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Intelligence and psychopathy: A study on non-incarcerated females from the normal population

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Abstract: Most research on the relation between psychopathy and intelligence has been conducted with incarcerated male samples. However, psychopathic traits can be found among non-incarcerated individuals, male or female, possessing high intellectual capacities. The construct of psychopathy has been comparatively understudied in women. We hypothesized a positive correlation between interpersonal psychopathic traits and intelligence among females, whereby those non-criminal females having high scores on these traits would be more intelligent than those having low scores on these traits. We carried out a correlational analysis and group comparisons on a sample of 121 non-criminal females. Variables that were measured include the Psychopathic Personality Inventory (PPI) total score and its two subscales; the Levenson Primary and Secondary Psychopathy (LPSP) total score and its two subscales; Psychoticism (P) and intelligence measured by Raven's Standard Progressive Matrices (SPM). A significant positive correlation ($r = .33, p < .05$) was found between LPSP-I (interpersonal affective factor) and SPM. Separate ANOVAs were conducted to compare SPM scores of the participants, when they were allocated to groups based on either the PPI or the LPSP scores. Performance of the interpersonal affective group ($M = 53.32, SD = 3.45$) was better than that of the two other groups ($M = 50.26, SD = 3.25$ for "Impulsive Antisocial", and $M = 49.37, SD = 4.67$ for "non psychopathy").

ABOUT THE AUTHORS

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PUBLIC INTEREST STATEMENT

The concept of psychopathy is often associated with delinquency among males. However, psychopathic traits, such as egocentricity, superficial charm, lack of empathy, remorse or guilt and impulsivity, can be found among non-incarcerated individuals such as university students possessing high intellectual capacities. In this study, we chose to examine the relationship between psychopathy traits and intelligence among university students and specifically among females, given that only a few investigations have been previously conducted in this population. We found a positive correlation between interpersonal aspects of psychopathic traits and intelligence. This correlation suggests that intelligent individuals who possess psychopathic traits may be less prone to use aggression because they can use their cognitive resources to plan to get what they want by nonviolent means (such as conning and manipulation), and subsequently may be less likely to wind up in prison.

Subjects: Criminology and Criminal Justice; Neuropsychological Tests & Assessments; Personality; Individual Differences/IQ

Keywords: intelligence; PPI; LPSP; Psychoticism; psychopathic women; Raven's progressive matrices

1. Introduction

Despite some early assumptions regarding a link between psychopathy and intact intellectual functioning (Cleckley, 1976), findings have been mixed, with some linking psychopathy to below average intelligence, some indicating average or higher intelligence, while others have found no relationship (Allen, Briskman, Humayun, Dadds, & Scott, 2013; Hare & Neumann, 2008; Johansson & Kerr, 2005; Walsh, Swogger, & Kosson, 2004). Most research has used the Psychopathy Checklist (PCL) and Psychopathy Checklist Revised (PCL-R; Hare, 1991). Although the PCL/PCL-R was intended to measure a unidimensional construct, factor analysis of the PCL-R items has consistently revealed a two-factor structure, although alternative three- and also four-factor models have been proposed (Cooke & Michie, 2001). The first factor of the PCL-R encompasses the interpersonal and affective features of psychopathy (i.e. superficial charm, conning/manipulation, shallow affect, lack of empathy or remorse). This factor was later split into an Interpersonal and an Affective component. The second factor includes items that reflect a chronically unstable and antisocial lifestyle (i.e. impulsivity, irresponsibility, intentional dependence upon others), and this factor was later split into Lifestyle and Antisocial facets (Hare & Neumann, 2006). Accordingly, researchers claimed that exclusive reliance on total scores may mask important differential relationships that could enhance the understanding and further identification of psychopathy subtypes (Feilhauer, Cima, Korebrits, & Kunert, 2012; Lilienfeld, 1998; Vitacco, Neumann, & Jackson, 2005).

Heinzen, Köhler, Godt, Geiger, and Huchzermeier (2011) have suggested that individuals with interpersonal psychopathic features should possess high levels of intellectual ability that enable them to plan their actions and to be especially skilled at manipulating others in social interactions. In contrast, individuals with behavioral psychopathic personality features should be similar to typical antisocial delinquents, who tend to show lower intelligence and commit offenses impulsively. They showed that the Social Deviance facet of the PCL-SV (screening version) was negatively correlated with intelligence. Additionally, individuals scoring high on interpersonal features of psychopathy were significantly more intelligent than those scoring high on antisocial features, but less intelligent than those scoring low on both psychopathy features (the "non psychopathy" group).

