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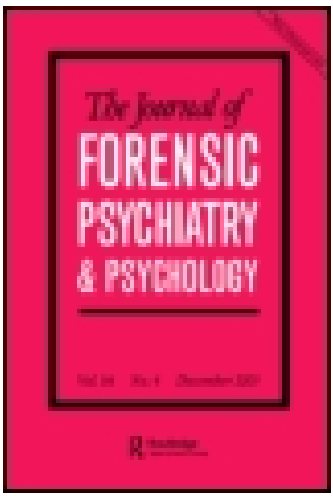

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The psychometric properties of the Anger Bodily Sensations Questionnaire (ABSQ)

Almar Justin Zwets[a], Ruud Hornsveld[b], Floris W. Kraaimaat[c], Thijs Kanters[a], Peter Muris[d] & Hjalmar van Marle[ab]

[a] KARID, FPC De Kijvelanden, Poortugaal, Netherlands

[b] Medical Center, Erasmus University, Rotterdam, Netherlands

[c] Department of Medical Psychology, Radboud University, Nijmegen, Netherlands

[d] Department of Psychology, Maastricht University, Maastricht, Netherlands

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The psychometric properties of the Anger Bodily Sensations Questionnaire (ABSQ)

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[a]*KARID, FPC De Kijvelanden, Poortugaal, Netherlands;* [b]*Medical Center, Erasmus University, Rotterdam, Netherlands;* [c]*Department of Medical Psychology, Radboud University, Nijmegen, Netherlands;* [d]*Department of Psychology, Maastricht University, Maastricht, Netherlands*

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The Anger Bodily Sensations Questionnaire (ABSQ) is a newly developed self-report instrument for measuring bodily sensations related to anger in interpersonal situations. In this study, we investigated the psychometric properties of the ABSQ in a sample of 70 offenders and a sample of 100 secondary vocational students. Results indicated that the internal consistency and test-retest reliability of the instrument were good. An explorative factor analysis carried out on the ABSQ data of the combined sample yielded three factors. Support was found for the concurrent validity of the instrument. In both samples, the total score of the ABSQ showed positive correlations with measures of bodily awareness, social anxiety, anger, and aggression. Altogether, results suggest that the ABSQ appears to be a reliable and valid questionnaire. Further research is needed to examine the psychometric properties of the ABSQ in larger offender and non-clinical samples.

Keywords: forensic psychiatry; anger; bodily sensations; self-report questionnaire

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Introduction

Anger is a regularly experienced emotion that is often accompanied by physiological symptoms, such as changes in heart rate, blood pressure, and muscle tension (Frijda, 1986). According to Frijda (1986), emotions can be considered as action tendencies to achieve needs or solve problems. Therefore, anger is often seen as an emotional response to an alleged injustice, which may mobilize corrective action (Novaco, 1976, 1985). However, when anger levels are high, it may become maladaptive and trigger aggressive behavior (Anderson & Bushman, 2002; Cates & Shontz, 1996). More specifically, high levels of anger can have a detrimental effect on higher cognitive processes which play an important role in regulating impulsive behavior, including reactive aggression

*Corresponding author. Email: Almar.Zwets@Kijvelanden.nl

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(e.g. Tyson, 1998; Zillmann, 1984). Because of the maladaptive effects of anger in (alleged) provocative situations, arousal reduction is often included as one of the core elements of cognitive-behavioral treatment programs for anger and aggression (e.g. Kassinove & Tafrate, 2002; Novaco, 1975, 2003). Arousal management includes cognitive restructuring and relaxation techniques, but in addition focuses on the recognition of bodily sensations which are associated with anger. The ability to adjust the level of arousal by using these skills is often seen as a prerequisite for emotion regulation (Gross, 1998).

