Evolutionary Psychological Science (2016) 2:177–188
DOI 10.1007/s40806-016-0050-z

RESEARCH ARTICLE

Quantifying Common Criticisms of Evolutionary Psychology

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Published online: 17 March 2016

Abstract In a sample of academics ($N = 111$), we quantified the dimensions underlying criticisms of evolutionary psychology in relation to criticisms of its parent fields (i.e., general psychology and evolutionary biology) and examined how various demographic and sociopolitical individual differences were related to these criticism dimensions. The five primary criticisms of evolutionary psychology reflected conceptual concerns, concerns over political implications, concerns over sampling, concerns about the validity of findings, and religious concerns. Evolutionary psychology suffered the worst selective skepticism relative to its parent fields. In a general sense, political liberalism was associated with more intense criticisms toward evolutionary psychology, but these associations were weak and differed across three measures of political personality (i.e., Right-Wing Authoritarianism, social dominance orientation, and religiousness). Homosexuals and qualitative researchers were especially critical of evolutionary psychology. We offer these limited findings as insights into the motivated resistance to the theory of evolution as a unifying meta-theory in psychology, and we hope to provide a future framework for reducing unmerited and selective resistance to an evolutionary-informed psychological science.

Keywords Evolutionary psychology · Individual differences · Meta-science

We thank Jesse Marczyk for feedback on designing the survey and Claire Lehman for comments on an earlier draft of this paper.

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According to the eminent ethologist Niko Tinbergen, all biological systems need to be understood on four different levels: mechanism, development, phylogeny, and adaptive function (Tinbergen 1963). Evolutionary psychology is a subfield within the broader field of general psychology that attempts to take all of Tinbergen's levels of analysis seriously, particularly the often neglected level of adaptive function as applied to humans (Brase 2014; Buss 1995). Doing so has proven fruitful in advancing and integrating our understanding of numerous aspects of social psychology (Schaller et al. 2006), memory research (Nairne et al. 2008), personality and individual differences (Buss 2009), and evolved navigation (Jackson and Cormack 2008). For instance, in the case of social psychology, evolutionary psychological approaches have provided major advances in our understanding of romantic and sexual jealousy (Buss et al. 1996, 1999; Sagarin et al. 2012); long-term and short-term mate preferences (Buss and Schmitt 1993; Li and Kenrick 2006); sexual attitudes and behaviors (Schmitt 2005); racism and prejudice (McDonald et al. 2011; Navarrete et al. 2012); kinship recognition, and incest avoidance (Lieberman et al. 2007; Park et al. 2008); and the evolved functions of religiosity (Gladden et al. 2009; Kirkpatrick 1999; Wilson 2010). Knowing the adaptive functions behind the design of, for instance, human sociality is akin to knowing that the human heart is designed to pump blood; it is central to an advanced and complete scientific understanding of human psychology. Or, as an evolutionary biologist would rightly note, nothing in *psychology* makes sense except in light of evolution (Dobzhansky 1973).

Despite the astonishingly generative nature of evolutionary psychology as a scientific research paradigm (Ketelaar and

Ellis 2000), there continues to be motivated resistance to the adoption of evolutionary psychology among many social scientists and psychologists (see Confer et al. 2010; Garvey 2008; Jonason and Dane 2014; Perry and Mace 2010; Varella et al. 2013). Extreme skepticism and no-holds-barred criticism are, of course, part and parcel of high-quality science. Even so, many criticisms of evolutionary psychology appear to be applied differentially, with critics decrying certain methods and findings unequally across scientific disciplines (Buller 2005; Fausto-Sterling 1997). Moreover, some criticisms of evolutionary psychology appear motivated by ideological and political concerns rather than for legitimate scientific reasons, with healthy empirical skepticism falling to the wayside as a result of extreme evolutionary science nihilism (Fine 2010). In this study, we attempted to pinpoint the primary criticisms of evolutionary psychology and strived to elucidate the motivational foundations behind some of these selective criticisms.

A number of interrelated motivations have been proposed to account for the lack of widespread acceptance of evolutionary theory within the social sciences (Barkow et al. 1995) and to the asymmetrical criticisms being leveled at evolutionary psychology compared to other perspectives. First, there may be systematic and (at times) deliberate misunderstandings of the field of evolutionary psychology, such as falsely asserting that it is inappropriately deterministic, reductionistic, essentialistic, normatively prescriptive, and more (Hagen 2005; Sundberg and Dini 1993; Varella et al. 2013). Second, many academics, especially social psychologists (Duarte et al. 2015; Inbar and Lammers 2012; Jussim et al. 2015) and sociologists (Horowitz et al. 2014), may be especially left-leaning in their politics (Haidt 2012), a trend associated with the ideologically motivated rejection of evolutionary theory (Perry and Mace 2010), evolutionary psychology (Cowan 2014), and the empirical reality of evolved sex differences in human psychology (Geher and Gambacorta 2010). Third, individual differences in one's personal mating strategy may provide motivations for defensively rejecting certain findings in evolutionary psychology (Geher and Gambacorta 2010). Fourth, there may be a tendency to focus on methodological limitations (e.g., over-reliance on sampling of college students) and conceptual concerns (e.g., undervaluing the role of culture)—concerns potentially relevant to all of social science—that are selectively overstated when attempting to reject the possible application of evolutionary theory to the study of humans (Confer et al. 2010; Kurzban 2013; Schmitt and Pilcher 2004). More specifically, some criticisms may stem from epistemological commitments (e.g., assumptions of complete social constructionism; Wilson 2009) and methodological predilections (e.g., assumptions of the value of qualitative over quantitative research) that are especially common in the social sciences (van den Berghe 1990) and whose prevalence across fields is conspicuously associated with the rejection of evolutionary psychology (Geher and Gambacorta 2010). Fifth, evolutionary psychology may be objected to on religious grounds just as the general theory of evolution is rejected in explicit and implicit ways (Jonason and Dane 2014).

