A bifactor model of the Polish version of the Hare Self-Report Psychopathy Scale

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ABSTRACT

The 64-item Hare Self-Report Psychopathy Scale was translated into Polish with the aim to test construct validity and dimensionality, incremental validity, and composite reliability of the measure in a sample of working adults ($N = 319$). Confirmatory factor analyses revealed that the best fitting model was the bifactor conceptualization containing six latent factors; two general factors of psychopathy and four grouping factors represented by interpersonal, affective, antisocial, and lifestyle latent variables (compared to a 2-factor, 4-factor, and 4-factor with 2 hierarchical factors). The scores of the Polish version of Hare SRP evidenced good composite reliability and incremental validity in terms of predicting scores on aggression scale. Implications for theory and future research are discussed.

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1. Introduction

Psychopathy is often presented as a complex set of dimensions which makes the disorder extremely difficult to capture and define (Ogloff, 2006). Consequently there is much debate in the literature with regards the underlying factor structure of psychopathy.

The most prominent and widely-used measure of psychopathy is the Psychopathy Checklist-Revised (PCL-R; Hare, 1991; Hare, 2003). However, the PCL-R must be completed by a highly trained clinician, which requires extensive amounts of time and access to collateral records of the individual being assessed (Lilienfeld & Fowler, 2007). Furthermore, problems exist with the PCL-R in terms of establishing the latent structure of the construct. Although the scale consists of 20 items, only 18 items are identified as loading onto two factors: (1) Interpersonal/Affective and (2) Lifestyle/Antisocial.

With these limitations in mind, a number of self-report measures of psychopathy have been developed in recent years, one of them being the *Self-Report Psychopathy Scale* (SRP; Hare, 1985). The first version of the SRP consisted of 29 items however the scale possessed poor psychometric properties (Lilienfeld & Fowler, 2007). In order to address those issues, a revised version of the

measure was created (Hare, Harpur, & Hemphill, 1989; as cited in Williams & Paulhus, 2004). The SRP-II consisted of 60 items, 31 of which form the core of the scale and align with the two factors of the PCL-R (Williams & Paulhus, 2004). In a validation study of the SRP-II among a forensic sample, Hare (2003) reported a moderate correlation between the SRP-II and PCL-R ($r = .54$). Nevertheless, Williams and Paulhus' (2004) exploratory factor analysis of the SRP-II found the two-factor model upon which the PCL-R was developed did not represent a good explanation of the data. The SRP-II was instead best represented by an alternative two-factor model. The first factor combined antisocial behaviour, impulsivity and interpersonal manipulation subscales. The second factor included items pertaining to affective deficits.

The newest version of the SRP, the SRP-III (Paulhus, Neumann, & Hare, in press), consists of 64 items measured on a five-point Likert scale. The instrument was reported to be best captured by a four-factor solution, with 16 items loading on the four factors of *Interpersonal Manipulation*, *Callous Affect*, *Erratic Lifestyle*, and *Antisocial Behaviour*. Neal and Sellbom (2012) investigated the factor structure of the SRP-III among a sample of undergraduate students. The authors compared four alternative models and results indicated the four-factor model suggested by Paulhus et al. (in press) proved to be the most accurate representation of the data, however, none of the models met acceptable model fit criteria as measured by fit indices. The researchers suggested that the unsatisfactory results were likely due to the large indicator-to-factor ratio and hence a parcelling technique developed by Cattell and

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Burdsal (1975) was employed. Neal and Sellbom (2012) created 16 radical parcels, each containing indicators from the same hypothesised factor. The same alternative models were estimated for the transformed scale. The technique was successful in improving the fit indices. As hypothesised, the instrument was best captured by the same four-factor solution whose model fit criteria were found to be satisfactory.

The above studies reveal promising findings as to the usefulness of the SRP-III and provide evidence that psychopathy is best conceptualised as four factorial solution. However, based on work with the PCL-R, a variety of factorial solutions have been identified including correlated two- (Harpur, Hakstian, & Hare, 1988; Hare et al., 1990), three- (Cooke & Michie, 2001), and four- (Hare 2003; Hare & Neumann, 2006) factor models. More recently a number of authors have utilised an alternative model structure which may yield a theoretically and statistically satisfactory solution to the debate. This involved the application of bifactor modelling procedures.