In contrast, de Tribolet-Hardy, Vohs, Mokros, and Habermeyer (2014) did not report a significant difference in general intelligence when they split their sample into two groups based on total PCL-R scores. They suggest that those who score high on the PCL-R are not less intelligent than those who score low on the PCL-R, but do present with a different pattern of spatial and verbal abilities. They reported a negative correlation between spatial intelligence and antisocial behavior (as assessed by Factor 2 of the PCL-R). According to the authors, these findings support Raine's (2002) early starter/spatial impairment model of antisocial behavior. According to this model, "early visuospatial (right hemisphere) impairments can predispose an individual to persistent antisocial behavior by interfering with early attachment and emotion recognition and regulation" (Raine et al., 2005, p. 39).

However, such studies have largely focused on samples of incarcerated males (de Tribolet-Hardy et al., 2014; Heinzen et al., 2011; Salekin, Neumann, Leistico, & Zalot, 2004; Vitacco et al., 2005); thus the true relationship between psychopathy and intelligence may have been obscured (due to long-term substance abuse, the acute effect of incarceration, and conditions that develop as a result of prolonged stay in the institution). Porter and Woodworth (2006) emphasize that less intelligent psychopaths may turn to violence to compensate for their inferior abilities to manipulate others through language. Furthermore, intelligent psychopaths may be less prone to use aggression because they can get what they want by nonviolent means (such as conning and manipulation), and thus may be

less likely to wind up in prison. As such, they would be less likely to be studied by researchers, whereas less intelligent psychopaths are available in disproportionate numbers for research.

In addition, few investigations have been conducted on the relationship between psychopathy and intelligence in females, mostly because of the general lower prevalence of psychopathy in female samples (Nicholls, Ogloff, Brink, & Spidel, 2005; Verona & Vitale, 2006). To date, only two studies (Spironelli, Segrè, Stegagno, & Angrilli, 2014; Vitale, Smith, Brinkley, & Newman, 2002) have analyzed the relationship between intelligence and psychopathy in female offenders. Vitale et al. (2002) found a weak negative relationship between psychopathy and verbal intelligence, which was significant only for African-American women but not for Caucasian women. Spironelli et al. (2014) found a significant negative correlation between non-verbal intelligence and total PCL-R score. Negative correlations were also found between non-verbal intelligence and the four PCL-R subscales. They concluded that their results support the view that unsuccessful psychopathic women (i.e. psychopaths who are detected and convicted) have poor planning, and are unable to represent future consequences of their actions.

While it has to be acknowledged that the study of incarcerated psychopaths has provided valuable insights into many facets of antisocial and criminal behavior, Kirkman (2002) argues that studies which focus on non-incarcerated samples, who are not criminals, “have an arguably equal potential to illuminate our understanding of those emotional difficulties, unconfounded by criminality or the effects of long term institutionalization” (p. 158). Research on non-incarcerated psychopaths has the potential to increase our knowledge about the conditions in the social environment which promote or prevent the development of antisocial behavior. Moreover, by conducting research with people who have the characteristics of a psychopath, but whose behavior does not reach the level for prosecution, one can eventually separate those features which are specific to psychopathy and those which are associated with criminality (Widom & Newman, 1985).

According to Salekin, Trobst, and Krioukova (2001), there are good reasons for using university samples in the study of psychopaths from the community. First, compared to the past, more people turn to academic studies in order to find potential long-term careers. Thus, these individuals who begin their studies at the university, enroll in academic courses and participate in studies, provide researchers a window for observing highly diverse groups of individuals. Second, one type of psychopath, that Cleckley described as the “successful psychopath,” may use formal education (business, law, medicine, accounting) as a source to higher status and positions of greater power. It is this type of psychopath who is least likely to be found within samples of incarcerated individuals. Thus, investigating psychopathic characteristics in university samples may help to shed light on the nature of psychopathy in this particular subtype of psychopathy. Third, previous research on community samples that did not use university samples (Belmore & Quinsey, 1994; Widom & Newman, 1985) were unable to avoid selecting a high proportion of criminals who had lengthy arrest records and previous histories of incarceration.

