

# **The Validity of the Psychopathic Personality Inventory-Revised in a Community Sample**

Uzieblo, Katarzyna<sup>1</sup>, Verschuere, Bruno<sup>1</sup>, Van den Bussche, Eva<sup>2</sup>, & Crombez,  
Geert<sup>1</sup>

<sup>1</sup>. Ghent University, Belgium: Department of Psychology

<sup>2</sup>. University of Leuven, Belgium: Department of Psychology

**RUNNING HEAD: PSYCHOPATHY AND SELF REPORT**

Corresponding author:

Katarzyna Uzieblo

University Ghent - Department of Experimental Clinical and Health Psychology

H. Dunantlaan 2

Ghent, 9000

Belgium

Tel.: +32(0)9-264 91 07 \* Fax: +32(0)9-264 64 89

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## **Abstract**

Research on the Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005) initially revealed two factors: Fearless-Dominance, and Self-Centered Impulsivity. This study examined the validity of the PPI-R factors in a community sample ( $N=675$ ). First, confirmatory factor analyses did not support the two-factor structure. Second, the PPI-R factors showed good convergent and discriminant validity with two other self-report measures of psychopathy, i.e. the Youth Psychopathic Traits Inventory (YPI; Andershed, Kerr, Stattin, & Levander, 2002) and the Levenson's Self-Report of Psychopathy (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995). Third, PPI-R factors exhibited good external validity in relation to various theoretically relevant correlates. Our results indicate that the PPI-R factors have good convergent, discriminant, and external validity, but our confirmatory factor analysis raises concerns about the robustness of the two-factor structure.

Key words: psychopathy, self-report measures, validity, community, Psychopathic Personality Inventory-Revised, Levenson's Self-Report Measure for Psychopathy, Youth Psychopathic Traits Inventory

## INTRODUCTION

A well-established instrument to index psychopathy in forensic populations is the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), which requires collateral information from files and a clinical interview. Despite its good psychometric characteristics, the need of collateral information limits the use of the PCL-R in non-institutionalized populations. To overcome these problems, self-report measures of psychopathy were developed. Their use has many advantages: It is economical and may solve the problem of judgement bias (Mikton & Grounds, 2008).

Several self-report measures for psychopathy are available. A promising measure is the Psychopathic Personality Inventory (PPI; Lilienfeld & Andrews, 1996) and its revised version (PPI-R; Lilienfeld & Widows, 2005). Initial studies on the psychometric characteristics of the original PPI have reported evidence for its usefulness. The PPI consists of eight subscales, each assessing a distinct psychopathic trait (Lilienfeld & Andrews, 1996). Exploratory factor analyses with the PPI revealed that seven of the eight subscales are organized into two higher-order factors: (1) Fearless-Dominance (PPI-I) assessing the affective-interpersonal traits and consisting of the subscales Fearlessness, Stress Immunity, and Social Potency; (2) Impulsive Antisociality (PPI-II), assessing behavioural-lifestyle traits and consisting of the subscales Impulsive Nonconformity, Blame Externalization, Machiavellian Egocentricity, and Carefree Nonplanfulness. The eighth subscale, the Coldheartedness scale, did not load on either PPI-factor, and has been regarded as a separate factor (PPI-III; “Coldheartedness”) (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005; Benning, Patrick, Hicks, Blonigen, & Krueger, 2003).

As might be expected of good psychopathy instruments, the PPI total score is related to antisocial behaviour (Edens, Poythress, Lilienfeld, Patrick, & Test, 2008),

substance abuse, and fearfulness (Lilienfeld & Andrews, 1996). The convergent and discriminant validity of the PPI-factors is supported by their relations with the corresponding factors of the PCL-R (Berardino, Meloy, Sherman, & Jacobs, 2005) and other self-report measures of psychopathy (Benning, Patrick, Salekin, & Leistico, 2005). Furthermore, the PPI-factors are correlated with theoretically relevant constructs of psychopathy. PPI-I is related to indices of antisocial behaviour (Benning et al., 2003), low fear and anxiety (Patrick, Edens, Poythress, Lilienfeld, & Benning, 2006), and low behavioural inhibition (Uzieblo, Verschuere, & Crombez, 2007). PPI-II is mainly associated to institutional maladjustment (Edens et al., 2008), indices of externalizing conduct (Benning et al., 2003), high anxiety (Patrick et al., 2006; Uzieblo et al., 2007), and fun seeking behaviour (Uzieblo et al., 2007). Less is known about the validity of the third PPI-factor (Benning et al., 2003), because it is often discarded from the analyses.

### *The Current Study*

Recently, the PPI was revised by Lilienfeld and Widows (2005). The revision essentially involves the shortening of the instrument from 187 to 154 items, the facilitation of the PPI's reading level, and the reformulation of culturally specific idioms. Because the PPI-R does not include items assessing antisocial behaviour, the second factor was named Self-Centered Impulsivity instead of Impulsive Antisociality.

We investigated the two-factor structure of the PPI-R using confirmatory factor analyses. It might be expected that the results regarding the PPI-R parallel those of the original PPI. Initial results regarding the validity of the PPI-R factors are promising, but need further corroboration. The first aim of this study was to investigate the factor structure of the PPI-R using confirmatory factor analysis.

Secondly, we investigated the convergent and discriminant validity of the PPI-R factors. Finally, we explored the external validity of the PPI-R factors.

*The PPI-R factor structure.* We expected a two-factor structure similar to the one obtained with the original PPI (Benning et al., 2003; Benning, Patrick, Salekin et al., 2005) and to the one obtained by the developers of the PPI-R (Lilienfeld & Widows, 2005).

