Behavioral Sciences & the Law
Behav. Sci. Law **30**: 557–574 (2012)
Published online 21 September 2012 in Wiley Online Library
(wileyonlinelibrary.com) DOI: 10.1002/bsl.2038

Psychopathic Traits in Females and Males across the Globe

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The current study examined the prevalence and structure of psychopathic traits in females and males using a very large world sample (*N* = 33,016, females = 19,183). Psychopathic traits were assessed with the Self-Report Psychopathy (SRP) scale, and structural equation modeling (SEM) was used to test the four-factor model of psychopathy (interpersonal, affective, lifestyle, antisocial) both in the total sample and in the separate samples of females and males. Multi-sample confirmatory factor analysis was used to test for invariance of model parameters across sex as well as across females from different world regions. Inferential statistics were used to examine how the mean-level average of the four SRP facets varied as a function of culture and sex. Finally, the SRP data were linked to objective world health data (e.g., mortality, fertility, gross domestic product) from relevant world regions. The results indicated good support for the four-factor model, as well as invariance across sex and reasonably good evidence of invariance across females from different world regions. Variation in the elevation of SRP facet scores across major world regions suggested that cultural factors moderated the expression of the level of psychopathic propensities and that these traits were strongly correlated with the world health data. **Copyright © 2012 John Wiley & Sons, Ltd.**

Despite the media's portrayal and the general public's conception of the psychopath as seemingly inhuman and fundamentally unlike most people, the empirical evidence from large-scale studies suggests that psychopathic traits are continuously distributed (Guay, Ruscio, Knight, & Hare, 2007; Edens, Marcus, Lilienfeld, & Poythress, 2006), present in samples from the community (e.g., Neumann & Hare, 2008; Neumann & Pardini, in press) and the corporate world (e.g., Babiak, Neumann, Hare, 2010; Mathieu, Hare, Jones, Babiak, & Neumann, in press), and linked to common genetic factors (e.g., Larsson et al., 2007; Taylor, Loney, Bobadilla, Iacono, & McGue, 2003; Viding, Frick, & Plomin, 2007). Community studies have found that psychopathic traits are linked to elevated levels of violence and alcohol use (Neumann & Hare, 2008), criminal offenses and other externalizing psychopathology (Neumann & Pardini, in press), as well as to problematic corporate behavior (Babiak et al., 2010).

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There is much more research on males than on females (particularly among offenders), with the prevalence of psychopathic traits being higher in the former than in the latter (Cale & Lilienfeld, 2002; Hare, 2003; Nicholls, Ogloff, Brink, & Spidel, 2005). The available research indicates that the psychopathy construct is viable with females but that there may be sex differences, as well as similarities, in the manifestation and correlates of psychopathic traits (Hare, 2003; Kosson et al., in press; Neumann & Hare, 2008; Neumann, Hare, & Newman, 2007; Nicholls et al., 2005; Seara-Cardoso et al., 2012; Vitale, Brinkley, Hiatt, & Newman, 2007; Vitale, MacCoon, & Newman, 2011).

Research based on state-of-the-art assessments (e.g., Hare, 2003; Forth, Kosson, & Hare, 2003) suggests that there is reasonably good evidence for measurement invariance across sex for both adult offenders (Bolt, Hare, Vitale, & Newman, 2004) and adolescent offenders (Kosson et al., in press). However, the structure and invariance of psychopathic traits in large, culturally diverse, general population samples have yet to be examined. Systematic research in contexts that are not confounded by such factors as substance abuse and institutionalization could help us to determine the cross-cultural generalizability of the psychopathy construct. Such research would also help us to understand better the ways in which culture influences the manifestation of psychopathic traits, and to determine how reliably these traits can be assessed in different cultures (e.g., Mokros et al., 2011; Neumann, Kosson, Forth, & Hare, 2006). Unfortunately, most cross-cultural studies are based on comparisons of only a few cultures, and in some cases have analytic and conceptual limitations (e.g., Cooke, Michie, Hart, & Clark, 2005; see discussions by Bolt, Hare, & Neumann, 2007; Neumann, Vitacco, Hare, & Wupperman, 2005; Neumann et al, 2007). The goal of the current study is to examine a wide array of cultures of large sample size using sound latent variable methods.

A latent variable model of the psychopathy construct that has garnered considerable support is the four-factor model, based on the Psychopathy Checklist-Revised (PCL-R; Hare, 2003) and its derivatives (collectively referred to as the PCL scales; Hare & Neumann, 2008; Neumann, 2007). In this model four correlated dimensions (interpersonal, affective, lifestyle, and antisocial) provide a viable representation of the larger psychopathy construct. Specifically, modeling studies have provided evidence for this four-factor latent structure of psychopathic traits across adult offender (Neumann, Hare, & Newman, 2007; Neumann, Hare, & Johansson, 2012), psychiatric (Hill, Neumann, & Rogers, 2005; Vitacco, Neumann, & Jackson, 2005), community (Neumann & Hare, 2008; Neumann & Pardini, in press), and professional/organizational samples (Babiak et al., 2010; Mathieu et al., 2012). Importantly, factor analytic evidence for these four components is not limited to studies with the PCL scales (e.g., Livesley, Jang and Vernon, 1998, Ullrich & Marneros, 2007). Recently, aspects of these four domains have been documented in a very large sample of patients assessed for DSM-IV personality disorders (Huprich, Schmitt, Richard, Chelminski, & Zimmerman, 2010). Similarly, studies with the Self-Report Psychopathy (SRP) scale (Paulhus, Neumann, & Hare, in press) provide strong evidence for a four-factor structure (Carré, Hyde, Neumann, Viding, & Hariri, in press; Mahmut, Menictas, Stevenson, & Homewood, 2011; Neal & Selbom 2012; Neumann & Pardini, in press; Seara-Cardoso et al., 2012; Williams, Paulhus, & Hare, 2007).