In this study, we attempted to quantify some of the criticisms of evolutionary psychology and assess the factor structure *underlying* these criticisms. That is, instead of collecting and assessing all potential criticisms, we assume a range of criticisms and that they should cluster together to represent particular themes. We also evaluated the motivated degree of these criticisms toward evolutionary psychology in the contexts of how the criticisms are also applied to the primary parent fields of general psychology and evolutionary biology. In addition, we examined how individual differences in political biases (e.g., authoritarianism), sexuality (i.e., sexual orientation and participant's sex), and epistemological/methodological tendencies in one's own research (e.g., preferential emphasis on qualitative methods) might relate to the underlying dimensions of evolutionary psychology criticism.

The Current Study

Although previous investigations have examined how and why people criticize evolutionary psychology (Garvey 2008; Horowitz et al. 2014; Perry and Mace 2010; van den Berghe 1990), few have attempted to document and quantify the most common criticisms and none (that we know of) has attempt to understand the latent structure underlying these criticisms using factor analyses and nomological network assessment. In this study, we created a multi-item inventory of criticisms of evolutionary psychology to obtain a general sense of the dimensionality of motivated negativity toward evolutionary psychology. We expected these items to be reducible to a multidimensional set of common rejections that people have of the field. Therefore, we predicted that objections to evolutionary psychology should be composed of dimensions related to methodology, conceptual issues, validity concerns, political concerns, and religious concerns (*H1*).

Importantly, most previous studies that examined criticisms leveled against evolutionary psychology rarely (if ever) juxtaposed it to its parent fields of general psychology and evolutionary biology (Garvey 2008; Perry and Mace 2010; Sundberg and Dini 1993); evolutionary psychology is the application of evolutionary biological models to understand the functionality of human psychology. This is important as it allows one to disentangle whether particular methodological or conceptual criticisms are uniquely appropriate to evolutionary psychology, as opposed to being limitations inherent to psychology or evolutionary science more generally. In addition, this is important because we perceive evolutionary psychology in between psychology and biology in terms of its

"scientific rigor" (Simonton 2015) but may suffer a unique profile of criticism. As an example, the apparent criticism of an overreliance of college student samples might be leveled in evolutionary psychology just as it is leveled against general psychology research, yet evidence might suggest that the criticism is more appropriately aimed at general psychology compared to evolutionary psychology (Kurzban 2013). In addition and importantly here, we expect evolutionary psychology to be evaluated more negatively than its parent fields regardless of extant evidence. Both parent fields may have their own, somewhat overlapping, concerns among academics. If we assume that evolutionary psychology draws on each parent field, it may be more strongly criticized than either on their own because it suffers from two sources of criticism (*H2*).

Recent revelations of strong liberal biases in psychology, especially within the subdiscipline of social psychology (Jussim 2012; Jussim et al. 2015), may be partly responsible for objections to evolutionary psychology (Cowan 2014; Geher and Gambacorta 2010; Mercier and Sperber 2011). However, such political biases may be informed by (albeit moderately correlated) more specific personality traits like authoritarianism, social dominance orientation, and religiosity. A person who is religious may object to evolutionary psychology and biology in general as they reject the very idea of a godless evolutionary process (*H3a*). It may be a necessary part of believing in the Biblical account of creation to reject the Darwinian account, especially when people are more religious (Garvey 2008). Authoritarianism is a measure of ideological fascism and political dogmatism (Altemeyer 1996). People who object to such an approach to life may object to evolutionary psychology (but we remain agnostic as to the particular form of criticisms) because it presents an apparently rigid (i.e., immune to change by conditions) view of human nature through misconceptions of genetic determinism as evidenced in social Darwinism (*H3b*). And last, someone who is low on social dominance believes in the equality of the races and the sexes; that is, they have a multicultural mindset (Sidanius and Pratto 1999). Such a person may object to evolutionary psychology because it is often misconstrued as focused on Western samples of college students (i.e., sampling concerns) and undervalues the role of culture (i.e., validity concerns: *H3c*).

People's mating orientations may have some bearing on their acceptance of evolutionary psychology. Prior research suggests that those without children may be more opposed to evolutionary psychology than those with children (Geher and Gambacorta 2010). As both men and women have somewhat different mating strategies (Buss and Schmitt 1993) and individual differences in sexual orientation may influence the differential pursuit of mating strategies (Schmitt 2007), we examined these two variables as well. There are at least four reasons why those who are not heterosexual may object to evolutionary approaches to human behavior. First, there is not a strong consensus in the field on the evolutionary place of homosexuality. Second, homosexuals may be less likely to have children than heterosexuals are leading them to be more critical of evolutionary psychology. These people may have devalued reproduction and may perceive an "obsession" of evolutionary psychology with reproduction as inconsistent with their worldviews leading to their rejection of the field. Homosexuals who may either be less interested in reproducing or who may have a much harder time doing so (compared to heterosexuals) may engage in cognitive dissonance reduction by dismissing certain claims made by evolutionary psychology. Third, those engaging in heterosexual relationships may better conform to and, therefore, endorse conventional sex roles and mate preferences as part of their agenda toward reproducing (Cunningham and Russell 2004; Penke et al. 2007). Fourth, homosexuals and bisexuals, relative heterosexuals, as sexual minorities, may be personally concerned with the implications of evolutionary psychology for its apparent heternormativity (Jackson 2006). Therefore, we predict that homosexuals will have the most critical views of evolutionary psychology (*H4a*), and as evolutionary psychology is often mistakenly seen as sexist against women (Schmitt 2015), women may be more critical of the field (*H4b*).