*The convergent and discriminant validity.* We tested the convergent and discriminant validity of the PPI-R factors by relating the PPI-R factors to factors of two other self-report psychopathy measures, i.e. the Levenson's Self-Report of Psychopathy (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) and the Youth Psychopathic Traits Inventory (YPI; Andershed, Kerr, Stattin, & Levander, 2002).<sup>1</sup> The LSRP contains two factors. The Primary Psychopathy factor (LSRP-I) assesses the affective-interpersonal traits of psychopathy. The Secondary Psychopathy factor (LSRP-II) assesses behavioural-lifestyle traits of psychopathy (Levenson et al., 1995). The YPI displays a three-factor structure, consisting of an Interpersonal factor (YPI-I), an Affective factor (YPI-II), and a Lifestyle factor (YPI-III) (Andershed et al., 2002). Although the YPI was designed to be used in adolescents (i.e. <18 years), the YPI has also been successfully used in older participants (Forsman, Larsson, Andershed, & Lichtenstein, in press; Kansi, 2003). In the present study convergent validity was examined by computing associations among corresponding factors from the three self-report psychopathy measures. Discriminant validity was examined by computing associations among the non-corresponding factors. We expected that the former associations would be significantly larger than the latter associations.

*External validity.* To investigate the external validity of the PPI-R factors, a broad range of external variables relevant to the construct of psychopathy were

included in the present study. We first examined whether the PPI-R factors exhibit similar relations to these variables as previously established with the most widely used psychopathy instrument, the PCL-R. Factor analytical work with the PCL-R originally revealed a two-factor model of psychopathy: An affective-interpersonal factor (PCL-R: F1) and a social deviance factor (PCL-R: F2) (Harpur, Hare, & Hakstian, 1989).<sup>2</sup> PCL-R: F2 is associated with antisocial behaviour such as delinquent and aggressive behaviour (Hare, 2003), and alcohol- and drug abuse (Reardon, Lang, & Patrick, 2002). With regard to antisocial behaviour, we focused on minor violations of societal norms (e.g. animal abuse and fare-dodging) instead of actual delinquent behaviour, because these are expected to be more prevalent in a community sample.

Second, a series of external correlates were included which are of theoretical and clinical importance. A lack of anxiety in psychopathy has received a lot of attention in the literature (Cleckley, 1976; Lykken, 1995). PPI-studies confirm the negative association between PPI-I and anxiety, but indicate a positive relation between the PPI-II and anxiety (Benning et al., 2003; Uzieblo et al., 2007). We were also interested in the relationship between the psychopathy factors and certain less researched variables, in particular empathy and the experience of friendship relations. The relations of the PPI-R factors with empathy components (i.e. affective and cognitive empathy) were explored. Low affective empathy is associated with both affective-interpersonal (Mahmut, Homewood, & Stevenson, 2008) and behavioural-lifestyle traits (Joliffe & Farrington, 2004). A deficit in affective empathy would enable psychopathic individuals to repeatedly inflict harm to others. To successfully manipulate others, a good comprehension of affective states of others (high cognitive empathy) can be expected in psychopathic individuals (Hare, 2003). This would imply high cognitive empathy in psychopathy. Second, case studies suggest that individuals

with psychopathic traits have an indifferent attitude towards relationships (see e.g. Hare, 2003). We wanted to substantiate this clinical finding by examining whether PPI-R factor-scores are related to an indifferent perception and disregard of relationships. Third, there is increasing evidence that psychopathy is characterized by an underactive behavioural inhibition system (BIS) and/or by an overactive behavioural activation system (BAS) (Arnett, 1997; Gorenstein & Newman, 1980). Previous research indicates that the affective-interpersonal traits are mainly associated with low BIS and high BAS, and the behavioural-lifestyle traits with high BAS (Ross, Benning, & Adams, 2007; Uzieblo et al., 2007).

Based upon previous research and the aforementioned clinical and theoretical insights, the following hypotheses were formulated. First, it was expected that PPI-R-I would be related to low anxiety, low affective empathy, high cognitive empathy, an indifferent perception of relationships, low BIS and high BAS. Second, PPI-R-II was expected to be associated with antisocial behaviour, high anxiety, low affective empathy, and high BAS. Finally, it was hypothesized that PPI-R-III would be mainly related to low affective empathy.

## **METHOD**

### ***Participants***

Seven hundred and thirteen volunteers were recruited from the community. Following recommendations of Lilienfeld and Widows (2005), 5.33% participants were excluded because of an atypical score on the Inconsistent Responding 15 scale (1.68%), on the Inconsistent Responding 40 scale (2.24%), or on both Inconsistent Responding scales (1.40%). The final sample consisted of 675 participants (62.50% male;  $M = 32.99$  years,  $SD = 13.92$ , range = 16-73). The majority of the participants

had a Belgian nationality (99.6%). Most of the participants' mother tongue was Dutch (99%).

### ***Measures***

The *Psychopathic Personality Inventory-Revised* (PPI-R; Lilienfeld & Widows, 2005) is a 154-item self-report measure of psychopathic personality features. The items are answered using a 4-point Likert scale (1 = *false*, 2 = *mostly false*, 3 = *mostly true*, and 4 = *true*). The items are grouped into eight subscales seven of which can be organized into a two-factor higher order structure, based on previous principal factor analysis in a large community/college sample ( $N=985$ ): The Fearless Dominance Factor (PPI-R-I), including the subscales Stress Immunity, Social Influence, and Fearlessness; The Self-Centered Impulsivity factor (PPI-R-II), including the subscales Rebellious Nonconformity, Blame Externalization, Machiavellian Egocentricity, and Carefree Nonplanfulness. A third factor that emerged, the Coldheartedness factor (PPI-R-III), consists solely of the subscale with the same name and it did not load on the other PPI-R factors (Lilienfeld & Widows, 2005). Following Benning et al. (2003), these factor scores were calculated by averaging the mean of the standardized subscale scores.

The PPI-R also contains three validity scales: (1) The Deviant Responding scale, assessing if the participant is malingering, responding randomly or is experiencing difficulty to comprehend the instructions or the items; (2) the 15- and 40- item pair Inconsistent Responding scales, assessing whether the participant is answering inconsistently to the items; and (3) the Virtuous Responding scale, detecting positive impression management. Following the recommendations of the authors of the PPI-R, participants with an atypical score on the Inconsistent



Responding 15 scale (i.e.  $\geq 17$ ), and on the Inconsistent Responding 40 scale (i.e.  $\geq 45$ ) should be excluded out of analyses.