With respect to factor structure, some commentators (e.g., Cooke & Michie, 2001) have asserted that antisociality is not part of the psychopathy construct, although their

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DOI: 10.1002/bsl

published comments on the issue are contradictory (Cooke et al., 2007, p. s48; Skeem & Cooke, 2010, p. 435; also see Hare & Neumann, 2010). Moreover, Hare and Neumann (2008) have argued that the theoretical and statistical bases for this assertion are untenable. Both clinical tradition and empirical evidence clearly show that psychopathic propensities are fundamentally linked with antisociality (Hare & Neumann, 2010). Indeed, it is difficult to understand how the defining traits of the construct could be measured without reference to antisocial behaviors. Clinical descriptions and findings from genetic, longitudinal, and latent variable studies (see Hare & Neumann, 2008, 2010) all signify that antisociality is inherently tied to the psychopathy construct. Rather than being a simple consequence of the interpersonal, affective, and lifestyle features of psychopathy, antisociality is reciprocally related to these features (Forsman, Lichtenstein, Andershed, & Larsson, 2010; Hare & Neumann, 2012). As Lynam and Miller (2012) put it, "Antisocial behavior [ASB] plays a clear and prominent role in psychopathy. In fact, if there is an essential behavioral feature in common across the conceptualizations [of psychopathy], it is the presence of ASB. Any description of psychopathy is incomplete without ASB" (p. 342). The question is not whether or not overt antisociality is part of the psychopathy construct, but the ways in which it manifests itself and relates to other psychopathic features among females and males (Nicholls et al., 2005) and across cultures.[1]

While movements toward general population studies hold promise, they also involve considerable challenges. In particular, because structured assessment instruments, such as the PCL-R, require training and experience and are time-consuming, it is becoming common to use self-report instruments for large-sample studies of the general population. Unfortunately, the proliferation of such instruments runs the risk of returning the field to the way it was some 30 years ago, when putative measures of psychopathy did not measure the same thing (Hare, 1985). A current example of this possibility involves the extensive use of the Psychopathic Personality Inventory (PPI) and its revision, the PPI-R (Lilienfeld & Widows, 2005), based on the supposition that it is part of a nomological network anchored by the PCL-R. However, there are serious issues with respect to the psychometric properties of the PPI and PPI-R (Neumann et al., 2008; Neumann, Uzieblo, Crombez, & Hare, in press), as well as to their ability to measure the psychopathy construct. Concerning the latter, Lynam & Miller (2012, p. 351) argued that "fearless dominance," considered to be a core part of the PPI and PPI-R, is neither sufficient nor necessary for psychopathy.

The SRP, on the other hand, has a clear latent structure, and is strongly positively correlated with both the PCL-R and the Youth Psychopathic Traits Inventory (YPI; Andershed, Kerr, Stattin, & Levander, 2002; Neumann & Pardini, in press; Paulhus et al., in press), as well as with a psychopathy self-report based on the five-factor model of personality (Lynam et al., 2011). Although relatively low-level, the traits measured by the SRP are associated in the expected theoretical directions with relevant external correlates, such as criminal offenses and externalizing psychopathology

[1] It is important to note that the four correlated factors can also be accounted for in terms of a super-ordinate factor (Neumann et al., 2007). However, the super-ordinate nature of the PCL-R should not be equated with a simplistic notion of a unidimensional psychopathy construct, as some authors have recently done (see Neumann, Hare, & Johansson, 2012, for detailed discussion); such a mistake involves both a confusion between the measure and the construct it is designed to assess, and fails to recognize that the latent first-order PCL factors have differential associations with a range of external correlates (Hare & Neumann, 2008).

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DOI: 10.1002/bsl

(Neumann & Pardini, in press), moral reasoning (Seara-Cardoso et al., 2012), and amygdala activation to fearful faces (Carré et al., in press).

The current study involved further exploration of psychopathic traits in adult females, based on the use of a very large convenience sample (> 30,000) that represented cultures across 11 major world regions. The primary aims of the study were to examine the prevalence and factor structure of SRP-based psychopathy traits in females and males, and to assess the invariance of the four-factor model in females across different world regions. The sub-samples within the overall mega-sample afforded the investigators the opportunity to examine how culture might moderate the expression of the mean level of SRP facet scores. The authors used an early version of the SRP (i.e., an experimental version, SRP-E) and not the most recent version (Paulhus et al., in press). However, the authors believe this is not a significant issue, given that the two versions are significantly correlated (Paulhus et al., in press). Moreover, use of this earlier version allowed a test of the four-factor model with somewhat differing item sets. To the extent that generalizability was obtained across items sets, strong evidence could be provided for the four-factor model, as well as a mathematical representation of the psychopathy construct.

METHOD

Participants

The data for this study are from the International Sexuality Description Project-2 (ISDP-2), a collaborative research effort involving the administration of anonymous surveys to 34,118 participants (14,301 men and 19,817 women; age range (median) 18–91 (21) years) from 58 nations across 11 major regions (see Table 1) of the world (Schmitt, 2010; Schmitt et al., 2003, 2004). The number of cases with available SRP data was $N = 33{,}016$ (females = 19,183; males = 13,833). For most nations, participants were convenience samples primarily comprising college students or individuals from the community. Additional convenience-based community samples were obtained in Austria, China, Germany, Greece, and Mexico. An internet-based sample was also obtained in Germany. Most samples were recruited as volunteers, some received course credit for participation, and others received a small monetary reward for their participation. All samples were administered an anonymous self-report survey, and most surveys were returned via sealed envelope and/or a drop box. Further details on nation-specific sampling techniques, sample sizes, and assessment formats are available from the second author (D.S.S.).

Materials and Procedure

Participants in the ISDP-2 completed all questionnaires anonymously, using either an online survey or a paper and pencil survey. Researchers from nations where English was not the primary language used a translation/back-translation process to administer the ISDP-2 survey in their native language. Participants were presented with a native language version of the SRP scale called the SRP-III-a, though technically, Paulhus et al. (in press) refer to this version of the SRP as an experimental scale, the SRP-E.