Researchers in the social sciences (not to be confused with scientific psychology) have repeatedly been identified as reluctant to adopt evolutionary psychology (Garvey 2008; Geher and Gambacorta 2010; Perry and Mace 2010; Sundberg and Dini 1993). Fields like sociology may fail to understand and accept an evolutionary perspective on human behaviors, which may reflect ignorance, ideological bias (i.e., religious or epistemological), and both and may be characterized by anthropocentricism (i.e., the idea that humans are special), resistance to self-understanding, and limited capacity to accept the fundamental canons of scientific theory construction, including reductionism (i.e., the approach to science of breaking things down into constituent parts), individualism (i.e., focused on the person not the group), materialism (i.e., the focus on things that are naturally occurring), and parsimony (i.e., seeking the hypothesis with the fewest assumptions; van den Berghe 1990). Such fields of research may even be "less scientific" than psychology and biology (Simonton 2015). Unfortunately, many researchers have treated the social sciences as a monolithic field, failing to peer deeper into the potential reasons why people who are a part of that field might be opposed to evolutionary psychological models. We test two potential factors that may undergird social scientists' objections to evolutionary psychology. First, we examined research type in the forms of qualitative, quantitative, and mixed methods. Each field may come with particular assumptions about the world and how best to conduct science. Where evolutionary psychology opposes someone's preferred method, stronger criticisms should be present. In particular, most evolutionary psychology is quantitative in nature, suggesting that

qualitative and mixed method researchers may be more critical of evolutionary psychology relative to quantitative researchers (*H5a*). In addition, epistemological differences may underlie the objections leveled by social scientists. Social scientists may be more strongly social constructivists (i.e., interpretivists) and would endorse sentiments like the following: reality is entirely contingent on one's perception of it (van den Berghe 1990). In contrast, evolutionary psychologists are strongly (logical) positivists and would endorse the sentiment that reality is independent of one's perceptions of it. Therefore, we expect that those who fall into the former epistemological camp may be more critical of evolutionary psychology than those who are in the latter (*H5b*).

There are many roadblocks to the successful adoption of evolutionary theory to the field of psychology, not all of which can be solved by merely educating people about the science and dispelling myths and misconceptions (Jonason and Dane 2014; van den Berghe 1990). In this study, we attempted to understand what the primary criticisms are relative to its parent fields of general psychology and evolutionary biology and how the criticisms relate to individual differences in political personality, sexuality, and epistemological/methodological frameworks in a sample of (mostly North American) academics. We designed our study to provide insights into the apparent reluctance and hesitation around evolutionary psychology in the social and psychological sciences.

Method

Participants and Procedure

An online survey was distributed using academic listservs of social psychologists (i.e., socialpsychology.org) and sex researchers (i.e., the listserv of sex researchers called SEXNET) and via snowball sampling colleagues in other areas of psychology, asking people to take a study on "quantifying the criticisms of evolutionary psychology." Two hundred fifty-four academics started the survey. However, many participants did not complete assessments of all three fields.[1] In the end, 111 academics (M_{age} = 37.07, SD_{age} = 13.57), who were at a minimum enrolled in a Masters course, provided sufficient data to conduct trustworthy comparisons. On average, the sample was 47 % male (53 % female) and 80 % heterosexual (18 % homosexual, 2 % bisexual), 46 % held a Doctoral (i.e., Ph.D. or M.D.) degree (54 % held Bachelors or Masters degrees), 54 % were self-described as quantitative in their method (10 % qualitative; 36 % mixed methods), 43 % were self-described epistemological positivists (i.e., "I believe the way the world is independent of our concept"; 31 % interpretivists, "I believe the way the world is depends on the categories we have learned"; 29 % "other"), most (36 %) were self-described social/personality psychologists (71 % from other fields),[2] and most were from North America (69 %) with 2 % from South America, 16 % from Western Europe, 1 % from Eastern Europe, 1 % from Asia, and 10 % from Australia/New Zealand.

Measures

Quantifying Criticisms of Evolutionary Psychology

We assembled a list of criticisms that have been leveled against the field of evolutionary psychology (Table 1) based on a sampling of those provided in prior work (Cowan 2014; Varella et al. 2013). We asked participants how much they agreed (1 = *strongly disagree*; 5 = *strongly agree*) with each criticism in relation to general psychology, evolutionary psychology, and evolutionary biology.[3]

Individual Difference Measures

In order evaluate how academics' personality might relate to their criticisms, we measured three individual differences of relevance. These three measures are considered measures that are particularly important in research on prejudice research from a person-centered perspective (Hodson and Dhont 2015). They were chosen as central measures of political conservatism and ideological values (Sibley and Duckitt 2010).

Using a single-item measure, we assessed religiosity. Participants were asked how religious they were (1 = *not at all*; 5 = *extremely*). For descriptive purposes, we tested how religious the sample was using a one-sample *t* test. The sample was not particularly religious (M = 1.56; SD = 1.04), but this value was larger than expected by chance ($t(107) = 5.58$, $p < .01$).

A 12-item version of Altemeyer's (1996) Right-Wing Authoritarianism scale (Duckitt and Sibley 2010; Sibley and Duckitt 2010) was used. Participants indicated their level of agreement (1 = strongly disagree; 5 = strongly agree) with items such as "What our country really needs, instead of more

[1] We cleaned the data so only those who provided evaluations of the criticisms of all three fields were analysed to ensure we are comparing the same participants throughout. We suspect some participants felt they only had to respond to the questions relevant to their own discipline.