We used the authorized Dutch translation of the PPI-R (Uzieblo, Verschuere, Jellicic, Rossi, Maesschalck, & Crombez, 2006). This translation was based on the Functional Assessment of Chronic Illness Therapy (FACIT, 2006) procedures and guidelines for translation.

Internal consistencies of all psychopathy measures included in this study are depicted in Table 1.

The *Levenson's Self-Report of Psychopathy* (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) is a 26-item self-report measure of both the personality traits and the behavioural traits of psychopathy. Items are scored on a 4-point Likert scale (1 = *strongly disagree*, 2 = *disagree somewhat*, 3 = *agree somewhat*, 4 = *strongly agree*). Previous principal components analyses in 487 undergraduates revealed a two-factor structure: The Primary Psychopathy factor (LSRP-I), assessing the callous/manipulative lifestyle associated with psychopathy, and the Secondary Psychopathy factor (LSRP-II) assessing behavioural problems associated with psychopathy (Levenson et al., 1995). Levenson and colleagues (1995) reported acceptable to good coefficient alphas. The Dutch translation of the LSRP was used in the present study (Uzieblo, Verschuere, & Crombez, 2006). This translation was based on the FACIT-guidelines (2006).

The *Youth Psychopathic Traits Inventory* (YPI; Andershed, Kerr, Stattin, & Levander, 2002) is a 50-item self-report measure of psychopathic traits. Items are scored on a 4-point Likert scale (1 = *does not apply at all*, 2 = *does not apply well*, 3 = *applies fairly well*, 4 = *applies very well*). The YPI consists of 10 subscales, which are grouped in three factors as shown by previous exploratory factor analyses using a

sample of 1186 adolescents: an Interpersonal factor, Grandiose-Manipulative (YPI-I), consisting of the subscales Dishonest Charm, Grandiosity, Lying and Manipulation; an Affective factor, Callous-Unemotional (YPI-II), consisting of the subscales Remorselessness, Unemotionality, and Callousness; and a Lifestyle factor (YPI-III), Impulsive-Irresponsible, consisting of the subscales Thrill-Seeking, Impulsivity, and Irresponsibility (Andershed et al., 2002). Previous studies demonstrated good internal consistency of the YPI. We used the authorized Dutch translation (Das, de Ruiter, & Harreveld, 2002).

*Hollingshead's system* (1975) was used as index for socio-economic status (SES). This system was applied to code the occupational and the educational status of the participant and his/her partner. Occupations were coded from 1 ('farm labourer, menial, service workers') to 9 ('higher executive proprietor of a large concern, major professional'). Educational level was coded from 1 ('less than 7 years of schooling') to 7 ('graduate, professional training'). These scores are assigned to each participant based on the information given by them. Next, the occupational and the educational scores are weighted to obtain a single score (range 8-66). Higher SES-scores are indices for a higher social standard. Participants with homemaking or school as main activity, or who receive social assistance, could not be categorized (12.4%), and therefore did not receive a SES-score.

The *Empathy Quotient* (EQ; Baron-Cohen & Wheelwright, 2004) is a 60-item self-report measure for empathy. Responses are given on a 4-point scale ranging from 1 ('strongly disagree') to 4 ('strongly agree'). Based on a principal components analysis, Lawrence, Shaw, Baker, Baron-Cohen, and David (2004) distinguish three factors: the Cognitive Empathy-factor assessing the comprehension of others' affective states, the Emotional Reactivity-factor assessing the tendency to react

emotionally to others' mental states, and the Social Skills-factor assessing the spontaneous use of social skills and intuitive social understanding. Previous studies demonstrated good internal consistency for the EQ-total score and its factors (Baron-Cohen & Wheelwright, 2004; Lawrence et al., 2004). The authorized Dutch translation, following FACIT translation guidelines (2006), is used in the present study (De Corte, Uzieblo, Buysse, & Crombez, 2006).

Internal consistencies of all self-report measures for the external variables included in this study are described in Table 4.

The *Friendship Questionnaire* (FQ; Baron-Cohen & Wheelwright, 2003) is a 35-item self-report measure assessing the style of relating to others. Each item regards a statement or question about friendship (e.g. '*How interested are you in the everyday details (e.g., their relationships, family, what's currently going on in their lives) of your casual friends' lives?*'). Participants have to indicate to what extent these statements apply to them. High scores indicate that the participants enjoy intimate, empathic friendships, are interested in others, and consider friendship as valuable for its own sake. The authors report a good internal consistency. We used the authorized Dutch translation (Uzieblo, De Corte, Crombez, & Buysse, 2006) which respected the FACIT-guidelines (2006).

The *Trait-Anxiety Inventory* (STAI-T; Spielberger, 1983) is a 20-item self-report measure assessing a stable (trait) tendency to anxiety. Spielberger (1983) reported high internal consistency and a good test-retest reliability. We used the authorized Dutch translation which exhibited good internal consistency in previous studies (e.g., Van der ploeg, Defares, & Spielberger, 1980).

The *Behavioural Inhibition and Behavioural Activation Scales* (BIS/BAS-scales; Carver & White, 1994) is a 20-item self-report measure. Items are answered

using a 4-point response scale, ranging from 1 ('strongly agree') to 4 ('strongly disagree'). This measure consists of a 4-factor structure. The BIS-scale assesses the tendency to experience negative affect or behavioural inhibition when cues of threat are present, whereas the BAS-scale assesses the tendency to experience strong positive affect or behavioural approach when cues of incentive are present. The latter comprises of three subscales: Fun Seeking assesses the impulsive search of pleasure; Drive assesses the motivation to pursue goals; and Reward Responsiveness assesses the tendency to respond with positive affect in the context of desired events or cues of possible future reward. Adequate internal consistencies and test-retest reliability have been reported for the four BIS/BAS-scales (Carver & White, 1994). The Dutch version of the BIS/BAS-scales was used in the present study. This version exhibits satisfactory psychometric properties (Franken, Muris, & Rassin, 2005).