Bifactor modelling provides an empirically and conceptually distinct alternative to traditional CFA model solutions. Bifactor modelling views covariation among observable indicators to be explained by both "general factors" and "grouping factors" which exist at the same conceptual level. Reise, Moore, and Haviland (2010) argue that the necessity of creating heterogeneous item sets to capture the complexities of a psychological construct can often produce spurious evidence of multidimensionality in instances where scales are actually capturing a smaller number of latent factors.

Initially, Patrick, Hicks, Nichol, and Krueger (2007) investigated a number of competing latent models of the PCL-R including a bifactorial conceptualisation. These researchers found that a bifactor model including a single general "psychopathy" factor and two grouping factors in-line with Hare's original two-factor model of psychopathy (interpersonal/affective and social deviance) was the best fit of the data. Flores-Mendoza, Alvarenga, Herrero, and Abad (2008) subsequently investigated the latent structure of psychopathy using the PCL-R, with the inclusion of the bifactor model suggested by Patrick, Hicks, Nichol, and Krueger (2007). This study was performed among 124 male prisoners, and results indicated that the bifactorial solution was a better representation of the data than any other tested model.

Although these studies suggest the utility of applying a bifactorial model solution, the results are difficult to interpret based on existing theoretical models of psychopathy. Psychopathy has never been theorised to reflect a single latent construct as reflected in models of Patrick et al. (2007) and Flores-Mendoza et al. (2008). Consequently, Boduszek, Dhingra, Hyland, and Debowska (in press) sought to examine the underlying structure of psychopathy using the Psychopathy Checklist-Screening Version (PCL-SV; Hart, Cox, & Hare, 1995). Boduszek et al. (in press) retained the use of a bifactorial procedure, however, they tested a model in-line with theoretical formulations. This bifactorial solution included two general factors of psychopathy (Interpersonal/Affective and Antisocial/Lifestyle), and four grouping or method factors (Interpersonal, Affective, Antisocial Behaviour, and Erratic Lifestyle) that were hypothesised to arise as a consequence of heterogeneous item content. This new bifactorial model was found to be statistically superior to all other tested models. It was also consistent with Hare's (1991) original model of psychopathy (two factors of Interpersonal/Affective and Antisocial/Lifestyle), while also accounting for previous results which have suggested a greater degree of multidimensionality; namely that the presence of these additional factors is simply a method effect.

The current study is carried out to further investigate the underlying factor structure of the SRP-III using both traditional CFA techniques and bifactor modelling procedures. The current study is performed on the Polish version of the SRP-III and will thus add valuable evidence as to the scale cross-cultural applicability. It is hypothesised that a bifactorial solution consistent with the findings of Boduszek et al. (in press) will represent the best fit of the data.

2. Method

2.1. Participants

The opportunistic sample consisted of 319 Polish working adults recruited at the University of Security in Poznan (Poland). Participants ranged in age from 19 to 51 years (M = 25.16, SD = 6.24). The sample consisted of 175 males and 144 females. Additionally, 77.4% of participants reported being unmarried (n = 247), 20.7% being married (n = 66), 1.6% being divorced (n = 5), and 0.3% being widowed (n = 1).

2.2. Measures

Hare Self-Report Psychopathy Scale (SRP-III; Paulhus et al., in press) is a self-report measure modelled on the Psychopathy Checklist-Revised (PCL-R; Hare, 2003). It is composed of 64-items which fall into four subcategories of psychopathy: Interpersonal Manipulation (IPM – 16 items; α = .83), Callous Affect (CA – 16 items; α = .76), Erratic Lifestyle (ELS – 16 items; α = .76), and Antisocial Behaviour (ASB – 16 items; α = .80). Responses are measured on a five-point Likert scale. The SRP-III used in the current study was translated to Polish by a professional translator. In order to ensure that the meaning has been retained, the Polish version was translated back to English. The two versions were then presented to three experts who suggested minor changes.

