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Sensation seeking and its relationship with psychopathic traits, impulsivity and aggression: a validation of the Dutch Brief Sensation Seeking Scale (BSSS)

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Sensation seeking is a personality trait that manifests as a preference for change, variety and novelty. Sensation seeking has been positively associated with different externalising behaviours. However, its associations with psychopathic traits, impulsivity and aggression are unclear. These associations were examined via the psychometric properties of the Dutch version of the Brief Sensation Seeking Scale (BSSS) using individuals from the general population and forensic patients. The results show that the BSSS has good psychometric properties, including test-retest reliability and a four-factor structure. Additionally, the results support associations between sensation seeking and psychopathic traits, impulsivity and total scores of aggression but revealed no specific associations with different types of aggression (e.g. proactive and reactive). The Dutch BSSS is a valuable tool for assessing sensation seeking in both the general population and forensic patients. Future research should further examine its utility and explore the role of sensation seeking in antisocial conduct.

Keywords: sensation seeking; psychopathic traits; impulsivity; proactive aggression; reactive aggression; forensic patients; validation; psychometric properties.

Sensation seeking is a personality trait characterised by ‘the seeking of varied, novel, complex and intense sensations and experiences, and the willingness to take physical, social, legal and financial risk for the sake of such experience’ (Zuckerman, 1994, p. 27). Sensation seeking is a biopsychosocial dimension of personality associated with other externalising personality characteristics (Mann et al., 2018; Sarracino et al., 2011) and biological correlates (De Pascalis et al., 2007;

Lissek et al., 2005; Smith et al., 1989; for a review, see Roberti, 2004).

Based on the optimal level of arousal theory (Raine et al., 1997), people who get high on sensation seeking tend to experience physiological under arousal as an unpleasant state, leading them to behave in ways that increase their arousal to an optimal level by engaging in potentially risky behaviours such as aggression (Raine, 2002; Wilson & Scarpa, 2011; Zuckerman, 1994), sexual risk-taking

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(Hoyle et al., 2000), reckless driving (Heino et al., 1996), smoking (Zuckerman et al., 1990), alcohol use (Stacy et al., 1993) and use of illicit drugs (Newcomb & McGee, 1991; Zuckerman et al., 1993).

Although associations between sensation seeking and psychopathic traits and externalising behaviours seem likely given the arousal that typically accompanies antisocial behaviour, prior research has shown contradictory results. As such, the nature of these associations is still unclear.

Sensation seeking, psychopathic traits, impulsivity and aggression

Past research into sensation seeking has found different positive relationships with several antisocial personality traits (Zuckerman, 2007), including conduct problems (Byck et al., 2015; Mann et al., 2018) and psychopathy (Blackburn, 1969; Dickey, 2014). With respect to sensation seeking and psychopathic traits, Dickey (2014) found that sensation seeking was positively related to all three factors of the Triarchic Psychopathy Model (i.e. boldness, meanness and disinhibition; see Patrick et al., 2009) in an undergraduate sample. This relationship was also found by Weidacker et al. (2017) in both a forensic and a non-forensic sample using the sensation seeking subscale of the UPPS-P Impulsive Behaviour Scale (Lynam et al., 2006). However, the same group (Gray et al., 2019) failed to find an association between sensation seeking and psychopathic traits using the Psychopathy Checklist – Revised (PCL-R; Hare, 1991) and the Psychopathy Checklist: Screening Version (PCL:SV; Hart et al., 1995).

Also, previous research has demonstrated that sensation seeking is highly linked to impulsivity and often is conflated with it (Steinberg et al., 2008). It has even been found that the two concepts share genetic correlates (Hur & Bouchard, 1997), yet they have also been classified as distinct traits that seem to

develop differently in adolescence (Harden & Tucker-Drob, 2011).