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DOI: 10.1002/bsl

Table 1. Female SRP-E interpersonal, affective, lifestyle, and antisocial facet means (SDs) by world region

World region	INT	diffs*	AFF	diffs*	LIF	diffs*	ANT	diffs*__
1. North America	1.95	11, 10, 8, 7, 5, 4 > **1** > 3, 6	2.23	11, 10, 8, 5, 4, 2 > **1**	2.39	**1** > 2, 3, 6, 8, 10	1.22	10, 8, 4 > **1** > 2, 3, 5, 6
(*f* = 5,500)	(0.63)		(0.62)		(0.73)		(0.47)	
2. Central/South America	1.90	11, 10, 8, 7, 5, 4 > **2** > 6	2.34	4 > **2** > 1, 3, 6	2.29	9, 1 > **2** > 6	1.15	10,8,4,1 > **2**
(*f* = 1,234)	(0.65)		(0.61)		(0.72)		(0.40)	
3. Northern Europe	1.83	11, 10, 9, 8, 7, 5, 4, 1 > **3**	2.17	11, 10, 8, 5, 4, 2 > **3**	2.17	11, 9, 7, 5, 4, 1 > **3**	1.13	11, 10, 9, 8, 4, 1 > **3**
(*f* = 1,100)	(0.59)		(0.60)		(0.60)		(0.36)	
4. Western Europe	2.08	11, 10, 8, 7 > **4** > 1, 2, 3, 6	2.56	**4** > 1, 2, 3, 5, 6, 7, 8, 9, 10, 11	2.39	**4** > 3, 6, 8, 10	1.35	**4** > 1, 2, 3, 5, 6, 7, 9, 11
(*f* = 2,965)	(0.67)		(0.67)		(0.77)		(0.56)	
5. Eastern Europe	2.08	11, 10, 8, 7 > **5** > 1, 2, 3, 6	2.39	4 > **5** > 1, 3, 6, 7	2.37	**5** > 3, 6, 8	1.14	11, 10, 8, 4, 1 > **5**
(*f* = 2,378)	(0.67)		(0.63)		(0.70)		(0.38)	
6. Southern Europe	1.79	11, 10, 9, 8, 7, 5, 4, 2, 1 > **6**	2.23	11, 10, 8, 5, 4, 2 > **6**	2.17	11, 9, 7, 5, 4, 2, 1 > **6**	1.12	11, 10, 9, 8, 4, 1 > **6**
(*f* = 1,839)	(0.56)		(0.57)		(0.69)		(0.33)	
7. Middle East	2.23	10, 8 > **7** > 1, 2, 3, 4, 5, 6, 9	2.27	4, 5 > **7**	2.32	**7** > 3, 6	1.20	10, 8, 4 > **7**
(*f* = 715)	(0.68)		(0.62)		(0.75)		(0.44)	
8. Africa	2.57	**8** > 1, 2, 3, 4, 5, 6, 7, 9, 10, 11	2.40	4 > **8** > 1, 3, 6	2.23	9, 5, 4, 1 > **8**	1.36	**8** > 1, 2, 3, 5, 6, 7, 9, 11
(*f* = 935)	(0.66)		(0.65)		(0.68)		(0.66)	
9. Oceania	1.99	7, 8, 10, 11 > **9** > 3, 6	2.29	4 > **9**	2.48	**9** > 2, 3, 6, 8, 10	1.23	10, 8, 4 > **9** > 3, 6
(*f* = 585)	(0.67)		(0.59)		(0.71)		(0.47)	
10. South/South-east Asia	2.36	8 > **10** > 1, 2, 3, 4, 5, 6, 7, 9, 11	2.36	4 > **10** > 1, 3, 6	2.27	1, 4, 9 > **10**	1.40	**10** > 1, 2, 3, 5, 6, 7, 9, 11
(*f* = 1,258)	(0.65)		(0.62)		(0.70)		(0.56)	
11. East Asia	2.21	10, 8 > **11** > 1, 2, 3, 4, 5, 6, 9	2.35	4 > **11** > 1, 3, 6	2.33	**11** > 3, 6	1.24	10, 8, 4 > **11** > 3, 5, 6
(*f* = 674)	(0.71)		(0.52)		(0.56)		(0.42)	

*Significant group differences at $p < 0.0001$; f = number of females.
AFF, affective; ANT, antisocial; INT, interpersonal; LIF, lifestyle; SRP-E, experimental Self-Report Psychopathy scale.

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DOI: 10.1002/bsl

Nation-specific translation and administration details are available from the second author (D.S.S.).

SRP Scale

The SRP was initially developed in the early 1980s, but has since gone through a series of revisions. The origin of the SRP lies in early attempts to supplement clinical assessments of psychopathy with self-reports. Hare & Cox (1978) described a variety of such scales, and referred to a set of items that essentially was the precursor to that contained in SRP. In the early 1980s, a self-report version of the PCL was produced, named the Self-Report Psychopathy scale. Hare (1985) reported that this 29-item SRP scale was moderately correlated with other self-report scales conceptually related to psychopathy. Several later versions of the original SRP, including the SRP-II, the SRP-III, and the 31-item SRP-E, were circulated to interested investigators working in a variety of clinical, forensic, and community settings. These scales generated numerous empirical studies, with results that generally were consistent with clinical conceptions of psychopathy (Paulhus et al., in press).

The most recent version of the SRP contains 64 items (Neal & Selbom, 2012; Paulhus et al., in press), although Neumann and colleagues have developed a short-form of this version (Carré et al., in press; Neumann & Pardini, ; Seara-Cardoso et al., 2012). The earlier SRP-E is highly correlated with the most recent version (Paulhus et al., in press). For all versions of the SRP, participants are asked to rate the extent to which they agree with various statements about themselves using a five-point Likert scale (1 = "disagree strongly" to 5 = "agree strongly").

Participants in the current study completed a 19-item version of the SRP-E (see Figure 2). The rationale for using this reduced set of items was twofold: (1) Exploratory structural equation modeling (ESEM) analyses (see Muthen & Muthen, 2010) indicated that the SRP-E could be reduced to a 19-item scale, which had an excellent model fit and also maintained the four-factor model structure of the SRP; (2) The 19-item SRP-E model substantially reduced the number of model parameters that needed to be estimated, and thus allowed us to conduct a large series of multi-sample model analyses that were adequately powered across the diverse world regional samples. For instance, a 31-item, four-factor model (31 factor loadings, 31 error variances, six factor correlations = 68 parameters) would require approximately 680 cases, assuming the minimum suggested subjects-to-parameter ratio of 10:1. The reduced 19-item model, by contrast, requires far fewer subjects. In this way, given the reasonably large samples from each world region, an attempt was made to maximize the reliability of the parameter estimates for the series of multi-sample analyses conducted in this study. The 31-item scale correlated $r = 0.93$ ($p < 0.001$) with the 19-item SRP-E used in the current study.