While arousal reduction seems to be a standard element of cognitive-behavioral treatment programs for aggressive offenders, several programs are exclusively focused on the management of the physiological responses of anger. Psychomotor therapy (e.g. Boerhout & Van der Weele, 2007), for example, is an experience-based intervention during which aggressive patients first learn to recognize and analyze bodily sensations as part of specific emotions and then are taught how to regulate these emotions in an adequate way. By improving the skills to adequately identify and interpret their bodily sensations at an early stage, patients might learn to use these bodily sensations as 'signals' of anger and aggression, and to subsequently prevent, interrupt or modify their inadequate reactions to (alleged) provocations. Therefore, the early recognition of (changes in) bodily sensations may be essential for controlling anger and may contribute to the prevention of aggressive behavior (e.g. Novaco, 2007; Tyson, 1998).

To evaluate the efficacy of treatment programs for anger such as psychomotor therapy, it is necessary that treatment results are assessed by means of valid and reliable measures. Several instruments are available for assessing different aspects of anger (e.g. Novaco Anger Scale and Provocation Inventory; Novaco, 2003), hostility (e.g. Buss–Durkee Hostility Inventory; Buss & Durkee, 1957), aggression (e.g. Aggression Questionnaire; Buss & Perry, 1992), and coping skills (e.g. Coping Orientations to Problems Experienced Scale; Carver, Scheier, & Weintraub, 1989). However, to our knowledge, no instrument is available for assessing anger-related bodily sensations. Therefore, the aim of the current study was to develop a reliable and valid self-report questionnaire for assessing bodily sensations that are associated with the emotional state of anger in socially provocative situations, namely the Anger Bodily Sensations Questionnaire (ABSQ).

For the development of the ABSQ, 42 anger-related physiological responses were derived from the literature on emotions (Frijda, 1986; Goleman, 1995; Lorber, 2004; Mauss & Robinson, 2009; Scarpa & Raine, 1997; Tyson, 1998). Several studies have demonstrated that anger is associated with an epinephrine/norepinephrine response (e.g. Schwartz, Weinberger, & Singer, 1981), which peripherally expresses itself in symptoms of increased heart rate (e.g. McCraty, Atkinson, Tiller, Rein, & Watkins, 1995; Min, 2008), increased breathing frequency and breathing amplitude (e.g. Bloch, Lemeignan, & Aguilera, 1991), dyspnoea (shortness of breath; e.g. Winkler et al., 2006), increased perspiration

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(e.g. Winkler et al., 2006), increased body temperature (e.g. Ekman, Levenson, & Friesen, 1983), and increased muscle tension (e.g. Ax, 1953).

In the present study, the following steps were taken to examine the psychometric properties of the ABSQ. First, the initial set of 42 items was evaluated by three clinical psychologists in terms of readability and ambiguity. Next, a pilot investigation was conducted which led to the removal of unsatisfactory items, after which an exploratory factor analysis was performed. To assess the concurrent validity of this ABSQ, correlations were computed with measures of body awareness, arousal, anger, and aggression. The strongest positive correlations were expected between the ABSQ and measures of body awareness and anxious arousal, because all these measures have in common that they assess awareness of bodily sensations (although in different emotional states; Frijda, 1986). Furthermore, we expected positive correlations between the ABSQ on the one hand, and anger and reactive ('hot-blooded') aggression (Dodge & Coie, 1987; Dodge, Lochman, Harnish, Bates, & Pettit, 1997) on the other hand, as these constructs are thought to be associated with high levels of physiological arousal (e.g. Schore, 2003). Negative correlations were expected with proactive ('cold-blooded') aggression (Dodge & Coie, 1987), and with psychopathy, a construct which is typically characterized by deficient affective functioning (Hare, 1991, 2003). More specifically, we expected the ABSQ to be negatively correlated to primary psychopathy (Karpman, 1941), and not to secondary psychopathy, because of its exclusive association with reduced autonomic activation (Hansen, Johnsen, Thornton, Waage, & Thayer, 2007; Hare, 2003) and attenuated sensitivity to bodily sensations (Gao, Raine, & Schug, 2012).