One other behavioural domain that has received substantial empirical attention in sensation seeking research is aggression (for a meta-analysis, see Wilson & Scarpa, 2011). For example, Kafry (1982) found that the sensation seeking scores of young children (aged 6 to 10 years) were positively associated with the number of antisocial activities they had engaged in, such as shoplifting or physically hurting an animal or a person. Another study found that sensation seeking is associated with the desire to engage in both physical and verbal aggression (Joireman et al., 2003).

Furthermore, in line with the optimal level of arousal theory, different studies have indicated that sensation seeking is a mediating mechanism that underlies the association between physiological under arousal and aggressive behaviour (Hammerston et al., 2018; Portnoy et al., 2014).

Although numerous studies have shown an association between sensation seeking and aggression, its strength varies greatly – and some studies have failed to find an association at all (e.g. Ang & Woo, 2003; Parks & Zetes-Zanatta, 1999). One proposed explanation for these conflicting results is the variability in the measurement of aggression (Wilson & Scarpa, 2011). For example, some studies used cognitive, affective and behavioural measures (e.g. Dahlen et al., 2004) whereas other studies only included behavioural acts of aggression (e.g. Ang & Woo, 2003). Second, although the heterogeneity of aggression has received considerable empirical support (Crick & Dodge, 1996; Little et al., 2003; Poulin & Boivin, 2000), most of the studies have not made a distinction between different types of aggression (i.e. proactive versus reactive; Dodge & Coie, 1987).

Those studies that have made a distinction between reactive (e.g. impulsive) and proactive (instrumental) aggression have found positive correlations between sensation seeking and both forms of aggression (e.g. Cui et al., 2016; Pérez Fuentes et al., 2016). These

positive associations between sensation seeking and aggression have mostly been found in males but not consistently in females (Wilson & Scarpa, 2011).

Assessment of sensation seeking

The most widely used self-report instrument for assessing sensation seeking is Form V of the Sensation Seeking Scale (SSS-V; Zuckerman et al., 1978). The SSS-V comprises 40 items and produces an overall sensation seeking score as well as scores on four subscales: Thrill and Adventure Seeking, Experience Seeking, Disinhibition and Boredom Susceptibility. The Boredom Susceptibility and Thrill and Adventure Seeking subscales reflect types of sensation seeking which are generally seen as socially acceptable, whereas the Disinhibition and Experience Seeking subscales reflect less socially acceptable forms of sensation seeking (Zuckerman, 1978).

One critical point regarding the SSS-V is that it contains many items (Hoyle et al., 2002) and therefore cannot be used in lengthy, large-scale studies in which each variable is assessed with a small number of items. Also, some SSS-V items are not applicable to some populations because they refer to specific activities that are either not age appropriate or not culturally relevant. To address these concerns, Hoyle et al. (2002) developed a brief version of the SSS-V: the Brief Sensation Seeking Scale (BSSS).

The BSSS has in total eight items which are split equally into four subscales, corresponding to the SSS-V subscales. Responses are given on five-point Likert scales. The results reported by Hoyle et al. (2002) indicate that the BSSS has good reliability and structural validity. Additionally, the BSSS has been translated into different languages, including Chinese (Chen et al., 2013), Italian (Primi et al., 2011), Spanish (Saletti et al., 2017) and Portuguese (Pechorro et al., 2018). The results of these studies have further confirmed the psychometric properties of the BSSS,

suggesting that the instrument is reliable and valid across different cultures.

Current study

Although previous research has indicated that the BSSS is a reliable and valid instrument for assessing sensation seeking tendencies across different cultures and languages, the psychometric properties of the BSSS in Dutch are unknown. Thus, the first aim of the current study was to further validate the BSSS by examining the psychometric properties of the Dutch version in both a community sample and a forensic patients sample. The expectation was that the Dutch version of the BSSS would evidence good psychometric properties as it has done in translations into other languages. Specifically, we expected moderately high alpha coefficients reflecting the heterogeneity of item content and high test-retest reliability given the strong biological bases of the trait. Also, we expected that when exploring the factor structure of the Dutch version of the BSSS, we would find a good fit for a four-factor structure.