[2] We fear that this sample was imposed by the social networks of the researchers being social/personality psychologists.

[3] As a check, participants were provided with standardized definitions of each field (see Appendix) and were asked how much (1 = *limited*; 5 = *high*) expertise they had in each field. In three one-sample *t* tests, participants rated themselves as significantly knowledgeable in the fields (ts = 12.18 to 26.50, $ps < .01$) and, thus, were treated as sufficiently knowledgeable to comment on these respective fields. Unsurprisingly, our sample felt that they had more ($F(2, 108) = 58.43$, $p < .01$) knowledge in general psychology (M = 3.89, SD = 1.14) than evolutionary psychology (M = 3.11, SD = 1.20) or evolutionary biology (M = 2.49, SD = 1.27).

Table 1 Mean ratings of the criticisms of three academic disciplines, sorted by means in the evolutionary psychology column

	Mean (*SD*)		
	Evolutionary psychology	General psychology	Evolutionary biology
1. Does not make use of diverse (enough) samples.	3.48 (0.90)	3.87 (0.81)	2.41 (0.99)
2. Overly reliant on college student samples.	3.42 (0.87)	4.00 (0.78)	2.05 (0.95)
3. Confuses correlation with causation.	3.14 (1.31)	2.66 (1.14)	2.25 (0.97)
4. Theories are inconsistent with the Bible/Torah/Quran.	3.12 (1.39)	2.86 (1.24)	3.05 (1.35)
5. Has questionable implications for gender equality.	2.96 (1.35)	2.34 (1.12)	2.42 (1.16)
6. Assumptions are not testable.	2.91 (1.25)	2.23 (1.02)	2.14 (1.03)
7. Theories are not falsifiable.	2.89 (1.23)	2.21 (1.01)	2.20 (1.02)
8. Ignores the role of the environment or learning	2.86 (1.25)	2.34 (1.06)	2.59 (1.07)
9. Theories downplay the uniqueness of individuals.[a]	2.80 (1.09)	2.51 (1.12)	2.62 (1.06)
10. Has questionable political implications.	2.77 (1.26)	2.40 (1.16)	2.25 (1.16)
11. Culture is the most important aspect of human lives.	2.75 (2.00)	2.62 (0.96)	2.62 (0.92)
12. Has questionable implications for racial equality.	2.73 (1.29)	2.40 (1.13)	2.34 (1.13)
13. Has limited ecological validity.	2.71 (1.00)	2.61 (0.97)	2.13 (0.92)
14. Is limited to heterosexuals.	2.62 (1.13)	2.25 (1.14)	2.34 (1.05)
15. Its models/findings are not relevant to my research.[a]	2.18 (1.17)	1.68 (0.97)	2.27 (1.14)
16. Its implications are inconsistent with my religious beliefs.[a]	1.70 (0.96)	1.47 (0.81)	1.74 (0.99)

[a] Items excluded in the five factors; item analyses available upon request

'civil rights' is a good dose of law and order." By averaging the items, an authoritarianism index was created ($\alpha = 0.83$). For descriptive purposes, we tested how authoritarian the sample was using a one-sample *t* test. The sample was not particularly authoritarian ($M = 1.77$; $SD = 0.49$), but this value was larger than expected by chance ($t(110) = 16.24$, $p < .01$).

A ten-item version of social dominance orientation (Sidanius and Pratto 1999) was used (Duckitt and Sibley 2010; Sibley and Duckitt 2010). Participants reported their agreement (1 = strongly disagree; 5 = strongly agree) with statements like "No one group should dominate in society." Items were averaged to create an index of Social Dominance ($\alpha = 0.88$). For descriptive purposes, we tested how high on social dominance the sample was using a one-sample *t* test. The sample was low on social dominance ($M = 1.86$; $SD = 0.66$), but this value was larger than expected by chance ($t(110) = 13.76$, $p < .01$).

Results

According to H1, we expected the criticisms of evolutionary psychology to form a multidimensional structure. In order to evaluated H1, we factor analyzed (i.e., using principle component analysis with varimax rotation) the items reflecting criticisms toward each field and each revealed a multidimensional structure that was difficult to interpret. A strong global factor accounted for between 29.65 and 39.87 % of the variance, however. As such, we averaged the amount of criticism in general psychology (Cronbach's $\alpha = 0.81$), evolutionary psychology ($\alpha = 0.83$), and evolutionary biology ($\alpha = 0.88$) for comparison.[4] When we suppressed values beneath 0.50, the criticisms of evolutionary psychology revealed four clear factors.[5] Factor 1 reflected *conceptual criticisms* (% variance accounted for = 32.80, Eigen = 5.25) with items like "confuses correlation with causation" and "theories are not falsifiable." Factor 2 reflected concerns about *political implications* (% variance accounted for = 13.30, Eigen = 2.13) with items like "has questionable political implications" and "has questionable implications for race equality." Factor 3 reflected *concerns about validity* (% variance accounted for = 10.99, Eigen = 1.76) with items such as "has limited ecological validity" and "is limited to

[4] Criticisms toward psychology and biology were correlated ($r(109) = 0.32$, $p < .01$), criticisms toward psychology and evolutionary psychology were correlated ($r(109) = 0.64$, $p < .01$), and criticisms toward biology and evolutionary psychology were correlated ($r(109) = .64$, $p < .01$).

[5] This value was arrived at in an iterative process starting at 0.30 in hopes of finding a clean, multidimensional structure.