External Correlates

To provide evidence of the external validity of the SRP-E scores across the 11 major world regions, we obtained data of several objective measures of life history-related variables (Figueredo & Jacobs, 2010; Jonason, Koenig & Tost, 2010) at the level of world region. Using archival data from the United Nation's Human Development Report for 2005 (the year when the majority of the SRP-E data were collected), we

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obtained objective indicators of maternal mortality rate, infant mortality rate, fertility rate, adolescent fertility rate, body mass index (among women), gross domestic product per capita (GDPpc), and a gender empowerment measure. Pathogen levels at the world region level were obtained from Fincher, Thornhill, Murray, and Schaller (2008), and cultural masculinity at the world region level from Hofstede (2001). An index of progressive sex-role ideology was also obtained using a scale administered directly to participants in the ISDP-2 (Schmitt, 2010). Higher scores indicate more progressive (or less stereotypical/traditional) attitudes toward women's rights and roles in society. Nation-specific values on all external measures are available from the second author (D.S.S).

Data Analytic Plan

Consistent with model-based research on the latent structure of personality disorder symptoms (Huprich et al., 2010), the majority of analyses for the current study involved structural equation modeling (SEM), given its methodological rigor (e.g., modeling error separate from common variance, unambiguous specification of item-to-factor relations), and capacity to provide evidence of construct validity (Strauss & Smith, 2009). In particular, a multi-sample SEM approach allowed us to conduct tests for invariance of item discrimination (factor loadings) and extremity (threshold) parameters across males and females, as well as for females from different world regions.

All model analyses were conducted with Mplus (Muthen & Muthen, 2010), using the robust weighted least-squares estimation procedure, given the ordinal nature of the SRP-E items. As recommended by Hu and Bentler (1999), a two-index strategy was used to assess model fit: the (incremental) comparative fit index (CFI) and the (absolute fit index) root mean square error of approximation (RMSEA). Generally, $CFI \geq 0.90$ and $RMSEA \leq 0.08$ are considered acceptable indicators of model fit (Hoyle, 1995).

For the SEM analyses, the fit of the four-factor SRP-E model was first tested using the total sample, and then for the total samples of females and males separately (see Table 2 and Figures 2 and 3). Next, we tested a series of multi-sample confirmatory factor analysis (MS-CFA) analyses for males and females, and for various samples of females across broad world regions. To maintain adequate power for comparisons of females across world regions, 10 regions were organized into five broader world regions: North America, Central/South America, Europe, Africa/Middle East, and Asia. Given the uncertainly on how to 'fold' Oceania into a specific world region, as well as the relatively small number of cases in this region, Oceana was not included in the MS-CFAs. The algorithm for conducting the MS-CFAs was as follows. We tested whether or not the parameters (item loadings, then loadings and thresholds) for a 19-item four-factor SRP-E model could be constrained to be equal across two respective groups (e.g., males vs. females; North American females vs. European females), and whether or not each constrained model differed significantly from an unconstrained model (i.e., the configural model in which both loadings and thresholds were free between groups in the MS-CFA). If the constrained MS-CFA models were to show little difference in fit from the unconstrained model, then one could be reasonably confident of relatively good to strong measurement invariance across groups (Mokros et al., 2011).

Because the SRP-E has a 1–5 Likert scale, there are four thresholds ($k - 1$) for each item that is estimated and constrained in the MS-CFA. In general, threshold

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DOI: 10.1002/bsl

Table 2. Fit results for the four-factor experimental Self-Report Psychopathy scale (SRP-E) model: individual sample and multi-sample analyses

CFA model	CFI	RMSEA	χ^2difference
Overall model fit by total, female, and males samples			
Total sample	0.94	0.04	–
Female sample	0.93	0.04	–
Male sample	0.92	0.05	–
Multi-sample analysis: test for invariance across males and females			
Configural	0.91	0.04	–
Fixed loadings	0.93	0.04	$\chi^2(15) = 107$, $p < 0.05$
Fixed loading + thresholds	0.91	0.04	$\chi^2(68) = 1998$, $p < 0.05$
Multi-sample analyses: tests for invariance across females by broad world regions			
(North America as comparison sample, N = 5,500)			
North America vs. Central/South America (N = 1,234)			
Configural	0.93	0.04	–
Fixed loadings	0.94	0.05	$\chi^2(15) = 114$, $p < 0.0001$
Fixed loadings + thresholds	0.91	0.05	$\chi^2(68) = 1107$, $p < 0.0001$
North America vs. Europe (8,282)			
Configural	0.93	0.04	–
Fixed loadings	0.93	0.05	$\chi^2(15) = 171$, $p < 0.0001$
Fixed loadings + thresholds	0.90	0.04	$\chi^2(68) = 1942$, $p < 0.0001$
North America vs. Africa/Middle East (1,650)			
Configural	0.93	0.04	–
Fixed loadings	0.94	0.04	$\chi^2(15) = 186$, $p < 0.0001$
Fixed loadings + thresholds	0.90	0.05	$\chi^2(68) = 1809$, $p < 0.0001$
North America vs. Asia (N = 1,932)			
Configural	0.93	0.04	–
Fixed loadings	0.93	0.04	$\chi^2(15) = 155$, $p < 0.0001$
Fixed loadings + thresholds	0.87	0.05	$\chi^2(68) = 2065$, $p < 0.0001$
Multi-sample analyses: tests for invariance across females by broad world regions			
(Europe as comparison sample, N = 8,282)			
Europe vs. Central/South America (N = 1,234)			
Configural	0.92	0.05	–
Fixed loadings	0.93	0.04	$\chi^2(15) = 70$, $p < 0.00$
Fixed loadings + thresholds	0.92	0.04	$\chi^2(68) = 525$, $p < 0.05$
Europe vs. Africa/Middle East (1,650)			
Configural	0.93	0.05	–
Fixed loadings	0.93	0.04	$\chi^2(15) = 158$, $p < 0.0001$
Fixed loadings + thresholds	0.90	0.04	$\chi^2(68) = 1261$, $p < 0.0001$
Europe vs. Asia (N = 1,932)			
Configural	0.92	0.04	–
Fixed loadings	0.92	0.05	$\chi^2(15) = 185$, $p < 0.0001$
Fixed loadings + thresholds	0.87	0.06	$\chi^2(68) = 1757$, $p < 0.0001$

CFA, confirmatory factor analysis; CFI, comparative fit index; RMSEA, root mean square error of approximation.