The Buss-Perry Aggression Questionnaire – Short Form (BPAQ) (Bryant & Smith, 2001; Buss & Perry, 1992). The original BPAQ consists of 29 items rated on a 5-point Likert scale. The measure was translated to Polish by the AMITY Institute (Instytut AMITY, n.d.). It contains all 29 items from the original version of the questionnaire, however, for the purpose of the present research, only 12 items composing the abbreviated version of the instrument have been used (α = .83).

2.3. Procedure

The measures were administered in groups of up to 40 individuals. Participants gave an informed consent to take part in the study. All participants completed an anonymous, paper and pencil questionnaire which was compiled into a booklet along with an instruction sheet and a consent form attached to the front of the booklet. The participation was voluntary without any form of reward. On completion, participants were debriefed on the purpose of the study.

2.4. Statistical analysis

Confirmatory factor analyses (CFA) along with the utilisation of a confirmatory bifactor modelling approach using MPlus version 6.12 were performed in order to test construct validity and dimensionality of the Polish version of the SRP-III. Four alternative models of the instrument were specified and estimated using robust maximum likelihood estimation. Data was missing completely at random (less than 1%) and full information maximum likelihood (FIML) option was selected. Goodness-of-fit indices were used to compare different theoretical models. The first model specified investigated psychopathy as a two-factor phenomenon (Interpersonal/Affective and Lifestyle/Antisocial – Fig. 1). The second model reflected four dimensions of the measure (Interpersonal, Affective,
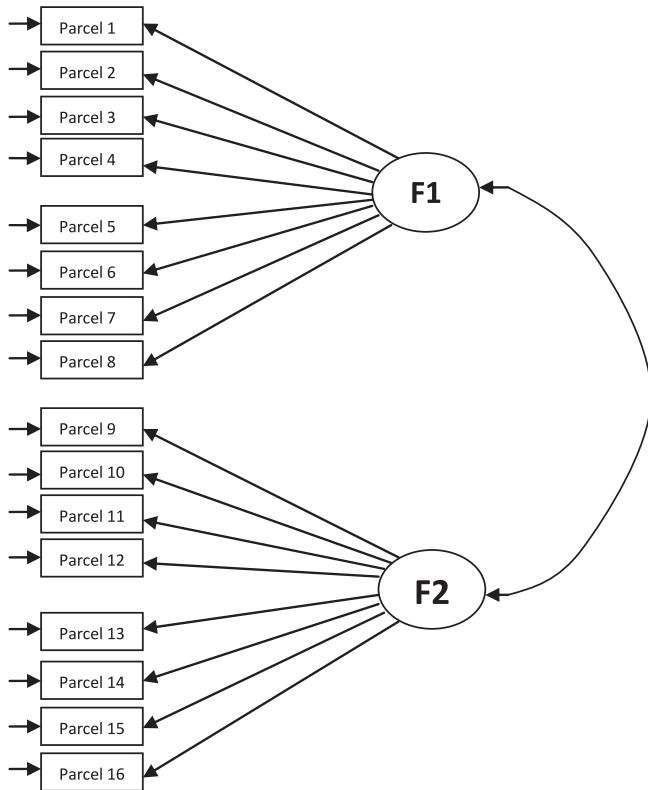
Fig. 1. Two-factor model for SRP-III. F1 = Factor 1; F2 = Factor 2; Parcels 1–4 = items from Interpersonal Manipulation subscale; Parcels 5–8 = items from Callous Affect subscale; Parcels 9–12 = items from Erratic Lifestyle subscale; Parcels 13–16 = items from Antisocial Behaviour subscale.