As noted earlier, previous studies investigating the associations between sensation seeking and psychopathic traits, impulsivity and aggression have found contradictory results. Therefore, the second aim of the current study was to elucidate the associations between sensation seeking and different facets of psychopathy, impulsivity and both proactive and reactive aggression. Based on previous studies, we hypothesised that scores on the BSSS would be positively associated with all three factors of the Triarchic Model of Psychopathy (Patrick et al., 2009), impulsivity and both forms of aggression.

Method

Participants

All analyses were conducted separately using data from two independent samples (see Table 1 for means and SDs on the different variables in each sample). The larger of the two was

Table 1. Means and standard deviations (*SDs*) for study measures in the community and forensic patients samples.

	Community sample	Forensic patients sample
TriPM ^a		
Total*	51.19 (16.05)	77.51 (18.33)
Boldness	28.97 (7.68)	27.94 (6.34)
Meanness*	10.55 (7.62)	21.85 (7.29)
Disinhibition*	11.67 (6.85)	27.72 (9.68)
RPQ ^a		
Total*	7.66 (4.21)	17.61 (8.77)
RPQre*	6.78 (3.28)	11.11 (4.42)
RPQpro*	0.89 (1.48)	6.50 (5.27)
BIS-11 ^b		
Total	59.09 (10.04)	–
Motor	19.59 (4.02)	–
Cognitive	16.50 (4.33)	–
Nonplanning	23.00 (3.97)	–
BSSS_1 ^a		
Total*	18.99 (4.59)	20.99 (5.68)
Experience Seeking*	6.65 (1.32)	6.02 (1.99)
Boredom Susceptibility*	5.02 (1.38)	4.40 (1.80)
Thrill and Adventure Seeking*	4.83 (1.83)	4.10 (2.01)
Disinhibition	4.47 (1.70)	4.48 (2.04)
BSSS_2 ^c		
Total	20.69 (4.42)	–
Experience Seeking	6.47 (1.29)	–
Boredom Susceptibility	5.10 (1.39)	–
Thrill and Adventure Seeking	4.87 (1.74)	–
Disinhibition	4.25 (1.65)	–

Note. *Samples differ significantly; ^aCommunity $n = 167$, Forensic patients $n = 82$; ^bCommunity $n = 108$, forensic patients $n = 0$; ^cCommunity $n = 141$, Forensic patients $n = 0$; BIS-11 = Barratt Impulsiveness Scale – 11; BSSS_1 = Brief Sensation Seeking Scale, first measure; BSSS_2 = Brief Sensation Seeking Scale, second measure; RPQ = Reactive Proactive Questionnaire; TriPM = Triachic Psychopathy Measure.

drawn from the general population residing in the Netherlands ($n = 167$) and included 26 males and 141 females. The mean age was 20.26 years ($SD = 2.98$) with a range of 17 to 37 years. The ethnicity of this sample was mainly Dutch (77.9%) but also included individuals from Asia (9.0%), Morocco (2.4%), Turkey (2.4%), Dutch Antilles (1.2%) and other countries (7.1%). A second, smaller sample was drawn from a forensic psychiatric population residing in the Netherlands ($n = 82$, all males). The mean age was 38.07 years ($SD = 9.32$) and ranged from 19 to 57 years. Most of the patients had a primary diagnosis

of schizophrenia or other psychotic disorder (36.6%) or antisocial personality disorder (20.7%). The ethnicity of this sample was mainly Dutch (68.2%) but also included individuals from Morocco (6.3%), Turkey (5.7%), Dutch Antilles (13.4%) and other countries (7.1%).

Participants sampled from the general population were recruited via social (online) networks or participated for course credit. The sample of forensic patients was recruited from a forensic mental institution in the Netherlands and received a snack item in exchange for their participation.