(or extremity) parameters provide information on the level of the underlying trait at which an item discriminates. Higher thresholds indicate that a higher level of a given latent trait must be present before a given item response is likely to be endorsed (Reise, 1999). In this case, the *b1* threshold provides an estimate of the likelihood of a response choice of 2 (disagree) over a 1 (disagree strongly), the *b2* threshold an estimate of the likelihood of a response choice of 3 (neutral) over a 2 (disagree), the *b3* threshold an estimate of the likelihood of a response choice of 4 (agree) over a 3 (neutral), and the *b4* threshold an estimate of the likelihood of a response choice of 5 (agree strongly) over a 4 (agree). See Reise (1999) for an excellent discussion of item response theory (IRT) and its parallels to CFA.

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To assess statistical differences in model fit, we used the guidelines provided by Cheung and Rensvold (2002). If the incremental change in the CFI (ΔCFI) between a superordinate model and a nested, more constrained model is ≤ 0.01, then it is reasonable to hold that the two models within the comparison do not differ statistically in terms of fit. Based on an extensive simulation study, Cheung and Rensvold (2002) recommended that ΔCFI is more appropriate than the more traditional ways of assessing differences in the chi-squared fit statistic between nested models. Nevertheless, using the procedures described in Mplus for modeling ordinal data, the traditional chi-square difference statistic [i.e., subtracting the respective chi-square values and degrees of freedom (DFS) via the non-nested and nested models] is also provided in the results; it should be noted that very large samples can result in significant chi-squared difference tests, despite trivial differences in model parameters (Muthen & Muthen, 2010). The recommendations for MS-CFA model specification outlined in the Mplus Manual were followed when modeling ordinal data.

Lastly, mean SRP-E facet scores (based on the 19-item scale) were computed for each of the 11 world regions; a one-way ANOVA was conducted (with post-hoc Tukey follow-ups) to determine how the world regions differed on the four SRP facets. To be conservative, only region differences that were at the $p < 0.001$ or greater level of significance were listed. Also, primarily for descriptive purposes, those individuals with high mean SRP facet scores were selected to examine the proportion of cases across sex and world region that tended to endorse various SRP-E traits. Specifically, a variable was computed by selecting those cases with a mean response average of 3.5 or greater for a given SRP-E facet. Given the one- to five-point SRP rating scale, a value of 3.5 or greater indicates an individual who, on average, is approaching an agree (4) response for an item.

RESULTS

Descriptive and Inferential Results

Table 1 provides the mean SRP-E facet scores by the 11 world regions. Not surprisingly, the SRP facet scores indicate that the mean response average for each SRP-E item was generally in the strongly disagree (1) to disagree (2) range. Given that the vast majority of individuals in the general population do not present with high levels of psychopathic traits (Neumann & Hare, 2008), these SRP-E facet scores are well within expectations. However, based on the results of the one-way ANOVA, the world regions differed significantly in terms of the level of specific SRP-E facets. In the statistical differences columns (diffs), one can see how each region differed (or did not differ) from each other world region.

The results indicate that individuals from the Middle East, Africa, South/South-east Asia, and East Asia produced the highest scores on the interpersonal SRP-E facet. By contrast, North America, Central/South America, Oceania, and the northern and southern regions of Europe tended to have lower scores on the interpersonal facet; however, North America and Oceania had some of the highest scores on the lifestyle facet. In terms of the affective SRP-E facet, western Europe produced higher scores than every other region, while North America and the northern and southern regions

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of Europe tended to have the lowest scores. Lastly, with respect to the antisocial facet, Western Europe, Africa, and South/South-east Asia produced the highest scores.

As shown in Figure 1, the proportion of individuals with a high mean SRP-E response was larger for males than for females, consistent with research on differential expressions of psychopathy as a function of sex (Nicholls et al., 2005). Overall, the prototypic profile of high-level SRP-E traits, for both males and females, involved relatively high lifestyle traits, followed by interpersonal and affective traits. Not surprisingly, very few cases presented with high levels of antisocial traits, although, as the authors have discussed elsewhere (Hare & Neumann, 2006; Neumann & Hare, 2008), this is in part why these later traits provide strong discrimination between psychopathic and non-psychopathic individuals in general population samples. As expected, the pattern of high-mean response cases in Figure 1 generally follows the results displayed