Lifestyle, and Antisocial – Fig. 2). The third model included four latent factors with two hierarchical factors (Fig. 3). The final model
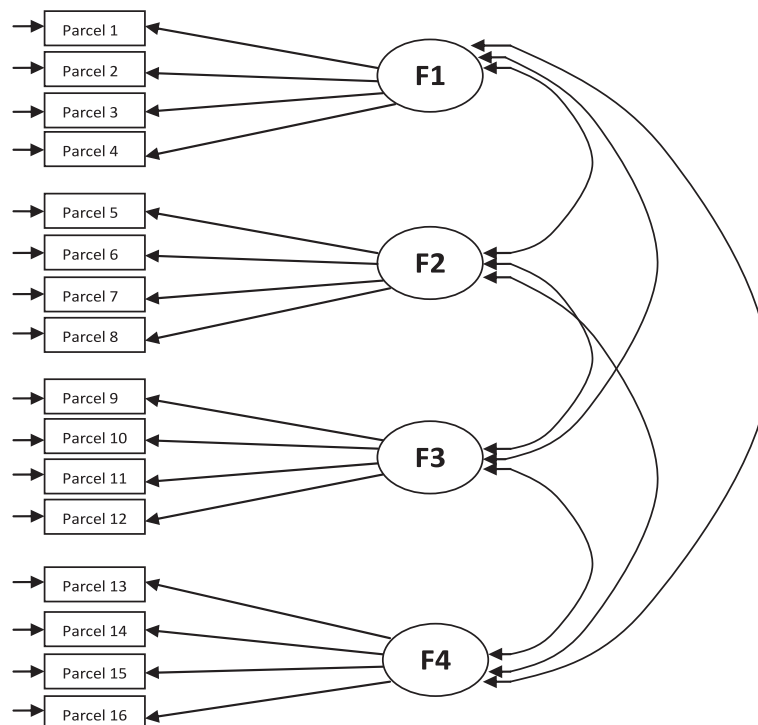
investigated a bifactorial solution of psychopathy as proposed by Boduszek et al. (in press) (Fig. 4). This model is a bifactor conceptualization containing six latent factors; two general factors of psychopathy and four grouping factors represented by Interpersonal, Affective, Lifestyle, and Antisocial latent variables.
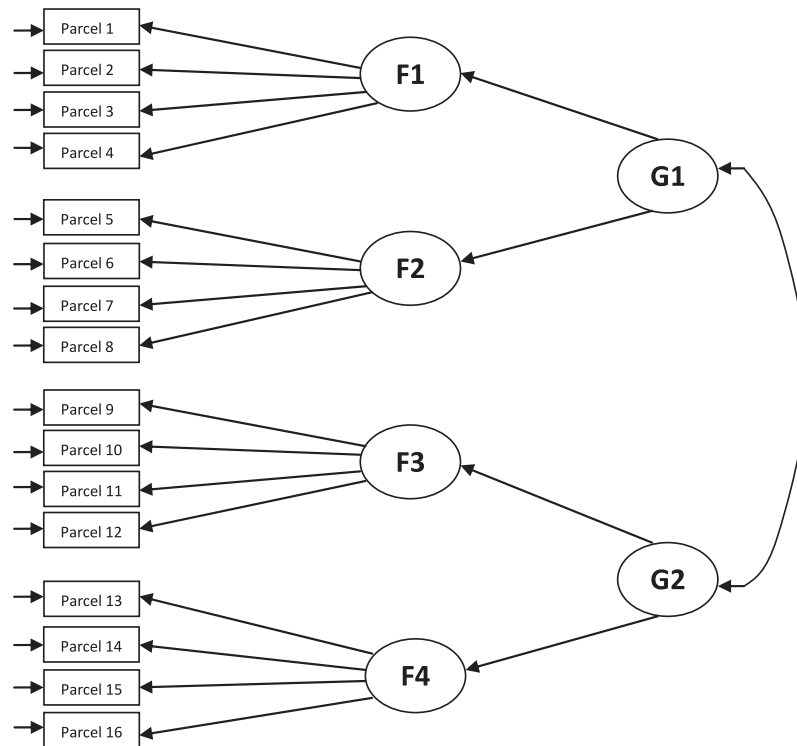
Similarly to Neal and Sellbom (2012) study, none of the above models met acceptable model fit criteria with the original 64-item measure. Followed by Neal and Sellbom's procedure, all 64 items were computed into 16 radial parcels. Each parcel contained four randomly chosen items from the same hypothesised factor. Again, four models were tested.