It should be noted that in this study, we focus only on women when investigating the relationship between psychopathy and intelligence. Only a few previous studies have examined this relationship among women; that of Spironelli et al. (2014) looked at incarcerated females, who were viewed as unsuccessful psychopaths. To complement their research, the present study includes women with psychopathic characteristics, who could be termed successful psychopaths. Therefore, in contrast to their findings, we expected to find a significant *positive* correlation between the interpersonal factor of psychopathy and intelligence, but not necessarily to find a significant *negative* correlation between the social deviance factor of psychopathy and intelligence, when looking at female participants drawn from a normative population. We also expected to find that individuals having high scores on the interpersonal factor, but low scores on the social deviance factor, would be more intelligent than those having high scores on the social deviance factor, and non-psychopathic individuals. Our reasoning here is that individuals from the community achieving high scores on the interpersonal aspects of psychopathy should conform to the prototype of the “successful

psychopath” of above-average intelligence (Heinzen et al., 2011; Porter & Woodworth, 2006; Spironelli et al., 2014; Yang et al., 2005).

The two factors of psychopathy were examined in this study by means of two commonly used measures of non-criminal psychopathy, the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996), and Levenson’s Primary and Secondary Psychopathy scales (LPSP; Levenson, Kiehl, & Fitzpatrick, 1995). Research shows that the correlation between these two measures and the PCL-R is moderate to high (Poythress, Edens, & Lilienfeld, 1998; Poythress et al., 2010). We also included the Psychoticism subscale of the Eysenck Personality Questionnaire (EPQ-R-S; Eysenck, Eysenck, & Barrett, 1985), which taps callousness, impulsiveness, and sensation seeking—all characteristics that have long been associated with the psychopathy construct (Rutherford, Cacciola, Alterman, & McKay, 1996). In accordance with Spironelli et al. (2014), intelligence will be measured using Raven’s Standard Progressive Matrices (Raven, Raven, & Court, 2000).

2. Methods

2.1. Participants

A group of 487 Caucasian undergraduates (371 females, 116 males) from Bar-Ilan University and Ashkelon Academic College in Israel participated in the study as part of their degree studies, which requires them to take an active part in research in their first year of studies. The students were given the opportunity to select research from a list of studies, and those who participated in this study provided informed consent, and were told, among other things, that they could leave the laboratory and receive credit for the time they participated if they felt uncomfortable during the study.

They ranged in age from 20 to 30 ($M = 22.65$, $SD = 1.78$), and were administered the PPI in group settings, in a single session conducted by the first author that lasted about forty minutes. Individuals who were currently using psychotropic medication, ADHD medication or who had head injury in the past were excluded from the sample ($n = 16$). As Lilienfeld and Andrews (1996) have suggested, participants should be excluded from the sample if they show high scores on the Deviant Responding Scale and the Unlikely Virtues Scale, both of which constitute validity scales of the PPI. Participants were thus excluded from the analyses if they scored more than three standard deviations above the mean for the pooled sample (e.g. Ross, Benning, Patrick, Thompson, & Thurston, 2009) on either the Deviant Response ($n = 2$) or the Unlikely Virtues Scale ($n = 6$), leaving a total of 463 participants in the sample. After the PPI was scored, the first author returned to a subsample of these participants on the basis of their scores (see below). Those who agreed to continue their participation in the second (lab) session continued in the study. A selective group of 146 participants (121 females, 25 males) were invited for this second session, which took place in the laboratory. Here, we present the data of the female participants.

2.2. Measures

2.2.1. The Psychopathic Personality Inventory

(PPI; Lilienfeld & Andrews, 1996) was developed to measure psychopathic personality traits in a non-incarcerated sample. Benning, Patrick, Hicks, Blonigen, and Krueger (2003), Benning, Patrick, Salekin, and Leistico (2005) factor-analyzed the eight PPI subscales, and uncovered two separate factors. PPI Factor 1 (PPI-I), labeled *Fearless Dominance*, measures the interpersonal and affective aspects of psychopathy, whereas PPI Factor 2 (PPI-II), labeled *Impulsive Antisociality*, measures the social deviance aspects of psychopathy. Lilienfeld and Andrews (1996) have reported high internal consistency for the PPI total score, ranging from .89 to .93, and internal consistency for the eight PPI subscales ranging from .70 to .90. The internal consistency coefficients (as measured by Cronbach’s α) in this study were .91 for PPI Total, .89 for PPI-I, .91 for PPI-II, and for the PPI subscales, alpha ranged from .77 (Coldheartedness) to .86 (Fearlessness). The majority of the subscales were at or above .80.