Table 2 Differences in criticisms across three fields of study

	Mean (*SD*)			*F*	η_p^2
	Evolutionary psychology	General psychology	Evolutionary biology		
Overall concerns	2.84 (0.53)	2.52 (0.53)	2.36 (0.63)	34.20**	0.26
Conceptual concerns	2.92 (0.98)	2.38 (0.83)	2.36 (0.80)	22.70**	0.18
Political implications	2.82 (1.20)	2.38 (1.02)	2.34 (1.07)	15.67**	0.13
Validity concerns	2.70 (0.76)	2.49 (0.69)	2.37 (0.69)	12.25**	0.10
Sampling concerns	3.46 (0.83)	3.93 (0.73)	2.22 (0.83)	175.30**	0.62
Religious concerns	3.11 (1.40)	2.86 (1.24)	3.05 (1.36)	4.76*	0.04

*$p < .05$; **$p < .01$

heterosexuals." Factor 4 reflected *concerns over samples* (% variance accounted for = 7.57, Eigen = 1.21) with items "overly reliant on student samples" and "does not make use of diverse enough samples." Factor 5 was a single item (i.e., "Theories are inconsistent with the Bible/Torah/Quran") that accounted 6.47 % more of the variance (Eigen = 1.04) reflecting *religious objections*. Items were averaged to create indexes of each (αs = 0.66–0.91), and in order to make comparisons, we imposed this structure on criticisms of general psychology (αs = 0.42–0.88)[6] and evolutionary biology (αs = 0.56–0.93). These new measures were used throughout the remainder of the study.

In evaluating H2, we hoped to understand what might behind the criticisms directed toward evolutionary psychology by comparing how evolutionary psychology compared to its parent fields (i.e., general psychology and evolutionary biology) in a series of repeated measures ANOVAs (see Table 2). Evolutionary psychology was more severely criticized than general psychology ($p < .01$) and evolutionary biology ($p < .01$) with no difference between the parent fields ($p < .07$). This trend was evident overall and in each of the particular concerns identified in the factor analysis with the exception of sampling concerns and religious concerns. In the case of sampling concerns, evolutionary biology was the least criticized for its sampling, followed by evolutionary psychology, and last general psychology. In the case of religious concerns, evolutionary psychology and evolutionary biology were criticized more harshly than general psychology.

In Table 3, we reported the correlations between criticisms and participant's age, religiosity, level of education, social dominance orientation, and authoritarianism.[7] [8] Religiousness was associated with stronger objections to evolutionary psychology through political concerns (*H3a*). Authoritarianism was associated with weaker criticism of evolutionary psychology on sampling grounds (*H3b*). People with a high social dominance orientation were less critical of evolutionary psychology on conceptual and sampling grounds (*H3c*). Criticisms over religious concerns were not correlated with any of these individual differences. In addition, age was positively correlated with criticisms about the samples used in evolutionary psychology.

Briefly, we report the correlations between the same criticisms in the fields of psychology and evolutionary biology. Authoritarianism ($r(109) = 0.30$, $p < .01$) and religiousness ($r(109) = -0.16$, $p < .10$) were correlated with criticisms of psychology revolving around religious implications of the findings and sampling issues, respectively. Age was correlated with individual differences in conceptual criticisms of biology ($r(109) = -0.17$, $p < .10$). Authoritarianism was correlated with criticisms about religious implications of biology ($r(109) = 0.25$, $p < .01$). And, individual differences in criticisms toward biology were all correlated with individual differences in participant's religiousness (rs 0.17 to 0.24, ps < .10).

In evaluating the remaining tests, we refer the reader to Table 4. In testing H4a, we examined whether participant's sexual orientation related to criticisms. There was an interaction with the overall repeated measures factor with sexual orientation ($F(2, 94) = 6.62$, $p < .01$, $\eta_p^2 = 0.07$) such that those who were homosexuals/bisexuals were more critical of evolutionary psychology than heterosexuals. Homosexuals/bisexuals were also more critical of evolutionary biology than heterosexuals. This interaction replicated in the subfactors of conceptual criticisms ($F(2, 94) = 6.33$, $p < .01$, $\eta_p^2 = 0.06$) and political implications ($F(2, 94) = 6.82$, $p < .01$, $\eta_p^2 = 0.06$) only. There was also a main effect of participant's sexual orientation on overall criticalness ($F(1, 94) = 5.03$, $p < .05$, $\eta_p^2 = 0.05$) such that homosexuals/bisexuals ($M = 2.79$, $SE = 0.06$) were more critical of all the fields than

[6] The intolerably low alpha here was for factor 3. The remainder was above 0.80.

[7] A full correlation matrix is available upon request. For reportorial economy, we report hypothesis testing only.

[8] These traits were correlated (rs = 0.26 to 0.65, ps < .01). Attempts at latent variable modeling were ineffective as the links between the latent factor and criticisms were too weakly correlated.

Table 3 Correlations between criticisms and individual differences

Overall	Age	Religiosity	RWA	SDO	Education
Evolutionary psychology	0.00	0.18*	−0.01	−0.14	0.07
General psychology	−0.04	−0.00	−0.01	−0.13	−0.03
Evolutionary biology	−0.14	0.27***	0.17*	0.07	−0.19**
Conceptual concerns					
Evolutionary psychology	0.08	0.10	−0.13	−0.19**	0.10
General psychology	−0.04	0.00	−0.02	−0.06	−0.05
Evolutionary biology	−0.17*	0.17*	0.02	0.06	−0.21**
Political concerns					
Evolutionary psychology	−0.03	0.21**	−0.02	−0.10	0.02
General psychology	−0.03	0.14	0.12	−0.04	0.03
Evolutionary biology	−0.06	0.24**	0.14	0.02	−0.04
Validity concerns					
Evolutionary psychology	−0.13	0.13	0.13	0.00	−0.01
General psychology	−0.09	−0.06	−0.07	−0.14	−0.09
Evolutionary biology	−0.07	0.19**	0.06	−0.05	−0.06
Sampling concerns					
Evolutionary psychology	0.18*	−0.09	−0.20**	−0.26***	0.13
General psychology	−0.16*	0.17*	0.11	0.01	−0.29***
Evolutionary biology	0.15*	−0.15*	−0.16*	−0.10	0.02
Religious concerns					
Evolutionary psychology	−0.09	−0.02	0.11	0.11	−0.04
General psychology	0.00	−0.09	−0.06	−0.03	−0.09
Evolutionary biology	−0.08	−0.12	0.06	0.11	−0.05