We performed our study in a sample of violent offenders and a sample of secondary vocational students. Therefore, it became possible to study differences between both samples in ABSQ scores and their relations to measures of anger and aggressive behavior. No hypotheses were formulated regarding the differences between both samples, because this part of the research was explorative in nature.

Method

Participants

The study was carried out in a sample of 70 offenders, who were 'detained under hospital order' for a serious violent offense (e.g. murder, manslaughter, aggravated assault, or rape). 'Detained under hospital order' means that the court has established a relation between a psychiatric disorder on the one hand and the committed offense on the other hand (e.g. Van Marle, 2002). Rulings are based on an extensive psychiatric and psychological evaluation in a special forensic assessment center, in which the offender had to stay for observation by order of the court. The offenders stayed in Forensic Psychiatric Center de

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Kijvelanden (in the vicinity of Rotterdam, The Netherlands) and participated in the current study between January 2011 and September 2012. Their mean age was 37.03 years (SD = 9.22; range = 21–57 years), which was somewhat younger than the total population of offenders 'detained under hospital order' in the Netherlands ($M = 41$ years; Van Gemmert & Van Schijndel, 2011), $t(69) = 3.60$, $p < .01$. The primary diagnosis of the offenders was a cluster B personality disorder on Axis II of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000). The offenders did not have a psychotic disorder on Axis I of the DSM-IV-TR.

Besides the offenders, 100 secondary vocational students also participated in the study. Their mean age was 19.22 years (SD = 1.99 years, range = 16–26 years). In the Netherlands, secondary vocational education can be followed after elementary school and concerns education for trades such as carpenter, housepainter, electrician, or administrative assistant.

All participants in the study were male and had sufficient command of the Dutch language in speech and in writing. The students were significantly younger than the offenders [$t(168) = 15.58$, $p < .01$].

Measures

The ABSQ (see Table 1), which was designed for the purpose of this study, measures specific bodily sensations as part of an anger reaction to an (alleged) provocation. The initial pilot version of the ABSQ consisted of 42 items which refer to the same anger-provoking situation, namely becoming tense because of someone else. The general introduction is stated on top of the form:

> Everybody can become tense as the result of the behavior of someone else, such as during an argument. This questionnaire contains several statements about your bodily reactions when you become angry in such a situation. Each statement is followed by a 5-point scale ranging from 'Not at all' to 'Very much'. You have to answer to what degree you generally experience these bodily sensations during situations when you become angry with another person. You may only choose one answer for each statement.

Every ABSQ item begins with 'When I get tense because of somebody, …' and is followed by a specific physiological response, e.g. 'I notice that my heart starts beating faster'. The participant has to answer to what degree the physiological response is experienced during an anger-provoking social situation on a Likert scale with 1 = 'Not at all,' 2 = 'A little,' 3 = 'Somewhat,' 4 = 'Much,' and 5 = 'Very much.'

The initial pool of 42 ABSQ items was evaluated by three clinical psychologists in terms of readability and ambiguity. This procedure resulted in the elimination of 10 items thus leaving 32 items for the pilot version of the ABSQ.

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Table 1. The 18-item version of the ABSQ 1: Mean item scores and standard deviations in the offender and student samples, and factor loadings of various items for the three factor solution.