The *Alcohol Use Disorders Identification Test* (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) is a 10-item self-report questionnaire for the identification of hazardous alcohol consumption. The first eight items are answered on a 5-point Likert scale (from 0 = *never* to 4 = *4 or more times a week*, for the first question; from 0 = *1 or 2* to 4 = *10 or more*, for the second question; from 0 = *never* to 4 = *daily or almost daily*, for items 3-8). The last two questions are answered with false/true response categories. The AUDIT-total score has demonstrated a high internal consistency (Allen, Litten, Fertig, & Barbor, 1997), and test-retest reliability (Babor et al., 2001). We administered the Dutch version of the AUDIT (Babor et al., 2001).

The *Drug Abuse Screening Test* (DAST-10; Skinner, 1982) is a 10-item self-report measure for drug abuse. Items are answered with true-false response categories. Recent studies reveal good psychometric properties of the DAST-10 (e.g., Yudko,

Lozhkina, & Fouts, 2007). In the current study the Dutch version of the DAST was applied (Verschuere, Uzieblo, & Crombez, 2006a).

*Self-Reported Minor Delinquent Behaviours* (Verschuere, Uzieblo, & Crombez, 2006b) was developed ad hoc to detect the frequency of minor criminal behaviours. The questionnaire consists of seven minor violations (e.g., “*Have you ever sold illegal drugs?*”, “*Have you ever mistreated an animal?*”). Items are scored on a 5-point Likert scale (0 = *never*, 1 = *once*, 2 = *twice*, 3 = *three times*, 4 = *more than three times*). The total score (maximal score = 28) was obtained by adding up all item-scores.

The *Buss-Durkee Hostility Inventory-Dutch version* (BDHI-D; Lange, Hoogendoorn, Wiederspalm, & de Beurs, 1995) is an adapted version of the original Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957) consisting of 40 items assessing hostility and the tendency towards aggressive behaviour with true-false response categories. Principal component analyses yielded three factors: Indirect Aggression, measuring suppressed hostility, Direct Aggression, measuring overt aggressive behaviour and verbal aggression, and Social Desirability. Good internal consistencies for the BDHI-D have been reported (Meesters & Muris, 1996).

### ***Procedure***

The participants were recruited through a snowball sampling technique: Eight undergraduate students contacted participants amongst their acquaintances. These participants provided a new series of participants, who in turn provided another series of volunteers, and so on. Thus, this technique relies on appointments from initial participants to produce additional participants. This technique has been considered as economical, efficient and effective (Snijders, 1992) and has been often applied in social sciences (Atkinson & Flint, 2001).

All participants received a letter in which the study was explained. The study was approved by the ethical committee of Ghent University and written informed consent was obtained from all participants. There was no reward for participation. In total 79% of all spread questionnaires were filled in. Information about those who declined to participate was not available.

### ***Missing Data***

With regard to the self-report measures, data from scales with more than 20% missing data were omitted from analyses (see also, Lilienfeld & Widows, 2005): .4% of PPI-R-I, LSRP-I, LSRP-II, and YPI-III, .6% of YPI-I and YPI-II, .7% of STAI-T and FQ, .1% of BIS, BAS Reward, and BAS Fun, .3% of BAS Drive and BAS, 1.8% of DAST-10, 4.2% of Indirect Aggression, Direct Aggression, and Social Desirability. It was tested whether the missing data were random with the Little's MCAR test (Little & Rubin, 1989). These analyses revealed that the missing data of all self-report measures were random (all  $\chi^2$ 's > 2.07, all  $p$ 's > .10), except the missing data of two measures, namely the BIS/BAS scale [ $\chi^2(19)=41.42, p<.01$ ] and the Friendship Questionnaire [ $\chi^2(2048)=2555.31, p<.01$ ]. But comparison of the analyses using imputed data with the analyses using listwise deletion showed no meaningful differences.

Data from scales with less than 20% missing data were prorated on basis of the mean for completed items (see also, Lilienfeld & Widows, 2005).

### ***Confirmatory Factor Analyses***

Confirmatory factor analyses were performed to determine whether the two-factor structure of the PPI-R as proposed by Lilienfeld and Widows (2005) could be replicated. The confirmatory factor analyses were performed with AMOS 16.0 (Arbuckle, 1995-2007). The fit of the model was estimated with the Maximum

Likelihood algorithm, while allowing the latent variables to correlate. In line with theoretical recommendations (Bollen & Long, 1993; Byrne, 2001), several fit indices were used to assess the model fit:  $\chi^2$ ,  $\chi^2/df$  (CMIN/df), the root mean square error of approximation (RMSEA), the goodness-of fit index (GFI) and the adjusted goodness-of-fit index (AGFI), and the comparative fit index (CFI) (for an overview, see Bollen & Long, 1993). A non-significant  $\chi^2$ - value and a CMIN/df -value within the 2:1 or 3:1 range indicate an acceptable model (Carmines & McIver, 1981; Marsh, Balla, & McDonald, 1988). Values of RMSEA up to .08, GFI and CFI above .90, and AGFI above .85 indicate proper fit (Browne & Cudeck, 1993; Hu & Bentler, 1991; Jöreskog & Sörbom, 1984).

Confirmatory factor analyses were performed on subscale level instead of on item level, because our current sample was too small to perform factor analyses on item level (Bentler & Chou, 1987). In the CFA model, the PPI-R factors, PPI-R-I and PPI-R-II, were indicated by their subscales. The latter served as manifest variables, whereas the PPI-R factors were considered as latent first-order factors. The PPI-R factors were allowed to correlate in both models.