RWA Right-Wing Authoritarianism, *SDO* social dominance orientation

*$p < .10$; **$p < .05$; ***$p < .01$

heterosexuals ($M = 2.51$, $SE = 0.06$). This main effect was present in conceptual criticisms ($F(1, 94) = 5.66$, $p < .05$, $\eta_p^2 = 0.05$), validity concerns ($F(1, 94) = 17.20$, $p < .01$, $\eta_p^2 = 0.14$), and sampling concerns ($F(1, 94) = 11.50$ $p < .01$, $\eta_p^2 = 0.10$). In the case of religious concerns, there was no interaction, but there was a main effect ($F(1, 103) = 12.06$, $p < .01$, $\eta_p^2 = 0.11$), suggesting that heterosexual people ($M = 3.21$; $SE = 0.13$) were more critical than homosexual/bisexual people ($M = 2.16$; $SE = 0.27$) of all three fields on grounds of religion.

Participant's sex (*H4b*) did not interact with the overall within-subjects factor, but there was a main effect such that women were more critical of evolutionary psychology than men were ($F(1, 106) = 4.16$, $p < .05$, $\eta_p^2 = 0.04$). This pattern remained for the subfactors of validity concerns ($F(1, 106) = 7.95$, $p < .01$, $\eta_p^2 = 0.07$) and sampling concerns ($F(1, 106) = 6.88$, $p < .01$, $\eta_p^2 = 0.06$) but not for political or conceptual concerns. Although there was no interaction for religious concerns, there was a main effect ($F(1, 104) = 6.50$, $p < .05$, $\eta_p^2 = 0.06$), suggesting that men ($M = 3.30$; $SE = 0.17$) were more critical than women ($M = 2.70$; $SE = 0.17$) of all three fields on grounds of religion.

Fourth, we sought to test whether the manner by which being involved in "social science" research played a role in criticisms of evolutionary psychology. Whether participants were qualitative, quantitative, or mixed, method researchers (*H5a*) had a main effect on the overall repeated measures factor ($F(2, 95) = 4.04$, $p < .05$, $\eta_p^2 = 0.04$) such that mixed method researchers were more critical than quantitative researchers, an effect driven by the subfactor of political implications ($F(2, 105) = 6.52$, $p < .01$, $\eta_p^2 = 0.11$). There was a main effect of research method on conceptual concerns ($F(2, 102) = 4.26$, $p < .05$, $\eta_p^2 = 0.08$) such that qualitative researchers were more critical than quantitative researchers of evolutionary psychology. There was an interaction (see Fig. 1) of the repeated measures factor and research methodology ($F(4, 102) = 2.51$, $p < .05$, $\eta_p^2 = 0.05$), suggesting that qualitative researchers were particularly critical of evolutionary psychology and, to a lesser extent, general psychology and mixed method researchers are critical of evolutionary biology and, to a lesser extent, evolutionary psychology.[9] There were no main

[9] An important proviso here is that there were only 11 qualitative researchers in the sample.

Table 4 Comparisons of various individual differences across the generalized criticisms of each field

Sex of the participant	Mean (*SD*)		
	Evolutionary psychology	General psychology	Evolutionary biology
Men	2.74 (0.62)	2.43 (0.53)	2.21 (0.55)
Women	2.92 (0.62)	2.58 (0.52)	2.49 (0.67)
Sexual orientation			
Heterosexual	2.75 (0.61)	2.52 (0.53)	2.28 (0.60)
Homosexual/bisexual	3.22 (0.46)	2.49 (0.54)	2.70 (0.63)
Epistemology			
Positivism	2.80 (0.63)	2.61 (0.46)	2.14 (0.49)
Interpretivism	2.90 (0.61)	2.52 (0.59)	2.60 (0.67)
Other	2.82 (0.67)	2.40 (0.55)	2.39 (0.61)
Methodology			
Quantitative	3.01 (0.58)	2.83 (0.52)	2.42 (0.48)
Qualitative	2.71 (0.59)	2.42 (0.49	2.26 (0.63)
Mixed	3.00 (0.65)	2.61 (0.57)	2.49 (0.65)
Region			
North America	2.84 (0.67)	2.50 (0.53)	2.35 (0.63)
Elsewhere	2.82 (0.52)	2.56 (0.53)	2.38 (0.63)
Field of inquiry			
Social psychology	2.75 (0.71)	2.38 (0.57)	2.41 (0.64)
Other fields	2.89 (0.56)	2.60 (0.49)	2.33 (0.62)

Specific details for these comparisons among the subfactors are available upon request

effects or interactions related to type of research on individual differences in religious objections.

Epistemological perspective (*H5b*) interacted with field of study to predict criticisms of evolutionary explanations ($F(4, 102) = 6.66$, $p < .01$, $\eta_p^2 = 0.13$), suggesting that interpretivistic researchers were more critical of evolutionary biology than positivistic researchers (see Fig. 2). This effect replicated in conceptual concerns ($F(4, 102) = 6.66$, $p < .01$, $\eta_p^2 = 0.13$), validity concerns ($F(4, 102) = 3.95$, $p < .01$, $\eta_p^2 = 0.07$), and sampling concerns ($F(4, 102) = 2.89$, $p < .05$, $\eta_p^2 = 0.05$), but not in political implications. There were no main effects or interactions related to type of research on individual differences in religious objections.