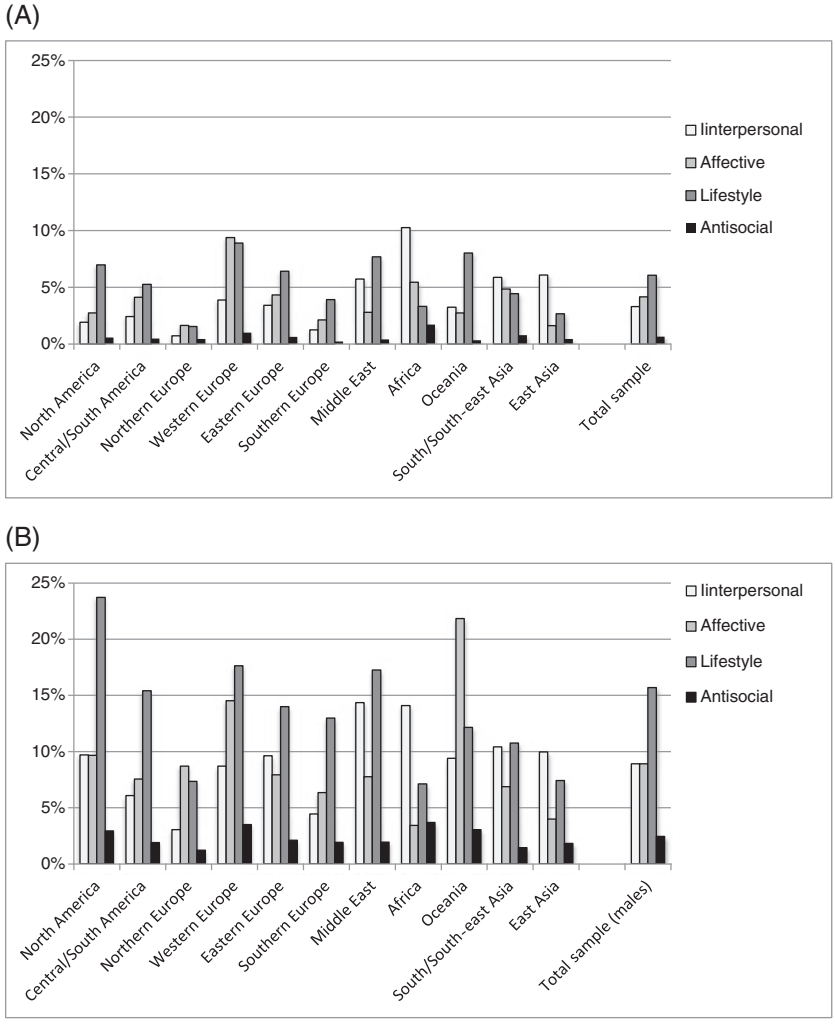

Figure 1. Proportion of cases with high mean item response style by the experimental Self-Report Psychopathy Experimental scale (SRP-E), facet and world region: (A) females; (B) males.

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in Table 1, except that males (Figure 1B) in Oceania, not in western Europe, showed the highest proportion of cases with high affective facet score responses. As such, Figure 1 may provide additional information on the expected proportion of cases with elevations of specific psychopathic (SRP-E) propensities, as well as how such propensities may differ as a function of sex and world region.

SEM Analyses

Table 2 provides the detailed results for the individual sample and multi-sample CFAs. Figures 2 and 3 show the model in graphic form with standardized parameters (all parameters were significant, p values < 0.01–0.001). For the individual sample findings, the results indicate that the four-factor SRP-E model provided a good fit to the data (CFI values = 0.92–0.94; RMSEA values = 0.04–0.05), both for the total sample and for the separate samples of males and females, consistent with other studies on the four-factor model (Hare & Neumann, 2008). In addition, the latent correlations generally show a strong pattern of associations among the SRP-E factors, for both males and females, with a more moderate association between the affective and antisocial factors. This latter result is likely due to a somewhat limited articulation of the affective factor within the SRP-E, compared with the stronger findings for this factor with the more recent version of the SRP (e.g., Neumann & Pardini, in press; Seara-Cardoso et al., 2012).

As shown in Table 2, the MS-CFA results for males and females indicated that both discrimination (factor loadings) and extremity (threshold) parameters could be constrained to be equal with little loss in model fit (i.e., change in CFI), although the traditional chi-squared difference test was significant in both model comparisons.

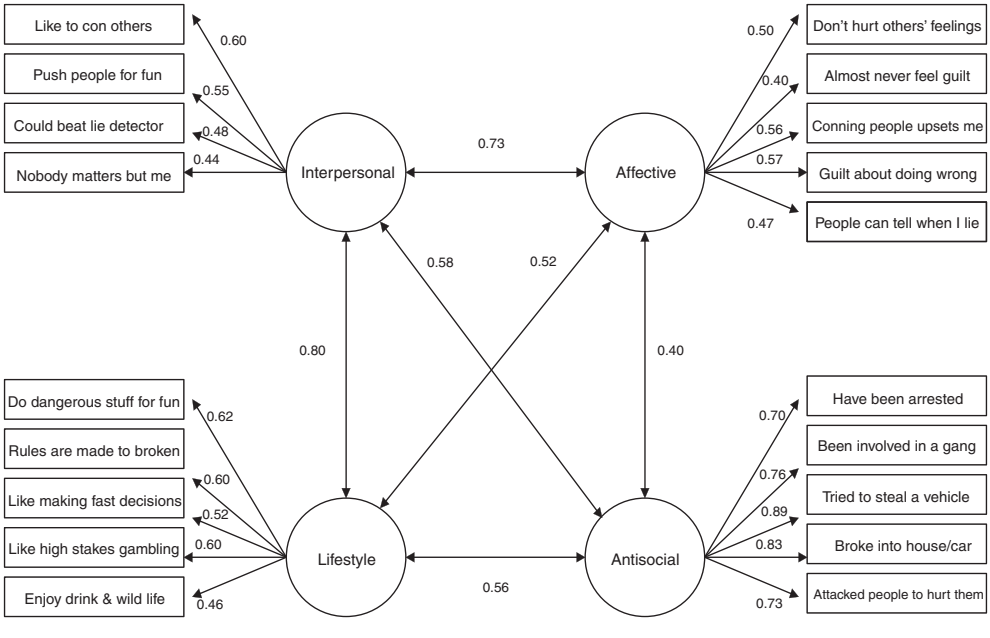

Figure 2. Four-factor experimental Self-Report Psychopathy scale (SRP-E) model: world sample ($N = 33{,}016$).

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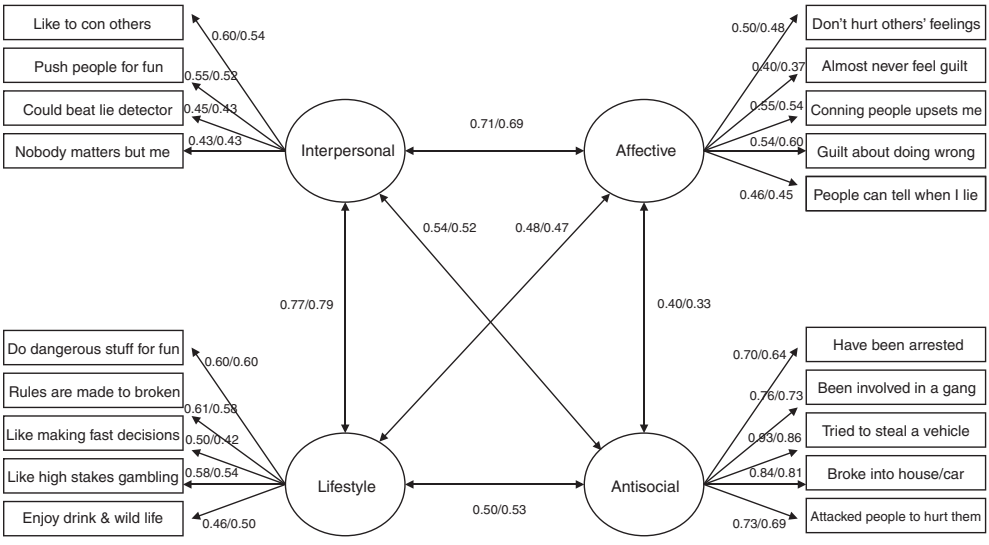

Figure 3. Four-factor experimental Self-Report Psychopathy scale (SRP-E) model: females ($N = 19{,}183$)/ males ($N = 13{,}833$).