### *Correlational Analyses*

Correlations were analyzed with SPSS 12.0 at a significance level of .01.

## **RESULTS**

### *Psychopathy Factors and Descriptive Statistics*

Means, standard deviations and internal consistencies (Cronbach's alphas) of PPI-R, LSRP, and YPI total and factor scores are displayed in Table 1. Consistent with psychopathy literature, males demonstrated higher total scores on the PPI-R, the LSRP and the YPI than females. This gender difference was found for all factors,

except for the behavioural-lifestyle factors of the PPI-R and the LSRP, where the gender difference was in the opposite direction.

INSERT TABLE 1 AROUND HERE

### *Confirmatory Factor Analyses*

Table 2 displays the standardized loadings of the subscales on the PPI-R factors. The subscale Blame Externalization displayed a rather low factor loading on PPI-R-II and the subscale Stress Immunity exhibited a relatively low factor loading on PPI-R-I. Satisfactory factor loadings of .30 or higher were obtained for the remaining PPI-R subscales.

Confirmatory factor analysis shows for all fit indices that the two-factor structure achieved a poor fit [ $\chi^2 = 376.39 (15), p < .01$ ; CMIN/DF = 26.10; RMSEA = .19 (.18; .21); GFI = .87; AGFI = .77; CFI = .67].<sup>3,4</sup>

INSERT TABLE 2 AROUND HERE

### *Convergent and Discriminant validity of the PPI-R factors*

In the present study all PPI-R factors were intercorrelated: PPI-R-I was correlated with PPI-R-II,  $r = .20, p < .01$ , and with PPI-R-III,  $r = .34, p < .01$ , and PPI-R-II was correlated with PPI-R-III,  $r = .09, p < .05$ . Because of these correlations, both zero-order and partial correlations were reported following the recommendations of Lynam, Hoyle, and Newman (2006). Partial correlations permit to investigate the unique variance of each PPI-R factor by controlling for the influence of the remaining two PPI-R factors (see Benning et al., 2003; but see Lynam et al., 2006).



Table 3 depicts the interrelations of the PPI-R factors with the factors of the LSRP and the YPI. PPI-R-I exhibited positive associations with LSRP-I and YPI-I. However, it was also approximately equally associated with the affective factor of the YPI (YPI-II) as with its behavioural factor (YPI-III). When controlling for PPI-R-II and PPI-R-III, PPI-R-I did not correlate with LSRP-I, and PPI-R-I became equally associated with YPI-I and YPI-III, and only to a lesser extent with YPI-II.

PPI-R-II was most strongly related to the corresponding factors of the LSRP and YPI (LSRP-II and YPI-III). Nevertheless, PPI-R-II also showed substantial correlations with the affective-interpersonal factors of the LSRP (LSRP-I), and the YPI (YPI-I and YPI-II). The same pattern of correlations was found after controlling for PPI-R-I and PPI-R-III.

PPI-R-III was related to the affective-interpersonal factors of the LSRP (LSRP-I) and the YPI (YPI-I and YPI-II); it was not associated with the behavioural-lifestyle factors of the LSRP (LSRP-II) and the YPI (YPI-III). After controlling for PPI-R-I and PPI-R-II, PPI-R-III was also most strongly associated with the affective-interpersonal factor of the LSRP (LSRP-I) and the affective factor of the YPI (YPI-II). However, the correlation between PPI-R-III and YPI-I did not remain significant, and PPI-R-III became negatively related to YPI-III.

INSERT TABLE 3 AROUND HERE

### *Interrelations between the PPI-R factors and the Criterion Variables<sup>5,6</sup>*

The zero-order correlations of the PPI-R factors with age, SES, and the criterion variables are presented in Table 4. There were negative relations between PPI-R-I and age, Emotional Reactivity, trait anxiety, BIS, and Indirect Aggression. In

addition, PPI-R-I was positively related to Cognitive Empathy, Social Skills, BAS, BAS-Drive, BAS-Fun, alcohol and drug use, and self-reported minor delinquent behaviour. After controlling for the remaining PPI-R factors a few notable changes were noted in the correlation pattern: PPI-R-I was positively associated with the total scores on the Empathy Quotient and the Friendship Questionnaire, and negatively with Direct Aggression. In addition, PPI-R-I was no longer associated with Emotional Reactivity, and alcohol and drug use.

PPI-R-II was negatively associated with age, SES, the Empathy Quotient total score, Emotional Reactivity, Social Skills and Social Desirability, and positively with trait anxiety, BAS, BAS-Fun, alcohol and drug use, self-reported minor delinquent behaviour and both Indirect and Direct Aggression. With regard to PPI-R-II, a similar pattern of associations remained when controlling for the remaining PPI-R factors. The one exception was the relation between PPI-R-II and the BAS-scale which became non-significant after partialling.

PPI-R-III exhibited negative associations with the Empathy Quotient total score, Cognitive Empathy, and Emotional Reactivity. Negative relations between PPI-R-III and the friendship scale, trait anxiety, BIS, BAS-Reward, and Indirect Aggression, were also observed. PPI-R-III was positively associated with self-reported minor delinquent behaviour. Most associations between PPI-R-III and the criterion variables were preserved when partialling out PPI-R-I and PPI-R-II. However, in contrast to the zero-order correlations, partial correlations displayed a positive relation of PPI-R-III with age, a negative relation with Social Skills and BAS-Fun, and a non-significant relation with minor delinquent behaviour.

INSERT TABLE 4 AROUND HERE

## DISCUSSION

This study examined the validity of the PPI-R factors. The results can be readily summarized. First, we were unable to find evidence for the two-factor structure of the PPI-R as proposed by Lilienfeld and Widows (2005) in our confirmatory factor analyses. Second, results indicated a good convergent and discriminant validity of the PPI-R factors. Third, the external validity of the PPI-R factors was good: the factors were related with a variety of clinically and theoretically relevant criterion variables.