	Offenders ($n = 70$)		Students ($n = 100$)		Factor loadings ($N = 170$)		
Description	*M*	SD	*M*	SD	1	2	3
8. When I get tense because of somebody I notice that my head feels warmer	2.16	1.14	2.23	1.29	**.83**	−.20	.22
9. When I get tense because of somebody I notice that I start breathing faster	1.97	.88	2.07	1.15	**.82**	−.11	.13
14. When I get tense because of somebody I notice that my heart starts beating harder	2.11	1.08	2.19	1.27	**.81**	.01	.01
13. When I get tense because of somebody I notice that my body becomes warmer	1.99	1.03	2.03	1.18	**.80**	.07	−.08
10. When I get tense because of somebody I notice that I start to sweat more	1.94	.98	1.82	1.10	**.74**	.17	−.24
1. When I get tense because of somebody I feel my heart starts beating faster	2.20	.88	2.31	1.01	**.70**	−.01	.02
5. When I get tense because of somebody I notice that my breathing becomes irregular	1.99	1.03	2.02	1.11	**.59**	.18	.02
16. When I get tense because of somebody I notice that I start breathing deeper	1.71	.80	1.86	1.03	**.51**	.15	.08
2. When I get tense because of somebody I notice that my hands are starting to sweat more	1.94	1.06	2.05	1.12	.50	.37	−.06
4. When I get tense because of somebody I get light-headed	1.53	.81	1.44	.88	−.06	**.69**	.20
17. When I get tense because of somebody I notice that I get a dry mouth	1.71	.80	1.68	.94	.03	**.68**	.06
12. When I get tense because of somebody I notice that my hands start shaking	1.90	1.12	1.69	.97	.11	**.65**	−.01
3. When I get tense because of somebody I notice that my body freezes	1.73	.95	1.41	.74	.14	**.64**	−.26
6. When I get tense because of somebody I notice that my body starts shaking	2.03	1.10	1.66	.92	.36	.44	.12
	1.96	1.26	2.16	1.30	.03	.01	**.85**

(*Continued*)

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Table 1. (*Continued*).

Description	Offenders ($n = 70$)		Students ($n = 100$)		Factor loadings ($N = 170$)		
	M	SD	*M*	SD	1	2	3
18. When I get tense because of somebody I notice that I clench my fists							
7. When I get tense because of somebody I notice that I get an adrenaline kick	2.43	1.20	2.63	1.39	.29	.06	**.60**
15. When I get tense because of somebody I notice that my jaw muscles become tensioned	1.76	.84	1.76	1.12	−.03	.49	.50
11. When I get tense because of somebody I notice that my muscles become tensioned	2.41	1.07	2.00	1.01	.38	.10	.47

Note: ABSQ = Anger Body Sensations Questionnaire. The items with factor loadings in bold are included in the factor structure. Items with factor loadings≥ .30 on two or more factors were removed from the corresponding factors.

The *Body Sensations Questionnaire* (BSQ; Chambless, Caputo, Bright, & Gallagher, 1984; Dutch version: Arrindell, 1993) assesses fear of bodily sensations in situations in which people are aroused or afraid. The questionnaire contains 17 items which have to be scored on a 5-point Likert scale ranging from 1 = 'Not frightened or worried by this sensation' to 5 = 'Very much frightened by this sensation.' A study on the psychometric properties of the BSQ (Chambless et al., 1984) demonstrated an internal consistency (Cronbach's α) of .87 and a test-retest reliability of .67. Validity was demonstrated by correlations with measures of avoidance behavior, panic, and depression. In the current study, the internal consistency (Cronbach's α) of the total BSQ was .91 in the offender sample.

The *Inventory of Interpersonal Situations* (IIS; Van Dam-Baggen & Kraaimaat, 1999) assesses how much anxiety people experience during social interactions (i.e. social anxiety) and how often they are able to actually perform the described behavior in such situations (i.e. social skills). The anxiety questions have to be answered on a 5-point Likert scale ranging from 1 = 'No discomfort' to 5 = 'Very much discomfort'. In the present study, only the social anxiety scale was used, which produced a good internal consistency coefficient (Cronbach's $\alpha = .95$) in the offender sample and .96 in the student sample. This is in line with a previous psychometric evaluation by Van Dam-Baggen and Kraaimaat (1999) who also demonstrated good internal consistency (Cronbach's $\alpha = .93$) as well as good test-retest reliability ($r = .84$) of the IIS Social anxiety scale.

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The trait scale of the *State-Trait Anger Scale* (STAS; Spielberger, 1980; Dutch version: Van der Ploeg, Defares, & Spielberger, 1982) was used to measure the general disposition of anger. Participants have to rate each item using a 4-point Likert scale: 1 = 'Almost never,' 2 = 'Sometimes,' 3 = 'Often,' and 4 = 'Almost always.' In a group of 150 Dutch male university students, Van der Ploeg et al. (1982) found good internal consistency (Cronbach's $\alpha = .86$) and good test-retest reliability ($r = .78$). In the current study, Cronbach's α's of the STAS were .96 for the offenders and .88 for the students.