Measures

The Brief Sensation Seeking Scale (BSSS; Hoyle et al., 2002)

The Dutch version of the BSSS (Van Dongen et al., 2011) has 8 items. Answers are given on a 4-point Likert scale ranging from 1 (*true*) to 4 (*not true*). The questionnaire has 4 subscales, each with 2 items. Total scores range from 8 to 32, with higher scores indicating higher sensation seeking tendencies. The subscales correspond to the original SSS-V subscales: Thrill and Adventure Seeking reflects tendencies to engage in dangerous or risky activities (Zuckerman & Neeb, 1979); Disinhibition refers to individuals who lose control over their behaviour in social situations; individuals with high Boredom Susceptibility scores have an aversion to repetitive and dull situations; and Experience Seeking refers to individuals who have the desire to seek out new experiences.

The Triarchic Psychopathy Measure (TriPM; Patrick et al., 2009)

The Dutch version of the TriPM (Van Dongen et al., 2017) was used to evaluate the construct validity of the BSSS. Responses to the 58 items are given on Likert scales ranging from 0 (*false*) to 3 (*true*). Total scores range from 0 to 174. The TriPM consists of three factors: disinhibition, boldness and meanness. Disinhibition includes 20 items that refer to tendencies toward impulsivity, hostility and irresponsibility (Patrick, 2010). Boldness, consisting of 19 items, represents individuals who have a high tolerance for stressful or threatening situations (Patrick et al., 2009). Meanness also contains 19 items and is defined as individuals with callousness, a lack of empathy and a lack of close attachments with others (Patrick, 2010; Patrick et al., 2009). The Dutch version of the TriPM is characterised by excellent internal consistency and good construct validity (Van Dongen et al., 2017).

The Barratt Impulsiveness Scale – 11 (BIS-11; Patton et al., 1995)

The Dutch version of the BIS-11 (Dom et al., 2007) has 30 items which measure an individual's level of impulsivity. It consists of three subscales. The Motor Impulsiveness subscale comprises 11 items that reflect behaving without thinking (Patton et al., 1995). The Cognitive Impulsiveness subscale includes 8 items that refer to making quick cognitive decisions. The Nonplanning Impulsiveness subscale has 11 items and reflects a tendency to not engage in forethought or plan for the future. Responses are given on Likert scales ranging from 1 (*never*) to 4 (*nearly always*). Total scores range from 30 to 120. Previous research indicates that the Dutch version of the BIS-11 has good internal consistency (Goudriaan et al., 2008)

The Reactive Proactive Questionnaire (RPQ; Raine et al., 2006)

The Dutch version of the RPQ (Cima et al., 2013) was used for determining the link between sensation seeking and aggression. The questionnaire has 23 items which are split into two dimensions, namely reactive aggression and proactive aggression (Cima et al., 2013). Responses are given on a 3-point Likert scale ranging from 0 (*never*) to 2 (*often*). Total scores range from 0 to 46. Reactive aggression is defined as a defensive reaction to a provocative situation (Dodge & Coie, 1987). Individuals with reactive aggression are violent through having problems with impulse control. With regard to proactive aggression, behaviours are controlled and emotionless. Individuals with proactive aggression use tactics to achieve their own personal goals. The RPQ is reliable, with high test-retest reliability and strong internal consistency (Cima et al., 2013). It also has great convergent validity through the existence of strong correlations between the RPQ and other measures. In addition, the questionnaire has great discriminant validity, criterion validity and construct validity (Cima et al., 2013).

Procedure

The translation-back-translation procedure (Van de Vijver & Hambleton, 1996) was used to create Dutch equivalents of the original English BSSS items (Hoyle et al., 2002). The translation from English into Dutch was completed by the first author and colleagues (Van Dongen et al., 2011), with the back-translation into English being completed by a professional, native, English-speaking translator. Discrepancies were revised until no semantic differences were detected between the English and Dutch versions of the BSSS.

Because the participants were part of different studies, the specific questionnaires administered in each study differed to some extent across participants. However, all participants in the present study completed the BSSS, the TriPM and the RPQ. In addition, a subsample of 108 participants from the community sample filled out the BIS-11. The BIS-11 was not completed by the participants in the forensic patient sample.