### *Factor Structure of the PPI-R*

Consistent with PPI-findings (Martin, Halder-Sinn, Funsch, & Rindfleisch, 2008; Neumann, Malterer, & Newman, 2008), the factor structure of the PPI-R subscales revealed an inadequate fit. There may be several reasons for this. First, some authors have raised concerns about the usefulness of confirmatory analytic techniques in testing the structure of personality measures (Church & Burke, 1994; McCrae, Zonderman, Costa, Bond, & Paunonen, 1996), in part because several studies obtained an inadequate fit with personality measures. However, some recent papers revealed an adequate fit with personality measures (Gustavsson, Eriksson, Hilding, Gunnarsson, & Ostensson, 2008; Svindseth et al., 2009). Additionally, no evidence has been found for the original PPI-structure when using *exploratory* factor analyses either (Neumann et al., 2008). Second, evidence in favour of the idea that the current instrument needs improvement is accumulating, taking into account previous PPI findings. The original factor structure of Benning and colleagues (2003) only accounts for 30% to 45% of the variance of the PPI (Eisenbarth & Alpers, 2007; Martin et al., 2008), and the PPI-subcales exhibit cross-loadings on the PPI-factors (Neumann et

al., 2008). It may well be that an alternative structure will result in a better model fit (see Maesschalck, Vertommen, & Hooghe, 2002; Neumann et al., 2008). Further research is warranted to explore the PPI-R structure at item level and to fine tune the PPI-R structure using exploratory analyses. In order to accomplish this, a large sample is required (see Bentler & Chou, 1987).

We also note that, in contrast to previous PPI-studies (Benning et al., 2003), the PPI-R factors in the present study were correlated. However, it does not necessarily oppose the notion of the PPI-R factors being orthogonal factors as proposed by Benning et al. (2003). Instead, as argued above, it is probably related to the PPI-R subscale structure. Cross-loadings of the PPI-R subscales could underlie the correlations among the factors, as found in previous PPI-studies (Neumann et al., 2008).

### ***Convergence and discriminant validity***

The present results suggest a satisfactory convergent and discriminant validity of the PPI-R factors. A particular finding needs further consideration. Overall, the behavioural-lifestyle factors displayed better convergence than the affective-interpersonal factors. It is possible that there is large variety in how measures assess the affective-interpersonal features of psychopathy. There are at least two explanations. First, it may well be easier to set criteria for antisocial behaviour than for personality-based criteria, given that the latter are mainly inferential (Cloninger, 1978). Second, the items that assess the affective-interpersonal traits were grounded on different theoretical conceptualizations of psychopathy. As a result, different instruments may measure different aspects of the affective-interpersonal psychopathy construct: PPI-R-I may well focus on the absence of fear and of stress reactivity, PPI-R-III on lack of empathy and guilt, LSRP-I on the lack of empathy, and YPI-II on the

lack of guilt, remorse and empathy, and on shallow affect. Further research should focus on the development of a more comprehensive measure covering the distinct affective and interpersonal psychopathy traits more broadly.

### ***External validity of the PPI-R- factors***

Our findings support the external validity of the PPI-R factors. As is the case for the affective-interpersonal factor of the PCL-R (PCL-R: F1), PPI-R-I was positively related to indices of antisocial behaviour, such as alcohol use and delinquent behaviour (Harpur et al., 1989; Verona, Patrick, & Joiner, 2001). Additionally, PPI-R-I was associated with enhanced cognitive empathy and social skills, but not with low emotional reactivity. The latter is in line with the finding that high scorers on the respective PPI-R factor exhibit a tendency to exploit others (Benning, Patrick, Blonigen, Hicks, & Iacono, 2005). It can be hypothesized that the ability to properly perceive the affective states of others and to be socially skilled enhances a successful exploitation and manipulation of others (see also, Book, Quinsey, & Langford, 2007). In line with previous PPI research (Benning et al., 2003; Uzieblo et al., 2007), PPI-R-I was negatively related to anxiety. In contrast to PCL-R:F1 (Hale, Goldstein, Abramowitz, Calamari, & Kosson, 2004; Schmitt & Newman, 1999), both PPI-I and PPI-R-I seem to tap a certain degree of anxiety symptoms (Benning et al., 2003; Lilienfeld & Widows, 2005). In contrast to what case studies suggested (Cleckley, 1976), no empirical evidence was found for a relationship between PPI-R-I scores and the perception on friendship relationships. PPI-R-I was related to low inhibition, high fun seeking behaviour and a high motivation to pursue goals, replicating previous PPI-research (Uzieblo et al., 2007). Finally, PPI-R-I was only associated with low indirect aggression. Indeed, individuals with affective-

interpersonal psychopathic traits do not exhibit the tendency to suppress feelings of hostility and negativity (Verona et al., 2001).

Comparable to the social deviance factor of the PCL-R (PCL-R: F2), PPI-R-II was positively associated with both anxiety (Hale et al., 2004; Vitale, Smith, Brinkley, & Newman, 2002) and indices of antisocial behaviour (substance use, minor delinquent behaviour and aggression), and negatively correlated with age and SES (Harpur et al., 1989; Harpur & Hare, 1994). In addition, individuals with higher scores on PPI-R-II exhibit a reduced ability to react with distress when observing suffering in others (Jolliffe & Farrington, 2004; Robinson, Roberts, Strayer, & Koopman, 2007), and to use appropriate social skills (Dodge et al., 2003). As found in previous PPI research (Uzieblo et al., 2007), the behavioural-lifestyle traits were mainly associated with high fun seeking behaviour. Finally, scores on PPI-R-II were associated with enhanced suppressed hostility.