Goodness-of-fit indices were used to compare four models of psychopathy: chi-square (χ^2), Root-Mean-Square Error of Approximation (RMSEA; Steiger, 1990) with 90% confidence interval (90% CI), Standardized Root Mean Square Residual (SRMR), Akaike Information Criterion (AIC; Akaike, 1973), Comparative Fit Index (CFI; Bentler, 1990), Tucker Lewis Index (TLI; Tucker & Lewis, 1973). A non-significant chi-square (Kline, 2005) and values above .95 for the CFI and TLI, are considered to reflect a good model fit (Hu & Bentler, 1998). A RMSEA and SRMR value less than .05 suggests acceptable errors of approximation in the population (Browne & Cudeck, 1993). AIC values were used to compare four specified models, with the smallest value indicating the best fitting model.

3. Results

3.1. Confirmatory factor analyses

Table 1 presents the fit indices for the four alternative models of psychopathy. As can be noted, none of the tested models, using the 64-item scale, met acceptable model fit criteria as evidenced from all fit indices. However, as demonstrated by the lowest AIC value, the bifactorial model has the best model fit when compared with other estimated models ($\chi^2_{(1888)}$ = 4930.42, p < .001, CFI = .634, TLI = .609, RMSEA = .060 (90% CI = .058/.062), SRMR = .073, AIC = 85176.36).

Fig. 2. Four-factor model for SRP-III. F1 = Factor 1; F2 = Factor 2; Parcels 1–4 = items from Interpersonal Manipulation subscale; Parcels 5–8 = items from Callous Affect subscale; Parcels 9–12 = items from Erratic Lifestyle subscale; Parcels 13–16 = items from Antisocial Behaviour subscale.

Fig. 3. Four factors model hierarchical two factor model for SRP-III. F1 = Factor 1; F2 = Factor 2; G1 = General factor 1; G2 = General factor 2; Parcels 1–4 = items from Interpersonal Manipulation subscale; Parcels 5–8 = items from Callous Affect subscale; Parcels 9–12 = items from Erratic Lifestyle subscale; Parcels 13–16 = items from Antisocial Behaviour subscale.
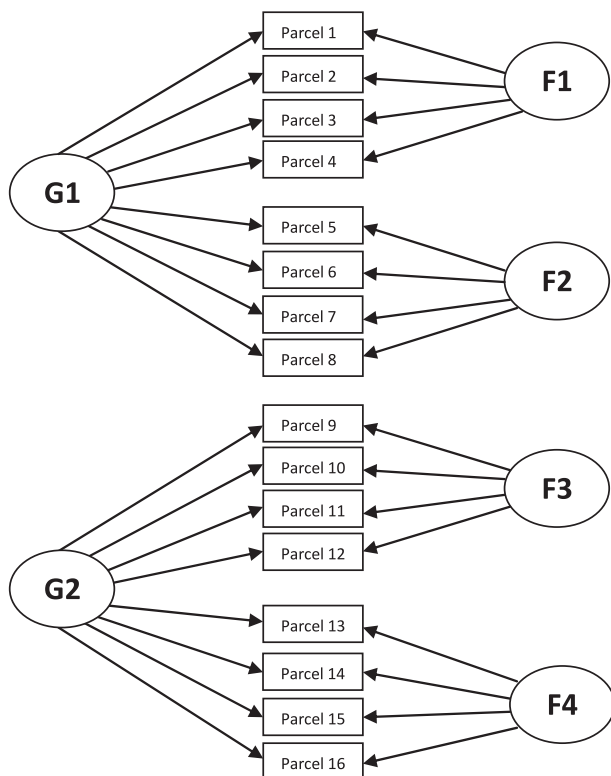
Fig. 4. Four factors model hierarchical two factor model for SRP-III. F1 = Factor 1; F2 = Factor 2; G1 = General factor 1; G2 = General factor 2; Parcels 1–4 = items from Interpersonal Manipulation subscale; Parcels 5–8 = items from Callous Affect subscale; Parcels 9–12 = items from Erratic Lifestyle subscale; Parcels 13–16 = items from Antisocial Behaviour subscale.