Before completing the packet of questionnaires, all participants received information regarding the purposes of the study and provided written informed consent. Subsequently, all participants responded to a set of demographic items (i.e. gender, age, cultural background, education, marital status and income). After providing demographic information, participants completed the supplied questionnaires. A subsample of 141 participants from the community sample completed the BSSS for a second time two weeks later.

Data analyses

Data from the two samples were analysed separately using SPSS v24.0 (IBM Corp., Armonk, NY, USA). A two-tailed significance level of .05 was used for all hypothesis tests. For examining the internal consistency of the BSSS, coefficient alpha reliability coefficients were calculated. Test-retest reliability was estimated using the two-way random effects model, consistency type with average measures. The factor structure of the BSSS was

examined using exploratory factor analysis (EFA) by means of a principal components analysis (PCA) for each sample.

The construct validity of the BSSS was evaluated by examining correlations between the BSSS and criterion measures consisting of TriPM total scores and subscales, BIS-11 total scores and subscales and RPQ total scores and residualised subscale scores. Pearson's correlation coefficients were calculated when normality and linearity assumptions were satisfied; otherwise Spearman's coefficients were calculated.

Results***BSSS internal consistency and test-retest reliability***

The internal consistency of the BSSS is, as expected, moderately high, with values of coefficient alpha equal to .75 for the community sample and .76 for the forensic patients sample. The corrected item-total correlations for each item are provided in Table 2. Values of the coefficients for the community sample are all moderate to high in magnitude, with the exception of Item 1. The coefficients for the forensic patients sample are comparable to those of the community sample, indicating the expected covariance between items to which responses can be attributed to a single underlying trait. Although the low-to-moderate value for these coefficients suggest significant specificity, it is nonetheless the case that responses are correlated with responses to the remaining items in the scale.

For the community sample, the intraclass correlation coefficient of .93 indicates high test-retest reliability.

Factor structure

Using a PCA, initially a two-factor solution was found in both the community and forensic patients samples. However, when we forced the analysis to produce four factors and used Varimax rotation, the results showed a four-

Table 2. Corrected item-total correlations for the BSSS in the community and forensic patients samples.

Item (by content domain)	Corrected item-total <i>r</i>	
	Community	Forensic patients
<i>Experience Seeking</i>		
1. I would like to explore strange places.	.27	.44
5. I would like to take off on a trip with no pre-planned routes or timetables.	.44	.31
<i>Boredom Susceptibility</i>		
2. I get restless when I spend too much time at home.	.33	.45
6. I prefer friends who are excitingly unpredictable.	.51	.52
<i>Thrill and Adventure Seeking</i>		
3. I like to do frightening things.	.58	.58
7. I would like to try bungee jumping.	.45	.40
<i>Disinhibition</i>		
4. I like wild parties.	.44	.48
8. I would love to have new and exciting experiences, even if they are illegal.	.59	.52

Note. Community $n = 167$, Forensic patients $n = 82$.

Table 3. Rotated factor loadings for the Dutch BSSS items in the community and forensic patients samples.

Item	Sample	Component 1	Component 2	Component 3	Component 4
1	Community	.02	-.04	.86	.23
	Forensic patients	.04	.71	.21	.43
2	Community	.16	.13	.11	.90
	Forensic patients	.26	.08	.10	.89
3	Community	.80	.20	.08	.25
	Forensic patients	.55	.04	.60	.15
4	Community	.05	.77	.03	.31
	Forensic patients	.76	-.06	.09	.26
5	Community	.23	.36	.72	-.13
	Forensic patients	.10	.89	.11	-.09
6	Community	.20	.81	.17	-.09
	Forensic patients	.70	.08	.06	.34
7	Community	.85	.08	.11	-.02
	Forensic patients	.05	.23	.90	.06
8	Community	.54	.56	.06	.12
	Forensic patients	.86	.18	.11	-.09

Note. Community $n = 167$, Forensic patients $n = 82$.

Table 4. Correlations between the BSSS and the TriPM total and subscales.