***The Coldheartedness factor: Should it stay or should it go?***

We have unclear results about the distinctiveness of the Coldheartedness factor. Although including the Coldheartedness factor in the confirmatory factor analyses did not result in an adequate model fit, PPI-R-III was related to PPI-R-I and to the factors of the YPI and the LSRP assessing affective, interpersonal traits of psychopathy. Furthermore, PPI-R-III exhibited meaningful relations with external variables in the present study, extending findings regarding its placement within the nomological network of psychopathy. PPI-R-III was associated not only with low affective empathy, as first hypothesized, but also with low cognitive empathy, indicating a general diminished empathic ability. Interestingly, instead of PPI-R-I, PPI-R-III appeared to be associated with little enjoyment of intimate relationships. Given that individuals scoring high on PPI-R-III are callous (Lilienfeld & Widows,

2005), and exhibit low sentimentality (Benning et al., 2003), it is not surprising that intimate relationships are of little value. The PPI-R-factor was also related to low trait anxiety, low BIS, low reward seeking behaviour, high minor delinquent behaviour, and low indirect and high direct aggression. In sum, PPI-R-III seems to tap unique propensities in comparison to PPI-R-I, which are related to psychopathy. With respect to the latter statement, it is interesting to note that PPI-R-I was mainly related to the interpersonal YPI factor, whereas PPI-R-III was mainly associated to the affective YPI factor. Hence, PPI-R-III seems to tap certain distinct affective and interpersonal traits of psychopathy, demonstrating its value as a psychopathy factor. Researchers should include Coldheartedness in future work.

### ***Limitations and Conclusions***

There are some limitations to be considered. **First, our sample was not randomly selected or matched on characteristics, such as gender and SES. The latter hampered proper comparisons across these characteristics.** Second, we only used self-report measures. Notwithstanding these limitations, the present study can be regarded as accumulating evidence for the meaningful locations of the PPI-R factors within the nomological network of psychopathy. In all, the PPI-R shows to be a promising tool to assess the affective-interpersonal and behavioural-lifestyle traits of psychopathy in non-institutionalized populations. But the present study also revealed and confirmed some important problematic issues with the PPI-R factor structure. Hence, most importantly, the PPI-R needs factor structure improvement which should be started at item level.

## Footnotes

<sup>1</sup> Although the final PPI-factor solutions as suggested by Benning et al. (2003) did not include the Coldheartedness factor, one can state that Coldheartedness is at least theoretically related to psychopathy. Hence, PPI-R-III is retained in the analyses regarding the convergent, discriminant and external validity of the PPI-R factors.

<sup>2</sup> More recent research indicates that a 3 (Cooke & Michie, 2001) or 4 factor solution provides the best fit (Vitacco, Rogers, Neumann, Harrison, & Vincent, 2005). Despite these recent findings, current knowledge regarding the PCL-R is still mainly based on the two-factor conceptualization of the PCL-R.

<sup>3</sup> Although beyond the scope of the current study, the invariance of the PPI-R structure across gender was examined, revealing an instable two-factor structure [ $\chi^2 = 363.66$  (41),  $p < .01$ ; CMIN/DF = 43.52; RMSEA = .14 (.12; .15); GFI = .88; AGFI = .74; CFI = .67]. Further information can be given upon request.

<sup>4</sup> Because the question remains whether the Coldheartedness factor should be retained in the PPI-R structure, we also tested a second model. In this model, the three PPI-R factors served as latent variables. The subscales of PPI-R-I and PPI-R-II functioned as manifest variables. Because PPI-R-III only retains one subscale, the items of PPI-R-III served as manifest variables. All factors were allowed to correlate. This model achieved an inadequate fit [ $\chi^2 = 1710.55$  (227),  $p < .01$ ; CMIN/DF = 7.54; RMSEA = .10 (.09; .10); GFI = .81 AGFI = .77; CFI = .58].

<sup>5</sup> When controlling for possible age, gender and socio-economic status effects, similar results emerged.

<sup>6</sup> Correlations between LSRP, YPI and external variables were not included in the present study, because these analyses fell beyond the scope of the current study. This information can be obtained upon request.



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Table 1. Means, Standard Deviations, Internal consistencies, Independent *t*-tests, and effect sizes (Cohen's *d*) of the PPI-R, the LSRP, and the YPI, and their factor scores for the total sample, the male and the female subsample.

	Cronbach's $\alpha$	Total Sample			Males			Females			<i>t</i>
		n	M	SD	n	M	SD	n	M	SD	
PPI-R-Total	.91	675	276.96	34.38	422	283.00	34.30	253	266.87	32.12	6.06**
<i>Fearless-Dominance</i>	.91	675	109.17	19.84	422	113.31	19.29	253	102.26	18.84	7.27**
<i>Self-Centered Impulsivity</i>	.89	675	135.16	21.01	422	135.39	21.43	253	134.79	20.31	.36
<i>Coldheartedness</i>	.79	675	32.62	6.58	422	34.30	6.44	253	29.82	5.82	9.07**
LSRP-Total	.81	672	48.99	9.19	420	49.71	9.44	252	47.79	8.64	2.63**
<i>Primary Psychopathy</i>	.79	672	30.07	6.63	420	31.13	6.75	252	28.30	6.04	5.47**
<i>Secondary Psychopathy</i>	.69	672	18.92	4.42	420	18.58	4.45	252	19.49	4.45	-2.61*
YPI-Total	.91	672	86.13	17.18	420	89.63	17.33	252	80.31	15.27	7.28**
<i>Grandiose-Manipulative</i>	.91	671	31.05	8.50	419	32.10	8.51	252	29.29	8.20	4.20**
<i>Callous-Unemotional</i>	.79	671	26.25	5.86	419	28.22	5.65	252	22.96	4.59	13.16**
<i>Lifestyle</i>	.83	672	28.92	7.14	420	29.45	7.37	252	28.05	6.66	2.46*

Note. PPI-R=Psychopathic Personality Inventory-Revised; LSRP=Levenson's Self-Report for Psychopathy; YPI=Youth Psychopathic Traits Inventory.

\*\*  $p < .01$ . \*  $p < .05$

Table 2. Confirmatory Factor Analysis of the PPI-R two-factor structure.

