in the reliability and validity of a Panic Disorder Screen. *Ethnic Health* 12: 283-296.

Kessler, R.C., McGonagle, K.A., Zhao, S., Nelson, C.B., Hughes, M., Eshleman, S., ... & Kendler, K.S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry* 51: 8-19.

Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R. & Walters, E.E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry* 62: 593-602.

Kingery, J.N., Ginsburg, G.S. & Burstein, M. (2009). Factor structure and psychometric properties of the Multidimensional Anxiety Scale for Children in an African American adolescent sample. *Child Psychiatry and Human Development* 40: 287.

Koo, K.H., Hebenstreit, C.L., Madden, E., Seal, K.H. & Maguen, S. (2015). Race/ethnicity and gender differences in mental health diagnoses among Iraq and Afghanistan veterans. *Psychiatry Research* 229: 724-731.

Kroenke, K., Spitzer, R.L., Williams, J.B. & Löwe, B. (2010). The patient health questionnaire somatic, anxiety, and depressive symptom scales: A systematic review. *General Hospital Psychiatry* 32: 345-359.

Last, C.G. & Perrin, S. (1993). Anxiety disorders in African-American and White children. *Journal of Abnormal Child Psychology* 21: 153-164.

Lewis, K.M., Byrd, D.A. & Ollendick, T.H. (2012). Anxiety symptoms in African-American and Caucasian youth: Relations to negative life events, social support, and coping. *Journal of Anxiety Disorders* 26: 32-39.

Liao, D., Barnes, R.W., Chambless, L.E., Simpson, R.J., Sorlie, P., Heiss, G. & ARIC investigators (1995). Age, race, and sex differences in autonomic cardiac function measured by spectral analysis of heart rate variability—the ARIC study. *American Journal of Cardiology* 76: 906-912.

Long, H., Liu, B., Hou, B., Wang, C., Li, J., Qin, W., ... & Jiang, T. (2013). The long rather than the short allele of 5-HTTLPR predisposes Han Chinese to anxiety and reduced connectivity between prefrontal cortex and amygdala. *Neuroscience Bulletin* 29: 4-15.

Lookingbill, D., Demers, L., Wang, C., Leung, A., Rittmaster, R. & Santen, R. (1991). Clinical and biochemical parameters of androgen action in normal healthy Caucasian versus Chinese subjects. *Journal of Clinical Endocrinology and Metabolism* 72*:* 1242-

1248.

Lynn, R. (1991). The evolution of racial differences in intelligence. *Mankind Quarterly* 32: 99-121.

Lynn, R. (2002). Racial and ethnic differences in psychopathic personality. *Personality and Individual Differences* 32: 273-316.

Lynn, R. (2006). *Race Differences in Intelligence: An Evolutionary Analysis*. Atlanta: Washington Summit.

Lynn, R. (in press). Race differences in crime, intelligence and psychopathic personality. *Journal of Criminal Law and Criminology*.

Manson, S.M., Bechtold, D.W., Novins, D.K. & Beals, J. (1997). Assessing psychopathology in American Indian and Alaska Native children and adolescents. *Applied Developmental Science* 1: 135-144.

Martel, M.M. (2014). Application of an integrated evolutionary psychological framework to psychopathology. *Psychological Inquiry* 25: 352-354.

Mathews, A. (1990). Why worry? The cognitive function of anxiety. *Behaviour Research and Therapy* 28: 455-468.

McHenry, J., Carrier, N., Hull, E. & Kabbaj, M. (2014). Sex differences in anxiety and depression: Role of testosterone. *Frontiers in Neuroendocrinology* 35: 42-57.

Meisenberg, G. & Woodley, M.A. (2013). Global behavioral variation: A test of differential-K. *Personality and Individual Differences* 55: 273-278.

Merikangas, K.R., He, J.P., Burstein, M., Swanson, S.A., Avenevoli, S., Cui, L., ... & Swendsen, J. (2010). Lifetime prevalence of mental disorders in US adolescents: Results from the National Comorbidity Survey Replication–Adolescent Supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry* 49: 980-989.

Miller, E.M. (1991). Climate and intelligence. *Mankind Quarterly* 32: 127-132.

Minelli, A., Bonvicini, C., Scassellati, C., Sartori, R. & Gennarelli, M. (2011). The influence of psychiatric screening in healthy populations selection: A new study and meta-analysis of functional 5-HTTLPR and rs25531 polymorphisms and anxiety-related personality traits. *BMC Psychiatry* 11: 50.