2.2.2. *The Levenson Primary and Secondary Psychopathy (LPSP) scales*

(Levenson et al., 1995) assess psychopathic tendencies in non-institutionalized community samples. The 16-item primary psychopathy scale (LPSP-I) corresponds to Factor 1 of the PCL-R (affective and interpersonal traits), whereas the 10-item secondary scale (LPSP-II) corresponds to Factor 2 of the PCL-R (irresponsible, impulsive, antisocial traits). In the present study, Cronbach's α was .80 for the primary psychopathy scale, and .71 for the secondary scale.

2.2.3. *The Eysenck Personality Questionnaire-Revised, short version*

(EPQ-R-S; Eysenck et al., 1985) comprises 48 items assessing Extraversion (E), Neuroticism (N) and Psychoticism (P), as well as a Lie Scale (L). In the present study, α reliabilities range between 0.50 (P) and 0.81 (N, E), broadly matching previously reported values (Glicksohn & Abulafia, 1998).

2.2.4 *Raven's Standard Progressive Matrices*

(SPM; Raven et al., 2000) is a nonverbal, culturally-free measure of the general ability to solve novel problems and adapt to new situations. We employed our computerized version of Raven's SPM (Glicksohn, Hadad, & Ben-Yaacov, 2016), which comprises 60 matrices, each of which presents 6 or 8 options for completing a pattern. The task is partitioned into 5 (A, B, C, D, E) sets of matrices having an increasing order of difficulty. We imposed a time limit of 20 min, which seems to be quite reasonable in light of other studies (Deary, Whalley, Lemmon, Crawford, & Starr, 2000, p. 52; Hamel & Schmittmann, 2006). The total score is the number of correct answers achieved. In the present study, we partitioned this score into a profile of repeated measures indicating cumulative performance: A, A + B, A + B + C, A + B + C + D, A + B + C + D + E. This is the same strategy that we adopted in our previous work when looking at performance on the Iowa Gambling Task (Glicksohn & Zilberman, 2010), and when looking at performance on the Wisconsin Card Sorting Test (Naor-Ziv & Glicksohn, 2016)—both of which have been used in connection with psychopathy (Dean et al., 2013; Sellbom & Verona, 2007).

2.3. *Grouping of participants*

The 121 female participants were allocated to one of four groups based on Verona, Patrick, Curtin, Bradley, and Lang's (2004) approach and according to their ranking on the two PPI factors within the data-set of the larger sample. While Verona et al. divided their subjects to "high" or "low" on the basis of scale median scores, we created more extreme comparison groups (upper quartile vs. lower quartile). These groups were as follows: (1) those participants having high scores (upper quartile) on PPI-I, and low scores (below median) on PPI-II (*Fearless Dominance Group*; $n = 24$); (2) those scoring high (upper quartile) on PPI-II, and low (below median) on PPI-I (*Impulsive Antisocial Group*; $n = 28$); (3) those scoring low (lower quartile) on PPI-I, and low (below median) on PPI-II ($n = 35$); and (4) those scoring low (lower quartile) on PPI-II, and low (below median) on PPI-I ($n = 27$).

The participants were also separately allocated to groups according to their score on the two LPSP factors. This resulted in one group of non-psychopathic subjects, which included those scoring low (lower quartile) on LPSP-I and low (below median) on LPSP-II; those scoring low (lower quartile) on LPSP-II and low (below median) on LPSP-I; and those scoring low (lower quartile) on both LPSP-I and LPSP-II (i.e. "non-psychopathy" group, $n = 65$). The other participants comprised the *Fearless Dominance* group (those participants having high scores [upper quartile] on LPSP-I, and low scores [below median] on LPSP-II, $n = 19$), and the *Impulsive Antisocial* group (those scoring high [upper quartile] on LPSP-II, and low [below median] on LPSP-I, $n = 23$). Participants who showed high total scores on both factors ($n = 7$ for the PPI, $n = 14$ for LPSP) were excluded from the subsequent analyses.