The *Aggression Questionnaire-Short Form* (AQ-SF; Bryant & Smith, 2001; Dutch version: Hornsveld, Muris, Kraaimaat, & Meesters, 2009) is a shortened version of the Aggression Questionnaire of Buss and Perry (1992; Dutch version: Meesters, Muris, Bosma, Schouten, & Beuving, 1996) which contains 12 items that can be allocated to four subscales, i.e. Physical Aggression, Verbal Aggression, Anger, and Hostility. Respondents have to rate the items using a 5-point scale ranging from 1 = 'Entirely disagree' to 5 = 'Entirely agree.' In the current study, we employed the total score of the AQ-SF and the Anger subscale, which both demonstrated good reliability in both samples (all Cronbach's α's between .76 and .89).

The *Reactive–Proactive Aggression Questionnaire* (RPQ; Raine et al., 2006; Dutch version: Cima, Raine, Meesters, & Popma, 2013) is a self-report questionnaire to assess reactive and proactive aggression. The RPQ consists of 23 items, with 11 items measuring reactive aggression and 12 items assessing proactive aggression. Respondents are instructed to rate for each item how often they exhibited this behavior in the past using a 3-point scale with 0 = 'Never,' 1 = 'Sometimes,' and 2 = 'Often.' Cima et al. (2013) found good internal consistency coefficients for the reactive subscale (Cronbach's $\alpha = .83$) and the proactive subscale (Cronbach's $\alpha = .87$). In the current study, similar reliability coefficients were obtained (all Cronbach's α's between .81 and .88).

The *Psychopathy Checklist-Revised* (PCL-R; Hare, 1991, 2003; Dutch version: Vertommen, Verheul, de Ruiter, & Hildebrand, 2002) is a checklist to assess the level of psychopathy. The checklist consists of 20 items, which have to be rated on a three-point scale with 0 = 'Does not apply,' 1 = 'Applies to some extent,' and 2 = 'Applies'. Vertommen et al. (2002) found support for the reliability of the Dutch version of the PCL-R in a group of 1192 inmates. Internal consistency (Cronbach's α) was .87 and the average inter-item correlation was .25. In the present study, we used the total score as well as the four-factor structure as proposed by Hare (Hare, 2003; Hare & Neumann, 2006), which implies the following facets: Interpersonal, Affective, Lifestyle, and Antisocial. The Interpersonal and Affective facets can be considered most indicative of primary psychopathy, whereas the Lifestyle and Antisocial facets are most indicative of secondary psychopathy (Levenson, Kiehl, & Fitzpatrick, 1995).

Procedure

The current study was approved by the scientific research committee of FPC de Kijvelanden. All offenders were individually approached on their wards by a research assistant. They received an informed consent letter in which they were explicitly told that cooperation was on a voluntary basis and that the test results would not have any influence on their clinical evaluation or treatment as these were processed anonymously. Participation was rewarded with a monetary compensation of 10 euros. The ABSQ was completed for a second time after one week in order to assess test-retest reliability.

The secondary vocational students were recruited on a college in Rotterdam. These participants received information about the study one week prior to the day of the data collection by means of an informed consent letter, in which it was clearly stated that participation was on a voluntary basis and that participation would be rewarded with 10 euros. One week later, students who agreed to participate in the study completed a similar set of questionnaires as the patients (except for the BSQ and the PCL-R, which were only obtained in the offender sample) in specially organized classes.