Munafò, M.R., Brown, S.M. & Hariri, A.R. (2008). Serotonin transporter (5-HTTLPR) genotype and amygdala activation: A meta-analysis. *Biological Psychiatry* 63: 852-857.

Narasimhan, S., Hodge, R., Doyle, G.A., Kraemer, D.J., Prabhakaran, R., Rickels, K., ... & Lohoff, F.W. (2011). Association analysis between the 5-HTTLPR polymorphism in the SLC6A4 gene and generalized anxiety disorder. *Psychiatric Genetics* 21: 267-268.

Neighbors, H.W. (1988). The help-seeking behavior of Black Americans: A summary of

findings from the National Survey of Black Americans. *Journal of the National Medical Association* 80: 1009-1012.

Norton, P.J. (2005). A psychometric analysis of Intolerance of Uncertainty Scale among four racial groups. *Journal of Anxiety Disorders* 19: 699-707.

Noskova, T., Pivac, N., Nedic, G., Kazantseva, A., Gaysina, D., Faskhutdinova, G., ... & Kovacic, Z. (2008). Ethnic differences in the serotonin transporter polymorphism (5-HTTLPR) in several European populations. *Progress in Neuro-Psychopharmacology and Biological Psychiatry* 32: 1735-1739.

Odgerel, Z., Talati, A., Hamilton, S.P., Levinson, D.F. & Weissman, M.M. (2013). Genotyping serotonin transporter polymorphisms 5-HTTLPR and rs25531 in European- and African-American subjects from the National Institute of Mental Health's Collaborative Center for Genomic Studies. *Translational Psychiatry* 3: e307.

Olfson, M., Shea, S., Feder, A., Fuentes, M., Nomura, Y., Gameroff, M. & Weissman, M.M. (2000). Prevalence of anxiety, depression, and substance use disorders in an urban general medicine practice. *Archives of Family Medicine* 9: 876-883.

Pardini, D.A., Raine, A., Erickson, K. & Loeber, R. (2014). Lower amygdala volume in men is associated with childhood aggression, early psychopathic traits, and future violence. *Biological Psychiatry* 75: 73-80.

Peng, K., Nisbett, R.E. & Wong, N.Y.C. (1997). Validity problems comparing values across cultures and possible solutions. *Psychological Methods* 2: 329-344.

Pertíñez Mena, J., Viladás Jené, L., Clusa Gironella, T., Menacho Pascual, I., Nadal Gurpegui, S. & Muns Solé, M. (2002). Estudio descriptivo de trastornos mentales en minorías étnicas residentes en un área urbana de Barcelona. *Atención Primaria* 29: 6-11.

Pianka, E.R. (1970). On r- and K-selection. *American Naturalist* 104: 592-596.

Pina, A.A., Little, M., Knight, G.P. & Silverman, W.K. (2009). Cross-ethnic measurement equivalence of the RCMAS in Latino and White youth with anxiety disorders. *Journal of Personality Assessment* 91: 58-61.

Qin, S., Young, C.B., Duan, X., Chen, T., Supekar, K. & Menon, V. (2014). Amygdala subregional structure and intrinsic functional connectivity predicts individual differences in anxiety during early childhood. *Biological Psychiatry* 75: 892-900.

Reinelt, E., Aldinger, M., Stopsack, M., Schwahn, C., John, U., Baumeister, S.E., ... & Barnow, S. (2014). High social support buffers the effects of 5-HTTLPR genotypes within social anxiety disorder. *European Archives of Psychiatry and Clinical Neuroscience* 264: 433-439.

Reynolds, C.R. & Paget, K.D. (1981). Factor analysis of the Revised Children's Manifest Anxiety Scale for Blacks, Whites, males, and females with a national normative sample. *Journal of Consulting and Clinical Psychology* 49: 352-359.

Ritsher, J.B., Struening, E.L., Hellman, F. & Guardino, M. (2002). Internal validity of an anxiety disorder screening instrument across five ethnic groups. *Psychiatry Research* 111: 199-213.

Robinson, C.M., Klenck, S.C. & Norton, P.J. (2009). Psychometric properties of the Generalized Anxiety Disorder Questionnaire for DSM-IV among four racial groups. *Cognitive Behaviour Therapy* 39: 251-261.