Cross-tabulation of the participants using these two separate allocations to groups, one based on the PPI and the other based on the LPSP, reveals the following: (1) a majority of 45 participants of those 62 scoring "low" (groups 3 and 4) on the PPI comprised the majority of those 65 participants classified as "non-psychopathy" on the LPSP; (2) a majority of 12 of those 28 participants comprising the *Impulsive Antisocial* group based on the PPI, also comprised the majority of those 23 participants

comprising the *Impulsive Antisocial* group, based on the LPSP; (3) 10 of the 19 participants classified as comprising the *Fearless Dominance* group based on the LPSP are split between *Fearless Dominance* and *Impulsive Antisocial* groups, based on the PPI; and (4) 14 of the 65 participants classified as “non-psychopathy” on the LPSP, are classified as *Fearless Dominance* on the PPI. Clearly, one may expect different results based on the particular grouping employed (i.e. that based on the PPI or that based on the LPSP).

2.4. Procedure

The second session was conducted in the lab, and participants were individually tested on a series of tasks that included the assessment of trait impulsivity, cognitive impulsivity, executive functions, the LPSP, the EPQ-R-S, and the SPM. This second session began with the completion of the SPM, followed by the other tasks including the EPQ-R-S (from which we derive the P score) and the LPSP. In this paper, we focus on the PPI, the LPSP, P, and the SPM.

3. Results

3.1. Descriptive statistics

Table 1 lists the means, standard deviations and ranges of the PPI total score, PPI factors (PPI-I, PPI-II), LPSP total score, LPSP factors (LPSP-I, LPSP-II), P and the total score on Raven’s Standard Progressive Matrices (SPM) for all 121 female participants, prior to their subgrouping.

It should be noted that the descriptive statistics of the PPI total score and the PPI factors (PPI-I, PPI-II) match the statistics reported in other studies (Blonigen, Carlson, Krueger, & Patrick, 2003; Curry, Chesters, & Viding, 2012; Sellbom & Verona, 2007; Uzieblo, Verschuere, & Crombez, 2007). Similarly, the results for the LPSP total score and the two LPSP scales (LPSP-I, LPSP-II) match statistics reported in other studies (Book, Holden, Starzyk, Wasylkiw, & Edwards, 2006; Falkenbach, Poythress, Falki, & Manchak, 2007; Levenson et al., 1995; Lilienfeld & Hess, 2001). Such is also the case for both P (Alexopoulos & Kalaitzidis, 2004; Eysenck et al., 1985; Glicksohn & Abulafia, 1998) and the SPM (Forget, Lacroix, & Cohen, 2002; Lovaglia, Lucas, Houser, Thye, & Markovsky, 1998; Skuy et al., 2002).

3.2. Correlational analysis

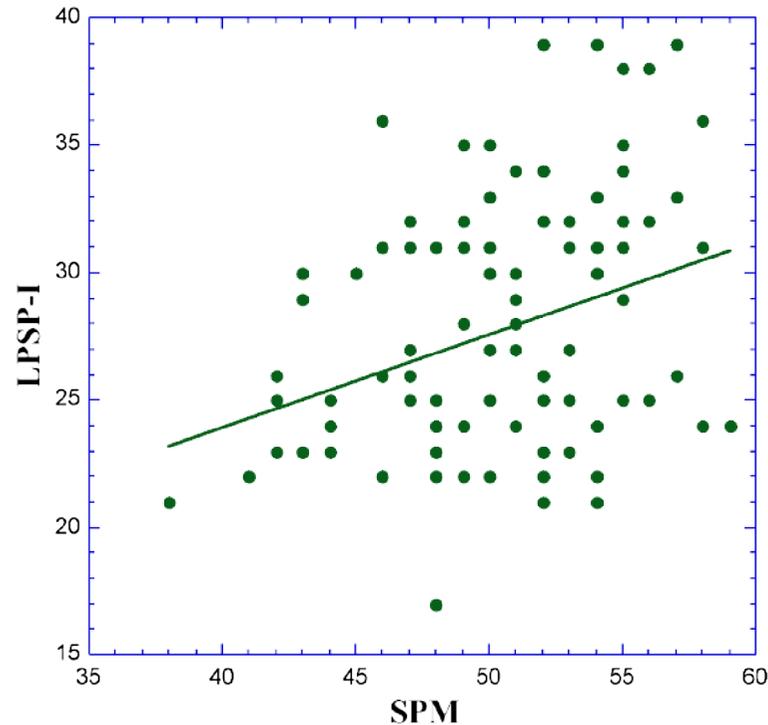
The significant, though small positive correlation that was found between P and SPM ($r = .19, p < .05$), is much smaller than that reported previously by Buckingham, Kiernan, and Ainsworth (2012), namely $r = .32$. One reason may be that the sample in that study included mixed genders (59 females and 41 males). Females score lower on P than males (Eysenck et al., 1985; Glicksohn & Abulafia, 1998) and that may explain the difference between the correlations. A much higher significant positive correlation was found between LPSP-I and SPM ($r = .33, p < .05$, after the removal of one conspicuous outlier), as can be seen in Figure 1, and in line with our hypothesis. No such correlation was found between the PPI factors and SPM.