	TriPM			
	Boldness	Meanness	Disinhibition	Total
BSSS_Total				
Community sample (<i>n</i> = 167)	.45**	.36 _a **	.41 _a **	.56 _a **
Forensic patients sample (<i>n</i> = 82)	.11 _a	.48 _a **	.26*	.35**

Note. **p* < .05; ***p* < .001; _aSpearman correlation coefficient. BSSS_Total = Brief Sensation Seeking Scale, total score; TriPM = Triarchic Psychopathy Measure.

Table 5. Correlations between the BSSS and the BIS-11 total and subscales.

	BIS-11			
	Cognitive	Motor ^a	Nonplanning	Total
BSSS_Total	.30**	.40**	.30**	.42**

Note. ***p* < .001; ^aSpearman correlation coefficient; Community *n* = 108; BIS-11 = Barratt Impulsiveness Scale – 11; BSSS_Total = Brief Sensation Seeking Scale, total score.

factor solution with an acceptable fit in the two samples (see Table 3).

In the community sample, only two eigenvalues were greater than 1.0 (i.e. 3.0, 1.1, 0.9, 0.9, 0.7, 0.6, 0.5 and 0.4). Consistent with the original BSSS, the different items corresponding to the subscales of the BSSS loaded on the four different factors with one exception; Item 6 of the BSSS did not load on the corresponding factor (the Boredom Susceptibility subscale) but instead loaded on the Disinhibition subscale.

In the forensic patients sample, again only two eigenvalues were greater than 1.0 (i.e. 3.1, 1.4, 0.9, 0.8, 0.6, 0.5, 0.5 and 0.3). In this sample too, consistent with the original BSSS, the different items corresponding to the subscales of the BSSS loaded on the four different factors with one exception; Item 6 of the BSSS again loaded more on the Disinhibition subscale than on the Boredom Susceptibility subscale.

Criterion validity

The correlations of BSSS scores with the TriPM, BIS-11 and RPQ total and subscale

scores are presented in Tables 4, 5 and 6, respectively.

Scores on the BSSS and total scores on the TriPM correlate positively for both the community and the forensic patients samples. Although the correlations involving TriPM subscales are similar in magnitude to those for the total scores in the community sample, sensation seeking shows the strongest positive relationship with boldness. In contrast to the community sample, boldness is not significantly related to the total sensation seeking scores in the forensic patients sample. Differing results were also found for meanness; whereas meanness has the lowest positive correlation with sensation seeking in the community sample, it has the highest positive correlation with sensation seeking in the forensic patients sample. Lastly, the relationship between disinhibition and sensation seeking is significant and positive in both samples.

As expected, the total scores on the BSSS are significantly positively correlated with the total scores on the BIS-11 in the community sample. With respect to the BIS-11 subscales, the Motor Impulsiveness subscale shows the

Table 6. Correlations between the BSSS and the RPQ total and subscales.

	RPQ		
	Proactive	Reactive	Total
BSSS_Total			
Community sample ($n = 167$)	-.05 _a	.10 _a	.15 _a *
Forensic patients sample ($n = 82$)	.02 _a	.16	.33 _a **

Note. * $p < .05$; ** $p < .001$; _aSpearman correlation coefficient; BSSS_Total = Brief Sensation Seeking Scale, total score; RPQ = Reactive Proactive Questionnaire.

strongest relationship with sensation seeking. The Cognitive Impulsiveness and Nonplanning Impulsiveness subscales are both moderately correlated with the total sensation seeking scores.

With respect to the relationship between sensation seeking and aggression, the correlation analyses show that, in both samples, the sensation seeking scores are significantly positively correlated with the RPQ total scores. However, focusing on the specific forms of aggression, values for the correlations of the sensation seeking scores with the residualised scores of proactive and reactive aggression resulted in non-significant correlations in both samples (see Table 1).

Discussion

The present study was motivated by two aims. The first aim was to evaluate the basic psychometric properties of a Dutch translation of the BSSS in both a community sample and a forensic patients sample. Having found support for the psychometric integrity of the translated measure, the second aim was to elucidate the relationship between sensation seeking and different psychopathic traits, impulsivity and both reactive and proactive aggression.