Statistical analysis

All analyses were carried out using the Statistical Package for the Social Sciences, version 20.0, including AMOS, version 18.0 (Arbuckle, 2009). Descriptive statistics were calculated to investigate the distribution of the ABSQ item scores. Pearson correlations were computed to assess the test-retest reliability of the ABSQ total and item scores and to examine the relations between the ABSQ and other measures in the offenders sample and the student sample separately. To explore the factor structure of the ABSQ, an explorative factor analysis (EFA) was carried out using a direct oblimin rotation, as factors were expected to be correlated. Furthermore, a confirmative factor analysis (CFA) was performed to test the fit of the obtained factor model. Goodness of fit was evaluated by means of the Comparative Fit Index (CFI; Bentler, 1990), the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), and the Standardized Root Mean Square Residual (SRMR). CFI values$\geq$ .90, RMSEA values$\leq$ .08, and SRMR values$<$ .08 can be considered as indicators for an acceptable fit (Hoyle, 1995; Hu & Bentler, 1999). Because the offender sample size was too small ($n = 70$) in order to conduct a factor analysis, EFA and CFA were performed in the combined sample of offenders and students ($N = 170$).

Finally, analyses of covariance (ANCOVAs), in which age was included as the covariate, were conducted to compare the sample of offenders with the sample of students on the ABSQ and other scales. As several offenders refused to complete all questionnaires according to the instructions, the number of participants varied per questionnaire.

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Results

Scale development and factor structure

The item pool of the ABSQ version with 32 items was refined by selecting items that were normally distributed (i.e. skewness and kurtosis values between −2 and + 2) and displayed sufficient one-week test-retest reliability. Based on the skewness and kurtosis statistics within the sample of offenders ($n = 70$), 13 items were removed. A total of 60 offenders (85.7%) completed the ABSQ for a second time after a period of one week. One item did not meet the criteria for a moderate to good test-retest reliability (Pearson's $r < .40$) and was also removed. Consequently, the definitive version of the ABSQ comprised 18 items.

To explore the factor structure of the ABSQ, an EFA was conducted (direct oblimin rotation) using the data from the combined sample of 70 offenders and 100 students. This analysis yielded a three-factor solution (see Table 1). Four items had a factor loading≥ .30 on two or more factors and were therefore removed from the corresponding factors, but not from the total score. Factor 1 contained eight items about changes related to respiration (four items), body heat (two items), transpiration (one item), and heart beat (one item). Factor 2 contained four items about physical responses related to a light-headed feeling (one item), a dry mouth (one item), and shaking and freezing of the body (two items). Factor 3 contained two items about changes in muscle tension (one item) and adrenaline (one item). A CFA of 14 items, which was performed in the combined sample of offenders and students ($N = 170$), indicated that the model fit was acceptable with a CFI of .93, a RMSEA of .08 ($CI^{90} = .06–.09$), and a SRMR of .05. The item-to-factor loadings were all significant and varied from .57 to .86 (see Figure 1).

Internal consistency and test-retest reliability

The internal consistency (Cronbach's α) of the total ABSQ (18 items) was .93 for the offenders and .91 for the students. The total score of the ABSQ also had a good test-retest reliability within the offender sample [r (60) = .82]. For the offenders, the three factors had acceptable to high internal consistency (.90, .67, and .73, respectively) and moderate to high test-retest reliability (.84, .67, and .81, respectively). For the students, the three factors had acceptable to high internal consistency (.90, .68, and .61, respectively).

Relations to other constructs (concurrent validity)

The concurrent validity of the ABSQ was first of all examined by relating the total score to an instrument for measuring awareness of bodily sensations, namely the BSQ (this was only done in the offender sample). Although the ABSQ and the BSQ are both related to bodily sensations, they only have two

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Factor structure of the ABSQ with factor loadings.