Table 1. Descriptive statistics for psychopathy and intelligence

	PPI-T	PPI-I	PPI-II	LPSP-T	LPSP-I	LPSP-II	EPQ-P	SPM-IQ
M	335.4	124.54	155.18	47.3	28.82	18.56	2.04	50.2
SD	38.97	22.18	23.92	9.04	5.75	4.84	1.55	4.49
Range	181	95	106	43	31	22	7	22
Minimum	268	80	115	31	17	10	0	37
Maximum	449	175	211	74	48	32	7	59
Kurtosis	-.31	-.53	-.94	-.25	.04	.12	.21	.06
Skewness	.46	.39	.31	.52	.52	.78	.67	-.5

Notes: PPI = Psychopathic Personality Inventory; LPSP = Levenson Primary and Secondary Psychopathy; EPQ-P = Psychoticism subscale of the Eysenck Personality Questionnaire; SPM-IQ = Raven’s Standard Progressive Matrices. N = 121.

Figure 1. Correlation between LPSP-I and SPM.



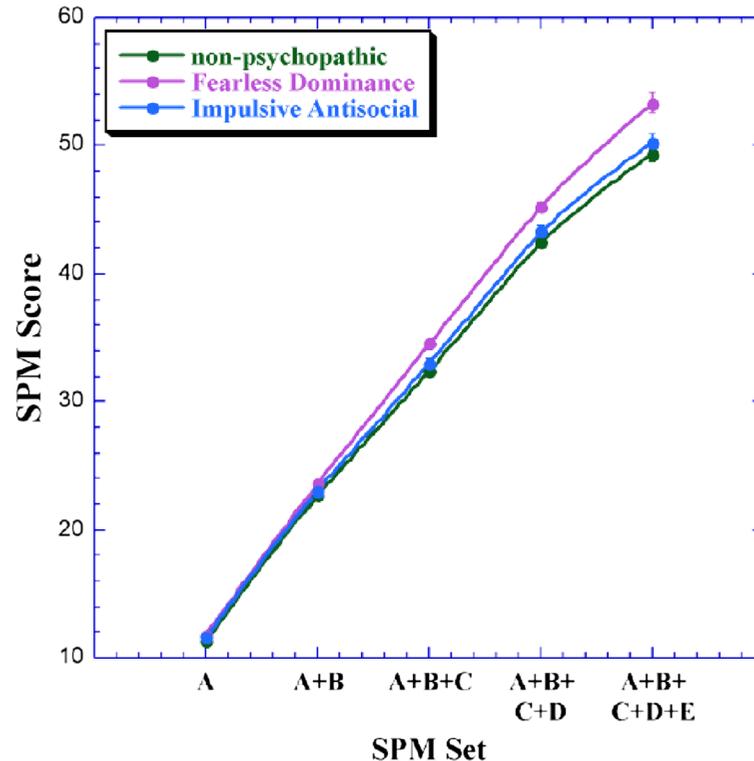
In line with the conclusion drawn by Hicks and Patrick (2006), that the two major factors of psychopathy (however assessed) might *jointly* have better predictive value for a criterion variable than either alone, we considered the possibility that the prediction of SPM using LPSP-I might be increased on considering also LPSP-II. To this end, we entered both LPSP-I and LPSP-II as predictors in a multiple-regression analysis, with SPM as criterion. While the regression was significant [$F(2, 104) = 6.27$, $MSE = 18.19$, $p < .005$, $R^2 = .108$], there was no improvement in prediction over that of LPSP-I (as reported above), given that LPSP-II was not a significant predictor in the equation [$t < 1$, ns]. This finding of a significant positive correlation between the interpersonal facet of psychopathy (here, LPSP-I) and intelligence (here, SPM) has been reported in other studies (e.g. Nijman, Merckelbach, & Cima, 2009; Salekin et al., 2004).