And last, in an exploratory manner, we tested how field of study might be correlated with criticisms. The overall within-subjects factor interacted ($F(2, 102) = 3.63$, $p < .05$, $\eta_p^2 = 0.04$) with field of study (i.e., social psychology vs. some other field) such that those from other fields were more critical of general psychology than those in social psychology and those other fields were more critical of evolutionary psychology than those in social psychology. This effect was only present in the conceptual concerns subfactor ($F(2, 102) = 3.49$, $p < .05$, $\eta_p^2 = 0.03$). There were no main effects or interactions related to type of research on individual differences in religious objections. However, as many evolutionary psychologists may count themselves among social psychologists ranks, we urge caution in interpreting such effects.

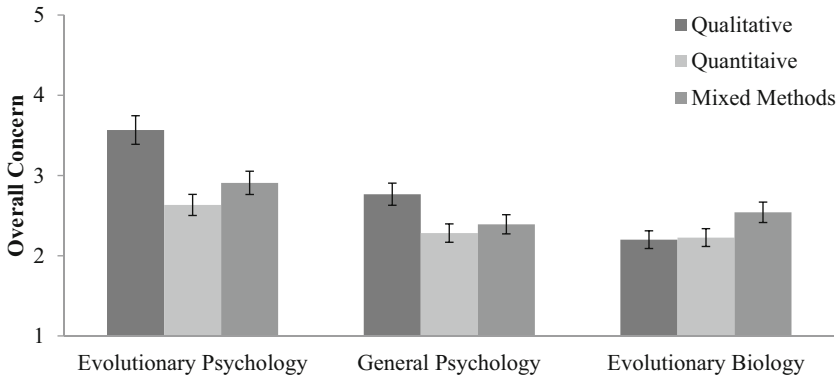

Fig. 1 Criticisms of academic fields by research methodology (5 % error bars)

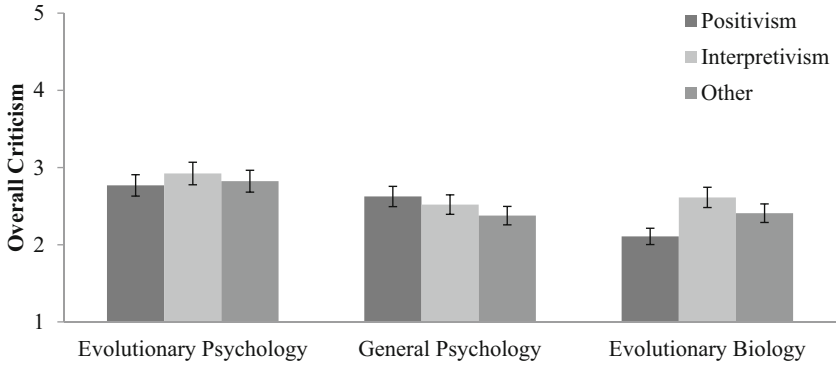

Fig. 2 Criticisms of academic fields by epistimological perspective (5 % error bars)

Discussion

Darwin (1859) ended his book *Origin of Species* with the much cited foreshadowing: "in the distant future I see open fields for far more important researches. Psychology will be based on a new foundation, that of the necessary acquirement of each mental power and capacity by gradation" (p. 488). While many have answered this call in psychology (Buss 2009; Lieberman et al. 2007; Park et al. 2008) and biology (Dobzhansky 1973; Tinbergen 1963; Wrangham and Paterson 1992), his call has met with resistance in much of the social sciences (Garvey 2008; Geher and Gambacorta 2010; Jonason and Dane 2014; Perry and Mace 2010; Varella et al. 2013), especially sociology (van den Berghe 1990). In this study, we attempted to provide some insights as to what those fundamental roadblocks may be and detail the role of individual differences in the criticisms of evolutionary psychology.

In this study, we sampled over 100 academics, with expectedly left-leaning biases in their personality (Jussim 2012; Jussim et al. 2015), in hopes of putting the pulse on their sentiments about evolutionary psychology. First, we conducted a factor analysis. This allowed some insight into the primary objections to evolutionary psychology. Although there were many specific factors in relation to the criticisms in each field, we were reasonably able to detect five basic dimensions to people's criticisms. These criticisms revolved around (1) conceptual concerns, (2) concerns regarding the political/social implications of the field's findings, (3) concerns about the validity of the work, (4) concerns about the samples used to in the research, and (5) concerns of the incongruity with religious teachings. These dimensions reflect concerns detailed in prior work (Geher and Gambacorta 2010; Jonason and Dane 2014; van den Berghe 1990). However, we were able to provide a unique, quantitative test of the criticisms of the field and demonstrate that criticisms of the field come in different "flavors" across varying centers of science and politics.

Second, we compared these criticisms across the two parent fields of evolutionary psychology. Evolutionary psychology appears to suffer from the worst reputation overall which may stem from inheritance from its parent fields of evolutionary biology and general psychology. For instance, it was general psychology that was most criticized for its reliance on student samples. However, evolutionary psychology may benefit from its interdisciplinary focus with anthropologists, biologists, and, of course, psychologists being part of the bigger picture of evolutionary psychology (Kurzban 2013; Simonton 2015). In addition, the larger field of psychology, with its skepticism about evolutionary psychology, may have required a greater burden of proof in evolutionary psychology, necessitating improved sampling techniques (Panksepp and Panksepp 2000). Indeed, articles published in 2012 in *Evolution and Human Behavior*, the flagship journal of the Human Behavior and Evolution Society, had less western, educated, industrialize, rich, and democratic (i.e., WEIRD); Henrich et al. 2010) samples than work published in the top journal in social and personality psychology, *Journal of Personality and Social Psychology* (Kurzban 2013).