Neal and Sellbom (2012) encountered a similar problem when assessing models for the original version of the SRP-III. They suggested that in order to evaluate model fit for the scale, its complexity should be reduced by using the parcelling technique. In line with Neal and Sellbom (2012) study, we assigned SRP-III items randomly into four parcels. The list of items in each parcel is presented in Table 2.

The same models as described before were estimated for the SRP-III after the items had been assigned into parcels (see Table 1). Results show that reducing the complexity of the models influenced an increase in CFI and TLI values and a decrease in RMSEA and SRMR values for all assessed solutions. The two-factor model was rejected as a poor approximation of the current data. The hierarchical and four-factor models were found to be an acceptable representation, however, not the optimal solution. None of the previous studies assessing the dimensionality of Hare SRP estimated the bifactorial model, which showed statistically significant improvement in the chi-square value over all alternative models. The bifactorial model showed the lowest AIC, RMSEA, and SRMR values and highest TLI and CFI values.

The adequacy of the bifactorial model can also be demonstrated by analysing its parameter estimates (see Table 3). Factor loadings for the general factors were much weaker and some were negative. According to Reise et al. (2010), when items load more strongly on grouping factors than on general factors, the superiority of the grouping factors should be assumed. Therefore, the Polish version of the SRP-III should be considered to consist of four grouping factors, which provide the basis for creating four subscales, and two meaningful general factors.

3.2. Incremental validity of psychopathy factors

The grouping factors were found to be associated with one another, yet most of the correlations were not as high as to indicate

Table 1
Fit Indices for the alternative models of the Polish version of the SRP-III.

Model	χ^2	df	RMSEA (90% CI)	SRMR	CFI	TLI	AIC
Models with 64-items							
Two-factor	5481.39***	1951	.064 (.066/.070)	.078	.575	.561	85601.33
Four-factor	5177.85***	1946	.061 (.059/.063)	.074	.611	.597	85307.79
Hierarchical	5180.58***	1947	.061 (.059/.063)	.074	.611	.597	85308.52
Bifactor	4930.42***	1888	.060 (058/.062)	.073	.634	.609	85176.36
Models with parcels							
Two-factor	587.01***	103	.121 (112/.131)	.078	.786	.751	23101.29
Four-factor	260.08***	98	.072 (.061/.083)	.057	.928	.912	22784.36
Hierarchical	265.48***	99	.073 (.062/.083)	.058	.927	.911	22787.75
Bifactor	170.93***	82	.058 (.046/.071)	.045	.961	.943	22727.20

Note: RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual.
*** $p < .001$.

Table 2
Items assigned to parcels (Neal and Sellbom, 2012).

	Parcel 1	Parcel 2	Parcel 3	Parcel 4
IPM	3, 13, 16R, 61R	27, 41, 45, 50	8, 24R, 35, 54	20, 31R, 38R, 58
CA	15, 33, 53, 60	30, 40, 44R, 56	7, 23R, 37, 48	2, 11R, 19R, 26R
ELS	17, 22R, 28, 55	4, 25R, 47R, 59	14R, 36R, 39, 42	1, 9, 32, 51
ASB	6R, 12, 49, 62	34R, 43, 57, 64	5R, 10, 29, 63	18R, 21R, 46R, 52

Note: IPM = Interpersonal Manipulation; CA = Callous Affect; ELS = Erratic Lifestyle; ASB = Antisocial Behaviour; R = reverse-coded item.

Table 3
Standardized factor loadings for the four grouping factors and two general factors of the Polish version of the SRP-III.