For both samples, basic psychometric analyses indicate that the translated instrument has acceptable internal consistency and excellent test-retest reliability, and provides breadth coverage of the sensation seeking construct. In addition, the results show that our data fit a four-factor model of the BSSS to an acceptable extent in both samples. However, one

item of the Dutch version of the BSSS (Item 6) does not load so much on the original formulated factor (the Boredom Susceptibility subscale) but loads more on the Disinhibition subscale. These results are consistent with earlier psychometric evaluations of translations of the BSSS (Chen et al., 2013; Pechorro et al., 2018; Primi et al., 2011; Saletti et al., 2017).

As hypothesised, the BSSS was found to correlate with total psychopathy scores in both samples. With respect to the psychopathy subscales, different correlation patterns were found for the two samples. The results show that sensation seeking is positively related to boldness, meanness and disinhibition in the community sample, whereas in the forensic patients sample it is only positively related to meanness and disinhibition. These results are somewhat consistent with earlier findings in a community sample (Dickey, 2014) and also consistent with the findings of Weidacker et al. (2017) – where the TriPM (Patrick et al., 2009) was also used – but differ from those of Gray et al. (2019), who did not find a relationship between sensation seeking and psychopathy in forensic patients. From these results it can be concluded that sensation seeking is related to callous-unemotional and disinhibitory tendencies in both the community and the forensic population. The strong relationship between boldness and sensation seeking in the community sample suggests that fearless-dominant individuals are more likely to engage in risky behaviour. As previous research has indicated that boldness is uniquely related to hypoarousal (Kyranides et al., 2017), these results

provide indirect support for the theory of optimal arousal. Critically, however, this association is not evident in the forensic patient sample.

Furthermore, the BSSS shows meaningful relationships with impulsivity in the community sample, providing support for its criterion validity. Sensation seeking is related to all three impulsivity subscales (Cognitive, Motor and Nonplanning) but shows the strongest relationship with the Motor Impulsiveness subscale. This is consistent with the idea that sensation seeking and impulsivity are related constructs yet also distinct (Harden & Tucker-Drob, 2011).

Concerning aggression, the results show that sensation seeking is positively related to the total RPQ scores in both the community and the forensic patient samples, consistent with meta-analytic findings that sensation seeking is related to aggression (Wilson & Scarpa, 2011). With respect to the relationship between sensation seeking and specific forms of aggression, no significant correlations were found. Although the positive correlation between sensation seeking and total scores of aggression is consistent with our hypothesis, the finding that sensation seeking does not relate to either proactive or reactive aggression is not what we hypothesised, nor is it consistent with previous findings (Cui et al., 2016; Pérez Fuentes et al., 2016).

One important limitation of the current study is that data for the BIS-11 and the retest data for the BSSS were only available for a subsample of the community sample. Therefore, no conclusions can be made about test-retest reliability and construct validity with the BIS-11 in the forensic population. Additionally, as the forensic patient sample exclusively consisted of males, it remains unclear whether or not the current results would generalise to female forensic patients.

In sum, the Dutch version of the BSSS seems to be a reliable tool for the measurement of sensation seeking for both community members and forensic patients. Although

additional validity information will need to be provided by future research, the preliminary evidence presented in the current study indicates that the scores are valid, correlating with the relevant traits for both samples and with aggression for the forensic patients, for whom there is sufficient evidence of aggression to permit meaningful estimates of correlation. As has been the case with other languages for which the BSSS is available, the Dutch version of the scale will enable new research on risk-related attitudes and behaviour.

Ethical standards

Declaration of conflicts of interest

Josanne van Dongen has declared no conflict of interests.

Manon de Groot has declared no conflict of interests.

Eric Rassin has declared no conflict of interests.

Rick Hoyle has declared no conflict of interests.

Ingmar Franken has declared no conflict of interests.

Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional review board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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