Third, in order to understand the criticisms of evolutionary psychology, we examined a range of individual differences. First, we found that low scores on social dominance (*H3c*), religiousness (*H3a*), and authoritarianism (*H3b*) were associated with the strength of people's criticisms toward evolutionary psychology. Second, those who identified as homosexual or bisexual were particularly critical to both evolutionary biology and evolutionary psychology (*H4a*). And third, interpretivists (i.e., social constructivists) were more critical of biology than positivists were (*H5b*), whereas qualitative researchers were more critical of psychology and (more strongly) evolutionary psychology than quantitative researchers (*H5a*; see Fig. 2). Taken together, these findings may be consistent with (1) perceptions of heteronormativity in psychology research (Jackson, 2006), (2) the fact that social psychology is seen as a socially and politically progressive field (Jussim 2012; Jussim et al. 2015), and (3) certain methodological and epistemological differences may underpin some of the objections to the use of evolutionary theory in reference to humans. In a larger sense, this may mean that not only do the types of criticisms vary as noted in the factor analyses but also do the people who hold those criticisms.

Limitations and Conclusions

Despite being the first attempt (we know of) to quantify the criticisms of evolutionary psychology and to examine individual differences in those criticisms, this study was limited in a number of ways. First, in hopes of getting a large sample, we used short measures throughout to reduce the time needed to complete the study. However, this may have attenuated our findings. Second, despite our attempts to sample this unique population—a population one would hope is good at taking surveys—we had to drop over 50 % of our raw data for not providing complete responses across the three fields being evaluated. While there was little evidence that those who did not give complete data varied from those who did in any major or systematic way, the loss of so many participants will have greatly underpowered our tests (thus, the use of $p < .10$ in Table 3 as an adjustment). Despite that, we found at least modest support, albeit specific to certain traits and certain criticisms for our hypotheses. Indeed, our study was underpowered ($\beta = 0.48$) as indicated by (questionable) *post hoc* power analyses, but, as we found at least some support for our hypotheses, concerns about power should be dampened.[10] Third, this work is merely exploratory. Although we tried to reduce the number of tests done through the use of factor analyses, we feel that much more correction (e.g., lowering α more) might undermine our ability to detect much at all. Fourth, while we derived our list of criticisms from prior work, we have not included some important criticisms like genetic determinism, just-so-stories, and important misunderstandings about deep time. While we feel that these may fall into the grouping of "conceptual concerns," future work should expand the list of potential criticisms.

Perhaps, the most important limitation of our paper was that it could not advance the field of evolutionary psychology, per se, as a scientific enterprise. Instead, this paper might be better seen as a potential roadmap as to what evolutionary psychologists could do to improve its reception and use in research settings. Here, we outline some potential things that researchers could do based on what we found in this study. First, although most research in evolutionary psychology is quantitative, qualitative and mixed methods might be adopted to demonstrate to researchers who use those methods that predictions derived from evolutionary psychology are relevant to their work. Second, it might be worth demonstrating how predictions and findings from the field are (1) not sexist (Schmitt 2015), (2) not heteronormative, (3) not socially illiberal, and (4) can improve our understanding of important psychological findings beyond what is known from the work provided by those of a more blank slate epistemology or proximal mechanistic focus.

While evolutionary theory provides a much-needed organizing meta-theory for psychology (Buss 2009; Confer et al. 2010; Tinbergen 1963), the majority of psychology researchers remain somewhat dubious about its utility. The question of why people object to evolutionary models of human behavior is multifaceted question that many have tried to answer (Garvey 2008; Jonason and Dane 2014; Perry and Mace 2010; van den Berghe 1990). We hope to have provided evidence of five primary dimensions of criticisms, situated those criticisms in relation to the parent fields of psychology and evolutionary biology and detailed how political, social, methodological, and epistemological preferences relate to those criticisms and may be partially responsible for motivated resistance to the adoption of evolutionary psychology as an organizing paradigm for all of psychology. We encourage more expansive work on this topic to better understand the criticisms of evolutionary psychology.

Appendix

Standardized Descriptions of Each Field

Psychology

Psychology is an academic and applied discipline that involves the scientific study of mental functions and behaviors. Psychology has the immediate goal of understanding individuals and groups by both establishing general principles and researching specific cases, and by many accounts, it ultimately aims to benefit society. Psychologists attempt to understand the role of mental functions in individual and social behavior, while also exploring the physiological and neurobiological processes that underlie certain cognitive functions and behaviors.

Evolutionary Psychology

It is an approach in the social and natural sciences that examines psychological traits such as memory, perception, and language from a modern evolutionary perspective. It seeks to identify which human psychological traits are evolved adaptations—that is, the functional products of natural selection or sexual selection. Evolutionary psychologists argue that much of human behavior is the output of psychological adaptations that evolved to solve recurrent problems in human ancestral environments.

[10] Indeed, the sample size needed is we had an average effect size ($r = 0.18$) would be nearly 250 people. As noted in the "Method" section, we had such numbers that take *part* of the study but removed them in hopes of being more conservative in our tests.

Evolutionary Biology

It is a subfield of biology concerned with the study of the evolutionary processes that produced the diversity of life on Earth. Someone who studies evolutionary biology is known as an evolutionary biologist. Evolutionary biologists study the descent of species and the origin of new species.

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