Item	IPM	CA	ELS	ASB	G1	G2
Parcel 1	.692***				.162*	
Parcel 2	.779***				−.355**	
Parcel 3	.741***				−.230**	
Parcel 4	.764***				.066	
Parcel 5		.717***			.059	
Parcel 6		.786***			.201	
Parcel 7		.701***			−.206**	
Parcel 8		.478***			.337***	
Parcel 9			.614***			.095
Parcel 10			.777***			−.088
Parcel 11			.534***			.061
Parcel 12			.820***			.058
Parcel 13				.535***		.849***
Parcel 14				.685***		.152
Parcel 15				.742***		.402***
Parcel 16				.450***		.275**

Note. Factor loadings are statistically significant at *** $p < .001$, ** $p < .01$, * $p < .05$

that they measure the same phenomenon (Table 4). The highest correlation was between Interpersonal Manipulation and Callous Affect subscales (.875) which can indicate a conceptual overlap between the factors.

Structural equation modelling was carried out to examine the relationship between four psychopathy facets and aggression.

Table 4
Correlations between latent factors.

	IPM	CA	ELS	ASB
IPM	–	.875	.795	.640
CA	–	–	.712	.618
ELS	–	–	–	.572
ASB	–	–	–	–

Note: IPM = Interpersonal Manipulation; CA = Callous Affect; ELS = Erratic Lifestyle; ASB = Antisocial Behaviour.

Aggression was regressed on all four psychopathy factors simultaneously and the SEM model had a good fit (χ^2 (94) = 207.73, $p < .001$, CFI = .953, TLI = .932, RMSEA = .062, 90% CI = .050/.073, SRMR = .047). Two psychopathy factors, ELS ($\beta = .43$, $p < .001$) and IPM ($\beta = .34$, $p < .05$) were statistically associated with aggression. The ASB factor was not statistically associated with aggression ($\beta = .43$, $p > .05$). Importantly, CA facet was found to be negatively yet not significantly associated with overall aggression ($\beta = -.25$, $p > .05$). Carmines and Zeller (1979) suggested that factors relating differently with external variables should be considered to measure different conceptions. This approach has already been adopted in other studies examining the dimensionality and incremental validity of a self-report measure (e.g. Boduszek, Hyland, Dhingra, & Mallett, 2013).

3.3. Composite reliability

Alpha coefficients as indicators of internal consistency have been criticised within a latent variable modelling context due to their reliance on both the number of items tested as well as correlations between them (see Cortina, 1993; Raykov, 1998). A more rigorous estimation of the reliability of an instrument scores can be provided by examining the composite reliability using the following formula:

$$\rho_c = (\text{sum of } \lambda_i)^2 / (\text{sum of } \lambda_i)^2 + (\text{sum of } \theta_i)$$

where ρ_c = reliability of the factor score, λ_i = standardized factor loading, and θ_i = standardised error variance. Values greater than .60 are considered acceptable (Bagozzi & Yi, 1998; Diamantopoulos & Siguaw, 2000). Current results indicate that the IPM factor score ($\rho_c = .85$), the CA factor score ($\rho_c = .79$), the ELS factor score ($\rho_c = .79$) and the ASB factor score ($\rho_c = .79$) of the Hare SRP possess good composite reliability.

4. Discussion

The current study was carried out with the primary purpose of evaluating the dimensionality and construct validity of the Polish version of the SRP-III. This study represents the first instance where the construct validity of the SRP-III has been investigated in a language other than English. Additionally, this study assessed the incremental validity of the Polish version of the SRP-III scores by examining the relationship between its factors and aggression. Finally, this paper sought to determine the internal reliability through the application of composite reliability.

Previous research with the English version of the SRP-III suggested that the latent structure of the scale was best represented by four factors: *Interpersonal Manipulation, Callous Affect, Erratic*

Lifestyle, and *Antisocial Behaviour.* However, a limitation of previous studies was the failure to include a bifactorial conceptualisation as a comparison model. A number of recent studies utilising the PCL-R and the PCL-SV have indicated that bifactorial models represent statistically superior representations of the data than do traditional multifactorial solutions. Boduszek and Dhingra discovered that a model which included two primary psychopathy factors (Interpersonal/Affective and Lifestyle/Antisocial) and four method factors (Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Antisocial Behaviour) was the best solution to the latent structure of the PCL-SV. It is important to note that both the SRP-III and PCL:SV were derived from the PCL and therefore it was hypothesised that a similar bifactorial solution would be the best fit of the data in the current study.