<b>Subscale</b>	<b>PPI-R-I</b>	<b>PPI-R-II</b>
<b>Stress Immunity</b>	.30	
<b>Social Influence</b>	.44	
<b>Fearlessness</b>	.82	
<b>Rebellious Nonconformity</b>		.94
<b>Blame Externalization</b>		.18
<b>Machiavellian Egocentricity</b>		.51
<b>Carefree Nonplanfulness</b>		.39

*Note.* PPI-R-I=Fearless-Dominance; PPI-R-II=Self-Centered Impulsivity; All factor loadings were significant.

Table 3. Pearson and Partial correlations of the PPI-R factors with the LSRP and YPI factors.

	PPI-R-I		PPI-R-II		PPI-R-III	
	zero-order	partial	zero-order	partial	zero-order	partial
<b>LSRP-I</b>	.24 <sup>a</sup> **	.02	.49 <sup>b</sup> **	.49**	.43**	.42**
<b>LSRP-II</b>	-.09 <sup>a,b*</sup>	-.30**	.68**	.71**	-.01	.01
<b>YPI-I</b>	.41 <sup>a,b</sup> **	.33**	.51 <sup>b</sup> **	.48**	.20**	.06
<b>YPI-II</b>	.34 <sup>b</sup> **	.18**	.30 <sup>b</sup> **	.26**	.47**	.41**
<b>YPI-III</b>	.35 <sup>a,b</sup> **	.33**	.70 <sup>b</sup> **	.69**	.05	-.14**

Note. PPI-R-I=Fearless-Dominance; PPI-R-II=Self-Centered Impulsivity; PPI-R-III=Coldheartedness; LSRP-I=Primary Psychopathy; LSRP-II=Secondary Psychopathy; YPI-I=Grandiose-Manipulative; YPI-II=Callous-Unemotional; YPI-III=Lifestyle factor. a = differs from the respective correlation with PPI-R-II with  $p < .01$ , b = differs from the respective correlation with PPI-R-III with  $p < .01$ .

\*\*  $p < .01$ . \* $p < .05$

Table 4. Internal consistencies of the criterion variables, Pearsons and Partial Correlations for the PPI-R factors with age, socio-economic status, the Empathy Quotient-scales, Friendship Questionnaire, trait anxiety, BIS/BAS-scales, alcohol and drug use, Self-reported Minor Delinquency, direct and indirect aggression, and Social Desirability.

	Cronbach's $\alpha$	PPI-R-I		PPI-R-II		PPI-R-III	
		zero -order	partial	zero-order	partial	zero-order	partial
<b>Age</b>	-	-.23 <sup>a,b**</sup>	-.16**	-.41 <sup>b**</sup>	-.38**	-.03	.10*
<b>SES</b>	-	.05 <sup>a,b</sup>	.07	-.16 <sup>b**</sup>	-.19**	.04	.02
<b>Empathy total score</b>	.83	-.03 <sup>b</sup>	.18**	-.29 <sup>b**</sup>	-.31**	-.47**	-.49**
<i>Cognitive Empathy</i>	.84	.23 <sup>a,b**</sup>	.33**	.01 <sup>b</sup>	-.02	-.19**	-.21**
<i>Emotional Reactivity</i>	.72	-.17 <sup>b**</sup>	.04	-.23 <sup>b**</sup>	-.24**	-.59**	-.57**
<i>Social Skills</i>	.48	.26 <sup>b**</sup>	.31**	-.17 <sup>b**</sup>	-.22**	-.03	-.15*
<b>Friendship Questionnaire</b>	.65	.01 <sup>b</sup>	.16**	-.01 <sup>b</sup>	.00	-.39**	-.41**
<b>Trait Anxiety</b>	.92	-.52 <sup>a,b**</sup>	-.57**	.34 <sup>b**</sup>	.55**	-.29**	-.18**
<b>BIS</b>	.76	-.48 <sup>a,b**</sup>	-.28**	-.06 <sup>b</sup>	.10	-.39**	-.22**
<b>BAS</b>	.73	.31 <sup>a,b**</sup>	.32**	.18 <sup>b**</sup>	.08	-.09*	-.14*
<i>BAS-Reward</i>	.56	.10 <sup>b**</sup>	.17**	.07 <sup>b</sup>	.01	-.20**	-.18**
<i>BAS-Drive</i>	.62	.23 <sup>a**</sup>	.29**	-.04	-.11	.02	-.02
<i>BAS-Fun</i>	.65	.34 <sup>b**</sup>	.27**	.34 <sup>b**</sup>	.23**	-.03	-.12*
<i>Alcohol use</i>	.85	.21 <sup>b**</sup>	.05	.24 <sup>b**</sup>	.26**	.07	-.03
<i>Drug use</i>	.69	.10 <sup>a,b**</sup>	-.02	.33 <sup>b**</sup>	.42**	.04	-.02
<i>Minor Delinquency</i>	.60	.30 <sup>a,b**</sup>	.21**	.43 <sup>b**</sup>	.44**	.14**	.01
<i>Indirect Aggression</i>	.78	-.32 <sup>a,b**</sup>	-.42**	.46 <sup>b**</sup>	.57**	-.18**	-.12*
<i>Direct Aggression</i>	.15	.05 <sup>a,b</sup>	-.12*	.42 <sup>b**</sup>	.43**	.13**	.12*
<i>Social Desirability</i>	.34	-.05 <sup>a,b</sup>	.08	-.37 <sup>b**</sup>	-.42**	-.07	-.08

Note. PPI-R-I = Fearless-Dominance, PPI-R-II = Self-Centered Impulsivity; PPI-R-III = Coldheartedness; Friendship = Friendship Questionnaire; BIS = Behavioural Inhibition Scale; BAS = Behavioural Activation Scale; BAS-Reward = Reward Responsiveness; BAS-Fun = BAS Fun Seeking. a = differs from the respective correlation with PPI-R-II with  $p < .01$ , b = differs from the respective correlation with PPI-R-III with  $p < .01$ .

\*\*  $p < .01$ . \*  $p < .05$