Rushton, J.P. (1985). Differential *K* theory: The sociobiology of individual and group differences. *Personality and Individual Differences* 6: 441-452.

Rushton, J.P. (1991). Do *r-K* strategies underlie human race differences? A reply to Weizmann et al. *Canadian Psychology* 32: 29-42.

Rushton, J.P. (2000). *Race, Evolution and Behavior: A Life History Perspective*, 3rd edition. Port Huron: Charles Darwin Research Institute.

Samuel, L.J., Roth, D.L., Schwartz, B.S., Thorpe, R.J. & Glass, T.A. (2016). Socioeconomic status, race/ethnicity, and diurnal cortisol trajectories in middle-aged and older adults. *Journal of Gerontology Series B: Psychological Sciences and Social Sciences*: gbw080.

Sandvik, A.M., Hansen, A.L., Hystad, S.W., Johnsen, B.H. & Bartone, P.T. (2015). Psychopathy, anxiety, and resiliency—Psychological hardiness as a mediator of the psychopathy–anxiety relationship in a prison setting. *Personality and Individual Differences* 72: 30-34.

Santner, S., Albertson, B., Zhang, G., Zhang, G., Santulli, M., Wang, C., … & Santen, R. (1998). Comparative rates of androgen production and metabolism in Caucasian and Chinese subjects. *Journal of Clinical Endocrinology and Metabolism* 83: 2104-2109.

Schmit, M.J., Ryan, A.M., Stierwalt, S.L. & Powell, A.B. (1995). Frame-of-reference effects on personality scale scores and criterion-related validity. *Journal of Applied Psychology* 80: 607-620.

Schuckit, M.A. & Hesselbrock, V. (1994). Alcohol dependence and anxiety disorders: What is the relationship? *American Journal of Psychiatry* 151: 1723-1734.

Schwartz, R.C., Feisthamel, K.P. & Smith, S.D. (2015). Differences in clinician anxiety and bipolar disorder diagnoses according to client race. *American Journal of Social Science Research* 1: 52-56.

Schwartz, S.H. & Melech, G. (2000). National differences in micro and macro worry: Social, economic, and cultural explanations. In: E. Diener & E.M. Suh (eds.), *Culture and Subjective Well-Being*, pp. 219-256. Cambridge, MA: MIT Press.

Scott, E.L., Eng, W. & Heimberg, R.G. (2002). Ethnic differences in worry in a nonclinical population. *Depression and Anxiety* 15: 79-82.

Segal, N. (2012). *Born Together – Reared Apart: The Landmark Minnesota Twin Study.* Cambridge, MA: Harvard University Press.

Sen, S., Burmeister, M. & Ghosh, D. (2004). Meta-analysis of the association between a serotonin transporter promoter polymorphism (5-HTTLPR) and anxiety-related personality traits. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics* 127: 85-89.

Shaw, C.M., Rait, G., Creed, F., Tomenson, B., Riste, L. & Cruickshank, J.K. (1999). General practice prevalence of anxiety and depressive illness and help seeking behaviour in African Caribbeans and white Europeans: Two phase general population survey Commentary: Counting heads may mask cultural and social factors. *BMJ* 318: 302-306.

Silva, A.M., Shen, W., Heo, M., Gallagher, D., Wang, Z., Sardinha, L.B. & Heymsfield, S.B. (2010). Ethnicity-related skeletal muscle differences across the lifespan. *American Journal of Human Biology* 22: 76-82.

Skriner, L.C. & Chu, B.C. (2014). Cross-ethnic measurement invariance of the SCARED and CES-D in a youth sample. *Psychological Assessment* 26: 332-337.

Snipp, C.M. (1997). The size and distribution of the American Indian population: Fertility, mortality, migration, and residence. *Population Research and Policy Review* 16*:* 61-93.

Soto, J.A., Dawson-Andoh, N.A. & BeLue, R. (2011). The relationship between perceived discrimination and generalized anxiety disorder among African Americans, Afro Caribbeans, and non-Hispanic Whites. *Journal of Anxiety Disorders* 25: 258-265.

Stearns, S.C. (1992). *The Evolution of Life Histories*. Oxford: Oxford University Press.

Stinson, F.S., Dawson, D.A., Chou, S.P., Smith, S., Goldstein, R.B., Ruan, W.J. & Grant, B.F. (2007). The epidemiology of DSM-IV specific phobia in the USA: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychological Medicine* 37: 1047-1059.