This bifactorial model was indeed found to offer the best explanation of the data, however, results of the current analysis indicated that the parcelled items of the Polish SRP-III were best explained in terms of four grouping factors (Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Antisocial Behaviour) and two general factors (Interpersonal/Affective and Lifestyle/Antisocial). This was demonstrated by the fact that the standardised factor loadings for each parcel were significantly greater for the four grouping factors than for the two general factors. As per the recommendations of Reise et al. (2010), these results provide evidence that the Polish SRP-III is best conceptualised as measuring four primary factors of psychopathy and two generally hidden factors.

The results of the current study considered in light of previous findings by Boduszek et al. (in press), Flores-Mendoza et al. (2008), and Patrick et al. (2007), are strongly suggestive that the latent structure of psychopathy will vary depending upon the method of assessment. It appears when the clinician-administered scales (PCL-R and PCL-SV) are utilised, psychopathy is captured in terms of two correlated factors (Interpersonal/Affective and Lifestyle/Antisocial). However, when a self-report scale is used, psychopathy is captured in terms of four correlated factors (Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Antisocial Behaviour).

Further, the four grouping psychopathy factors were correlated with a measure of reactive aggression in order to investigate the scale's incremental validity. Results of this analysis provided further empirical evidence in favour of conceptualising psychopathy in terms of four factors. Erratic Lifestyle and Interpersonal Manipulation were identified to be positively, and moderately, associated with aggression. Antisocial Behaviour and Callous Affect did not reach the level of statistical significance, however, Callous Affect displayed a negative association with aggression. Interpersonal Manipulation and Callous Affect were found to exhibit differing directional relationships with aggression which indicates that, despite the high level of correlation observed between them, these factors are unique and distinct from each other. This result demonstrates that the suggested two-factor models of the SRP-III which combine Interpersonal and Affective factors are misguided. The results are compatible with previous research indicating a strong link between behavioural aspects of psychopathy and reactive aggression (Reidy, Zeichner, Miller, & Martinez, 2007). Callous/unemotional traits were more often associated with instrumental aggression (e.g. Williamson, Hare, & Wong, 1987) and reduced impulsivity (e.g. Snowden & Gray, 2011).

A further aim of this study was to provide a robust assessment of the internal reliability of the scores of the Polish Version of SRP-III. Traditional approaches to establishing internal reliability such as Cronbach's alpha have been criticised within a latent variable context due to their tendency to over- or under-estimate scale reliabilities (Raykov, 1998). As such, composite reliability was performed to provide a more accurate assessment of internal reliability of a latent factor. All four subscales were found to possess good composite reliabilities.

While the results of the current study provide supportive evidence for the construct validity of the scores of the Polish Version of the SRP-III, this finding should be tempered by the fact that a parcelling procedure was necessary to find an acceptable model fit. A significant limitation associated with the SRP-III is the failure to identify an adequate factorial solution when using individual items of the scale. This occurrence is likely due to the very high indicator-to-factor ratio of the scale. Future research should therefore seek to develop a psychometrically valid abbreviated version. Items for the abbreviated version could be selected based on the theory and the strength of factor loadings within four grouping psychopathy factors. Similar procedures have been utilised in previous efforts to develop abbreviated versions of self-report psychological measures (Hyland, Shevlin, Adamson, & Boduszek, 2013). Another recommendation for future research is to assess whether the factorial solution identified in the current sample remains invariant across different populations.

The present research is the first to study the SRP-III within a sample of participants whose first language is not English, and to assess a bifactorial solution of psychopathy using the SRP-III. The results indicate that the Polish SRP-III is best conceptualised as measuring four grouping factors and two hidden general factors. It has been shown that the four grouping psychopathy factors have a good composite reliability and are differentially associated with overall aggression.

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