3.3. Group comparisons

Separate analyses of variance (ANOVA) were conducted to compare the SPM scores of the participants, when they were allocated to their respective groups, based on either the PPI or the LPSP. A two-way ANOVA incorporating Group and repeated measures on SPM Set (A, A + B, A + B + C, A + B + C + D, A + B + C + D + E) which, by definition, will indicate monotonic improvement in performance on the SPM, enabled us to explore the interaction between performance on the SPM and Group. That is to say, whether performance differentially improves depending on Group. Turning first to the grouping variable defined with reference to the LPSP (“non psychopathy”, $n = 65$; *Fearless Dominance*, $n = 19$; *Impulsive Antisocial*, $n = 23$), there was a main effect for Group [$F(2, 104) = 8.53$, $MSE = 18.17$, $p < .0005$; partial eta-squared = .14], whereby the *Fearless Dominance* group scored higher on the SPM ($M = 53.32$, $SD = 3.45$) than the other two groups ($M = 50.26$, $SD = 3.25$ for *Impulsive Antisocial*, and $M = 49.37$, $SD = 4.67$ for “non psychopathy”). More importantly, the interaction was also significant [$F(8, 416) = 4.81$, $MSE = 2.99$, $p < .0001$; partial $\eta^2 = .08$], as can be seen in Figure 2. Specifically, as noted above, performance of the *Fearless Dominance* group is better (higher scores) than that of the other two groups.

Figure 2. Differential improvement in performance on the SPM.

Notes: We found positive correlations between both Psychoticism and the interpersonal facet of psychopathy of the LPSP and Raven's SPM for a group of normative females.



Turning now to the four groups defined with reference to the PPI (*Fearless Dominance*, $n = 24$; *Impulsive Antisocial*, $n = 28$, and the two “non-psychopathic” control groups, $n = 35$ and $n = 27$), there was neither a main effect for Group [$F(3,110) < 1$] nor a significant interaction with Set [$F(12, 440) < 1.12$, ns].

4. Discussion

We found a positive correlation between P and SPM, and a positive correlation between the interpersonal facet, defined by the first factor (LPSP-I) of the LPSP, and SPM. These results indicate that females with the highest P scores and interpersonal psychopathic tendencies had higher intelligence scores, providing support for Cleckley’s (1976) assumption that psychopathic individuals have good intelligence “if not usually, of superior intelligence when measured scientifically” (p. 260). Furthermore, the *Fearless Dominance* group (i.e. high score on LPSP-I, coupled with low score on LPSP-II) scored the highest on the SPM.

The significant positive correlation between the interpersonal facet of psychopathic traits and intelligence has also been reported in other studies (e.g. Nijman et al., 2009; Salekin et al., 2004). Compared to other studies employing undergraduates (Benning et al., 2003; Sellbom & Verona, 2007), this positive correlation could be replicated between the interpersonal facet and intelligence, while at the same time, no negative correlation was found between the social deviant factor and intelligence. Why might this be so? While those previous studies included both genders, the sample in the present study comprised only female participants. Vitale et al. (2002) noted that females have lower tendencies to antisociality than males. Given this, the absence of a negative relation between the social deviant factor and intelligence in the present study may be better understood.

In the Spironelli et al. (2014) study, no correlation was found between the interpersonal factor of the PCL-R and intelligence, but a negative correlation was found between the social deviant factor and intelligence. However, this sample included only incarcerated females, and as Hare and Neumann (2006) have noted, the social deviant factor of the PCL-R relates to antisociality.

Furthermore, the SPM includes a time limit and therefore requires a certain level of attention. Tests having a time limit may be appropriate for use in a sample of undergraduates, but in other samples, such as incarcerated offenders who usually exhibit high levels of impulsivity and deficits in attention (Rushton & Timpler, 2009; Walsh et al., 2004), a time limit may result in a confounding of results (Heinzen et al., 2011).