Stöber, J. & Joormann, J. (2001). Worry, procrastination, and perfectionism: Differentiating amount of worry, pathological worry, anxiety, and depression. *Cognitive Therapy and Research* 25: 49-60.

Tarricone, I., Stivanello, E., Poggi, F., Castorini, V., Marseglia, M.V., Fantini, M.P. & Berardi, D. (2012). Ethnic variation in the prevalence of depression and anxiety in primary care: A systematic review and meta-analysis. *Psychiatry Research* 195: 91-106.

Turner, R.J. & Lloyd, D.A. (2004). Stress burden and the lifetime incidence of psychiatric disorder in young adults: Racial and ethnic contrasts. *Archives of General Psychiatry* 61: 481-488.

van de Vijver, F.J.R. & Leung, K. (1997). *Methods and Data Analysis for Cross-Cultural Research.* Newbury Park, CA: Sage.

van Honk, J., Peper, J.S. & Schutter, D.J. (2005). Testosterone reduces unconscious fear but not consciously experienced anxiety: Implications for the disorders of fear and anxiety. *Biological Psychiatry* 58: 218-225.

Watkins, D.C., Assari, S. & Johnson-Lawrence, V. (2015). Race and ethnic group differences in comorbid major depressive disorder, generalized anxiety disorder, and chronic medical conditions. *Journal of Racial and Ethnic Health Disparities* 2: 385-394.

Winters, S.J., Brufsky, A., Weissfeld, J., Trump, D.L., Dyky, M.A. & Hadeed, V. (2001). Testosterone, sex hormone-binding globulin, and body composition in young adult African American and Caucasian men. *Metabolism—Clinical and Experimental* 50: 1242-1247.

Wittchen, H.U., Zhao, S., Kessler, R.C. & Eaton, W.W. (1994). DSM-III-R generalized anxiety disorder in the National Comorbidity Survey. *Archives of General Psychiatry* 51: 355-364.

Woodley, M.A. & Fernandes, H.B. (2014). Strategic and cognitive differentiation–integration effort in a study of 76 countries. *Personality and Individual Differences* 57: 3-7.

Woodley of Menie, M.A., Figueredo, A.J., de Baca, T.C., Fernandes, H.B.F., Madison, G., Wolf, P.S. & Black, C.J. (2015). Strategic differentiation and integration of genomic-level heritabilities facilitate individual differences in preparedness and plasticity of human life history. *Frontiers in Psychology 6: 422*.

Woodward, A.T., Taylor, R.J., Bullard, K.M., Aranda, M.P., Lincoln, K.D. & Chatters, L.M. (2012). Prevalence of lifetime DSM-IV affective disorders among older African Americans, Black Caribbeans, Latinos, Asians and non-Hispanic White people. *International Journal of Geriatric Psychiatry* 27: 816-827.

Woody, S.R., Miao, S. & Kellman-McFarlane, K. (2015). Cultural differences in social anxiety: A meta-analysis of Asian and European heritage samples. *Asian American Journal of Psychology* 6: 47-55.

Zhang, L., Liu, L., Li, X., Song, Y. & Liu, J. (2015). Serotonin transporter gene polymorphism (5-HTTLPR) influences trait anxiety by modulating the functional connectivity between the amygdala and insula in Han Chinese males. *Human Brain Mapping* 36: 2732-2742.

Zhang, A.Y., Snowden, L.R. & Sue, S. (1998). Differences between Asian and White Americans' help seeking and utilization patterns in the Los Angeles area. *Journal of Community Psychology* 26: 317-326.

Zhao, Q., Li, Y.L., Liu, Y. & Ding, Y. (2016). Association between anxiety-depression and 5-HTTLPR gene polymorphism in school-aged twins. *Chinese Journal of Contemporary Pediatrics* 18: 61-66.

Zitzmann, M. & Nieschlag, E. (2001). Testosterone levels in healthy men and the relation

to behavioural and physical characteristics: Facts and constructs. *European Journal of Endocrinology* 144: 183-197.

Zvolensky, M.J., McNeil, D.W., Porter, C.A. & Stewart, S.H. (2001). Assessment of anxiety sensitivity in young American Indians and Alaska Natives. *Behaviour Research and Therapy* 39: 477-493.