Nevertheless, since chi-squared difference tests tend to be sensitive to large sample sizes, it is reasonable to hold that strong invariance was evident across males and females. As such, the results may provide investigators with some confidence that SRP traits do an equally good job at discriminating psychopathic from non-psychopathic individuals across males and females (equal factor loadings) in the general population, and at the same level of the underlying latent trait (equal thresholds).

Table 2 also shows the results of the MS-CFAs for females from different broad world regions. The findings indicate good evidence for structural invariance for all comparisons, given the small change in CFI when moving from the configural model to a model with constrained factor loadings across female samples. However, the findings also suggest there is less convincing evidence of invariance for thresholds across female samples (i.e., CFI change > 0.01), even though most models with constrained item factor loadings and thresholds were associated with good model fit. Thus, the results suggest that the SRP-E items were equally good at discriminating psychopathic from non-psychopathic females across world regions, but that females from different regions may be endorsing the items at differing levels of the underlying latent trait.

To further explore the suggested differences in threshold values across two broad regions of females, the *b3* and *b4* thresholds for North American ($N = 5{,}500$) and European ($N = 8{,}282$) females are shown in Figure 4. Overall, the pattern of threshold values indicates that the items from the interpersonal and antisocial factors tend to produce the highest threshold values, across both the North American and European samples (similar results were obtained for the *b1–b2* thresholds). Therefore, a relatively high level of the underlying psychopathy trait must be present before individuals endorse the items from these factors. Interestingly, these figures also indicate that there is not much difference between North American and European females in the pattern of most item thresholds. However, where some discrepancies appear, there is a

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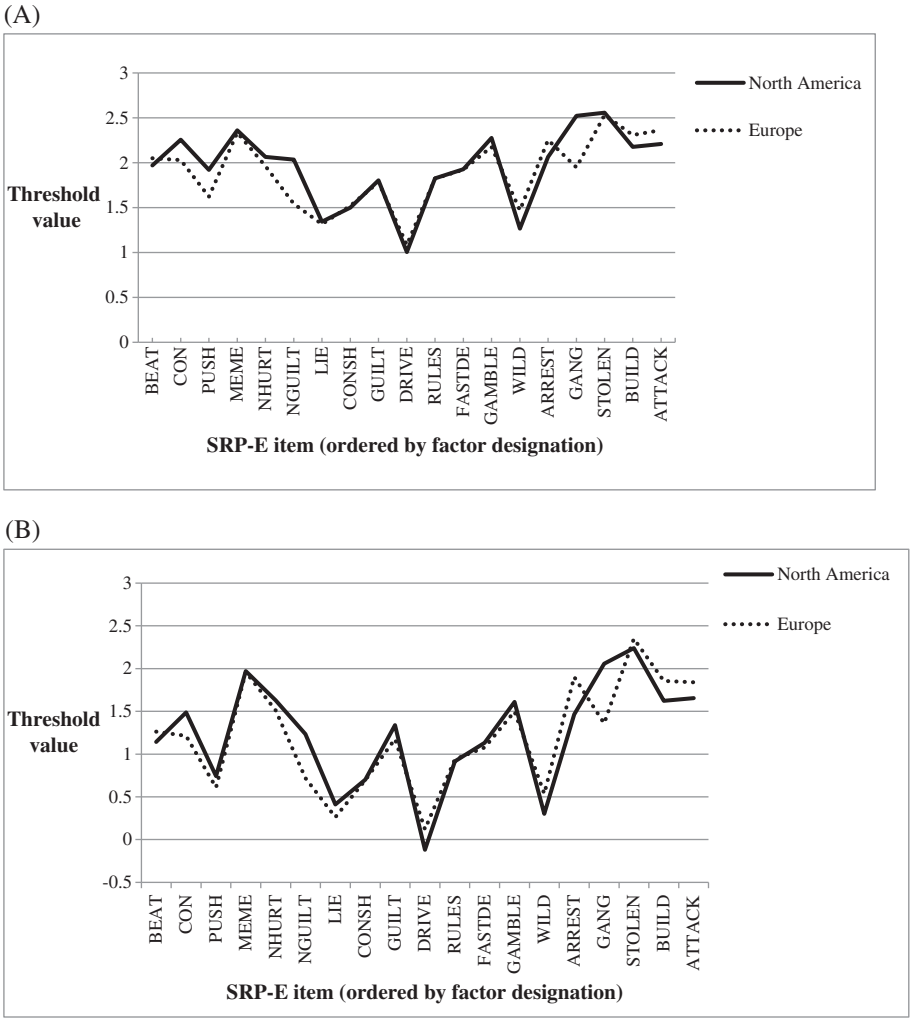

Figure 4. Threshold values (A = *b4*; B = *b3*) for North American and European females – see Figure 1 for experimental Self-Report Psychopathy scale (SRP-E) item descriptors.

differential pattern of threshold values across the two female samples. Specifically, the females from North America had slightly higher thresholds for a few of the interpersonal and/or affective items, while the females from Europe had slightly higher thresholds for a few of the lifestyle and antisocial items. This differential pattern of threshold values across these two regions means that when items are totaled to make a SRP-E facet score, the total score likely results in a cancellation of the underlying differential item thresholds, and thus produces relatively unbiased facet scores (e.g., Bolt et al., 2004). Taken together, the strong similarity in most threshold values across samples, along with good fit for the fully constrained models, suggests some evidence for strong invariance across females.