Our results concerning the differences between our subgroups of psychopathy in SPM are found only for the subgrouping based on the LPSP, but not with respect to the subgrouping based on the PPI. One reason may be the problematic factor structure of the PPI. For example, in two studies (Benning et al., 2003, 2005), the Fearlessness subscale cross-loaded onto the PPI-II factor, thereby questioning the validity of a clear two-factor structure. In the Neumann, Malterer, and Newman (2008) study, the authors uncovered a two-factor solution in which the Blame Externalization subscale and Social Potency subscale both cross-load on both PPI factors. They also reported results from Lilienfeld's dissertation (see Appendix in Neumann et al., 2008, p. 174) that reveal a two-factor solution, in which the Fearlessness subscale substantially cross-loads on both PPI factors, as does the Impulsive Nonconformity subscale, but to a lesser degree. Thus, our subgrouping based on the PPI, which presumes a clear two-factor structure underlying the PPI, seems to be compromised.

The present study shows that psychopathic traits may exist without deficits in intellect, or higher cognition—in contrast to what had been speculated on in earlier studies (e.g. Gorenstein, 1982; Gorenstein & Newman, 1980; Moore & Rose, 1995; Raine, O'Brien, Smiley, Scerbo, & Chan, 1990). In this sense, our findings complement Spironelli et al.'s (2014) investigation by demonstrating the difference in such a psychopathy–intelligence relationship between samples of unsuccessful (imprisoned) psychopaths and samples employing successful (not-in-jail) psychopaths.

This study is not without limitations. One important issue concerns the test used to measure intelligence. In most of the past research on psychopathy and intelligence (e.g. DeLisi, Vaughn, Beaver, & Wright, 2010; Fontaine, Barker, Salekin, & Viding, 2008) the WAIS (or its subtests) has been used. In the present study, the SPM was administered in an attempt to complement the Spironelli et al. (2014) study, and also because it is faster and less influenced by aspects of culture (such as language) and education level. However, these two IQ measures have shown a relatively high correlation in the literature, with an r value $> .70$ between SPM and WAIS Verbal and Performance IQ scores (e.g. Burke, 1972; McLeod & Rubin, 1962; Raven et al., 2000). As Spironelli et al. (2014) noted, the two IQ measures (SPM and WAIS) are almost equivalent, and most differences among all of the studies in this field should be explained mainly by other factors. According to them, a change in the direction of the correlation (negative vs. positive) between psychopathy measures and IQ cannot be definitely attributed to differences between measures. However, it may be useful to include in future research the use of a measure of verbal intelligence.

Another issue concerns the nature of the sample. Cleckley (1976) included “high intelligence” in his clinical profile because of the “selective nature of his patients, many of whom were well educated and from middle or upper class backgrounds” (Hare & Neumann, 2008, p. 227). To some extent, the sample in the present study resembles that in Cleckley's study; therefore it is possible that the findings about the relation between psychopathic traits and intelligence are limited to a sample of female undergraduates. In this sense, a sample consisting solely of females limits the generalizability of the results. Moreover, in our study, although 116 men originally completed the PPI, very few of them were invited to the second session ($n = 25$). Therefore, our findings need to be replicated in an adequate sample of male participants.

In addition, Demakis, Rimland, Reeve, and Ward (2015) noted in their study on the influence of psychopathy and intelligence on malingering among a sample of college students, that one of the main issues to be addressed is the generalizability of the sample. According to Demakis et al., a sample of college students varies from clinical populations in various ways, including level of actual cognitive impairment, psychological comorbidities, and psychopathology; therefore, the results of

studies may be different when using a lower-functioning population. Future research should address a more heterogeneous community sample, having a wider range of intelligence.

It is important to investigate this relationship between psychopathy and intelligence for several reasons. First, understanding the relationship between the main symptoms of psychopathy and intelligence may facilitate our understanding of the potential etiology of the disorder. Second, intelligence may have important implications in terms of the severity of the psychopathic condition and tendencies toward criminality. Individuals who lack normal emotional capacities (e.g. for remorse and empathy), but who do possess critical intellectual abilities such as planning, foresight, creativity, manipulation, and the ability to create a positive impression on others, may commit crimes with greater precision and with a decreased likelihood of detection (Salekin, 2006). Furthermore, in contrast with earlier research findings suggesting impairments on traditional measures of intelligence among delinquents, more recent findings (e.g. Loney, Frick, Ellis, & McCoy, 1998; Salekin et al., 2004) suggest that the main symptoms of psychopathy may not be associated with cognitive deficits but, rather, with higher verbal and creative, practical, and analytic abilities. Our results further highlight the importance of considering distinct facets of the psychopathy construct (i.e. affective-interpersonal vs. antisocial deviance features) in relation to variables such as intelligence.

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