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External Correlates of SRP-E Psychopathy

Finally, Table 3 shows how the SRP-E facets were correlated with a range of objective external correlates, based on the total sample of females. Perhaps most striking is how strongly the interpersonal facet is correlated with most of the external correlates. In addition, both the interpersonal and antisocial facets showed significant positive associations with regional mortality and fertility rates. Also of interest is the fact that both of these facets were significantly (inversely) correlated with progressive sex-role ideology and body mass index, suggesting that lower body mass and less progressive sex-role ideology were associated with relatively high levels of psychopathic features in females. Finally, the strong negative correlation between GDPpc and the interpersonal facet suggests that per-capita national wealth correlates inversely with expression of psychopathic features.

DISCUSSION

Overall, the SEM results indicated a good fit of the four-factor SRP-E model of psychopathy for the total sample and for the separate samples of males and females, consistent with other large-sample modeling studies using a diversity of methods and samples (Hare & Neumann, 2008). In terms of item discrimination parameters, both the interpersonal and antisocial items provided some of the best items for identifying individuals from the general population with psychopathic propensities. However, each latent SRP-E factor contained items with good discrimination power. Also, the modeling results revealed generally moderate to strong correlations between the latent SRP-E factors, and the pattern of associations was highly consistent across males and females.

In terms of high mean levels of psychopathic propensities across world regions, the SRP-E lifestyle facet tended to stand out, followed by interpersonal and affective facets, with the lowest proportions of high mean scores for the antisocial facet. This pattern generally held for both males and females. The prominence of lifestyle features, which reflect impulsive, disinhibited behavioral tendencies, is in line with the initial

Table 3. External correlates of female psychopathy

	SRP-E Psychopathy				
External variables	**Interpersonal**	**Affective**	**Lifestyle**	**Antisocial**	**Total**
Maternal mortality rate	0.81***	0.25	–0.31	0.63*	0.61*
Infant mortality rate	0.82***	0.24	–0.27	0.57*	0.60*
Fertility rate	0.73**	0.12	–0.27	0.57*	0.52*
Adolescient fertility rate	0.52*	0.14	–0.15	0.41	0.39
Pathogen levels	0.60*	0.13	–0.28	0.38	0.40
GDPpc	–0.69**	–0.23	0.18	–0.34	–0.49
Progressive sex–role ideology	–0.87***	–0.23	0.15	–0.64*	–0.67**
Gender empowerment measure	0.10	–0.35	–0.15	0.08	–0.05
Cultural masculinity	0.28	0.47	0.61*	0.40	0.52*
Body mass index (women)	–0.61*	–0.34	0.36	–0.54*	–0.48

GDPpc, gross domestic product per capita; SRP-E, experimental Self-Report Psychopathy scale.

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conceptualization of the psychopathy construct. Berrios (1996, p. 428) discussed impulsivity as the "kernel" around which the early psychopathy construct developed. Thus, the current results indicate that the SRP-E is very much in line with the historical origins of the psychopathy construct.

At the same time, the results appear to suggest that culture affects the expression of SRP-based psychopathy. For instance, in terms of high mean SRP-E item responses, greater proportions of females in Africa, the Middle East and South-eastern and Eastern Asia appeared to endorse the higher levels of interpersonal features of psychopathy than was the case in other world regions, a finding in line with recent work on the romantic attachment (Schmitt et al., 2004) and life history (Jonason et al., 2010) implications of high mortality and high stress environments on human personality development and reproductive behaviors (see also Figueredo & Jacobs, 2010; Schmitt, 2010). By contrast, greater proportions of females in North America, Oceania, and western Europe presented with higher levels of lifestyle features than did those in other regions (except for eastern Europe and the Middle East). Females from western Europe included by far the highest proportions of individuals with high affective facet scores. Finally, in addition to strong structural model findings for both males and females, the pattern of proportions of high-scoring cases for males and females was generally similar across the various world regions, suggesting some universality in terms of how culture may affect the expression of psychopathy. However, there were also some intriguing differences between males and females for a given world region, which may be important avenues to pursue (e.g., difference in proportions of high mean affective facet score between males and female from Oceania).

The multi-sample CFA results indicate that there is strong invariance of SRP traits across males and females (equal item loadings and thresholds). These findings provide evidence that the SRP-E items work equally well at discriminating psychopathic from non-psychopathic individuals, and at the same underlying latent trait level, for both males and females. Evidence of structural invariance (equal factor loadings) was also found across females from different world regions, but the evidence for metric invariance (equal thresholds) was less clear. When the threshold parameters were constrained to be equal, there was a drop in model fit (i.e., CFI change was > 0.01). However, these results could be due, in part, to a high degree of statistical power (paradoxically, very large samples mean that small differences can result in significant differences of model fit). Furthermore, when the threshold parameters were examined for the two largest regions of females (North America and Europe), the results suggested few meaningful differences in threshold parameters. What differences did exist in the threshold parameters between these two female samples were in opposite directions, and it therefore is reasonable to hold that these differential item effects would likely "wash out" when total facet scores are used (Bolt et al., 2004). Nevertheless, limited evidence for metric invariance could mean that females in different world regions endorse the SRP-E traits at slightly different levels of the underlying psychopathy trait, and thus differences in score level should be treated with some caution.

Evidence was also found for the association of psychopathic traits with several objective world health indices, suggesting that psychopathic traits in females have significant cultural health and attitudinal associations. In particular, both mortality and fertility rates were significantly associated with interpersonal and antisocial psychopathy features. Similarly, these two trait domains were associated with decreased

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progressive sex-role ideology and body mass index across world regions. Most intriguing was the fact that GDP was inversely associated with interpersonal features. Taken together, the findings suggest that the overall well-being of a given world region is associated with the propensity to display psychopathic features.

Lastly, SRP-E used in the current study provided a viable large-scale assessment of psychopathic traits, yet it is a less refined version of later SRP scales, particularly in terms of the affective factor. The most recent version of the SRP (Paulhus et al., in press) provides a more elaborate affective factor than does the SRP-E, and is associated with a range of external correlates such as criminal offenses, externalizing and internalizing psychopathology (Neumann & Pardini, in press), amygdala activation (Carré et al., in press), and moral reasoning (Sera-Cardoso et al., 2012).

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DOI: 10.1002/bsl