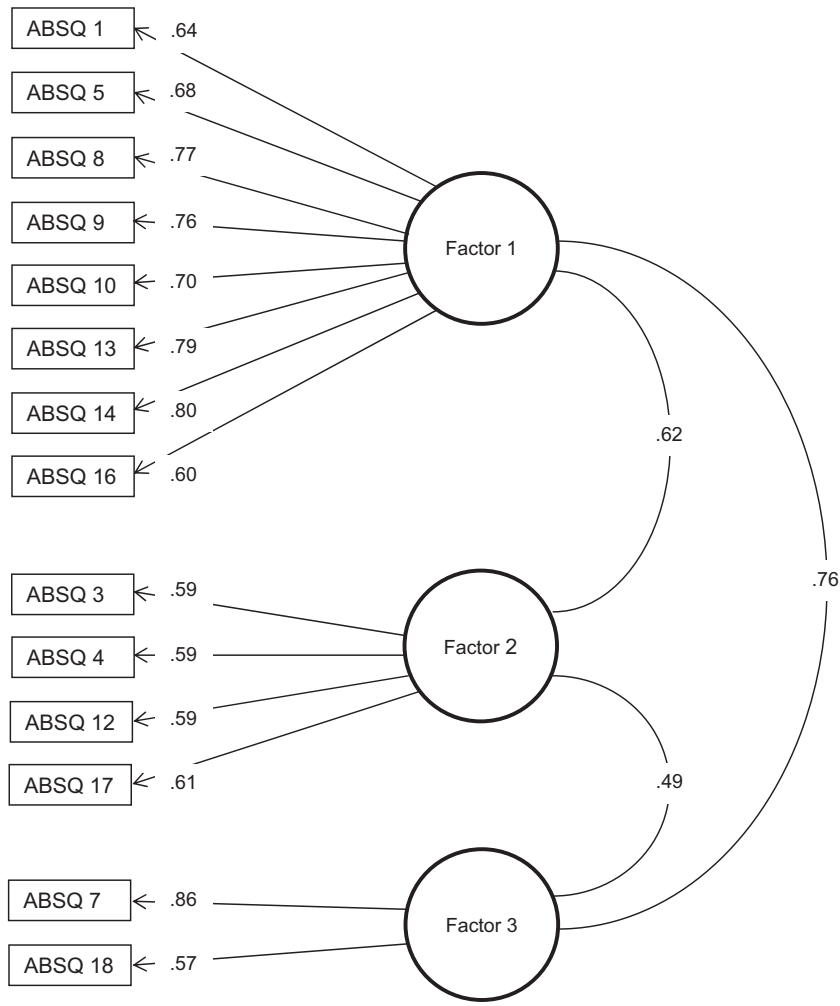

Figure 1. Factor structure of the ABSQ with factor loadings.

items in common (i.e. 'Pressure on the chest' and 'Starting to sweat more'). As expected, a positive correlation between the ABSQ and BSQ total score was documented (see Table 2). Similar results were found for the correlations among the ABSQ factor scores and the BSQ total score.

Furthermore, it was hypothesized that the ABSQ would be positively related to a measure of social anxiety (IIS), as both questionnaires are related to experienced emotional arousal during a social situation. Indeed, the expected

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Table 2. Pearson correlations between ABSQ scales and other measures in the samples of forensic offenders and vocational students.

		Offenders ($n = 70$)					Students ($n = 100$)				
Measure	Scales	n	Total	F1	F2	F3	n	Total	F1	F2	F3
BSQ†	Bodily sensations	69	.59**	.58**	.51**	.42**					
IIS	Anxiety total score	61	.45**	.46**	.56**	.57**	100	.45**	.38**	.51**	.17
STAS	Trait anger	64	.30*	.22	.14	.48**	100	.40**	.31**	.23*	.41**
AQ-SF	Total score	67	.39**	.26*	.23	.60**	100	.27**	.18	.12	.43**
	Anger	67	.38**	.24*	.23	.60**	100	.23*	.12	.14	.41**
RPQ	Reactive	61	.27*	.18	.17	.46**	100	.22*	.12	.11	.37**
	Proactive	61	−.06	−.14	−.15	−.26*	100	.07	−.02	.01	.32**
PCL-R†	Total score	62	−.17	−.22	−.16	.05					
	Interpersonal	62	−.12	−.16	−.11	.04					
	Affective	62	−.16	−.19	−.13	.01					
	Lifestyle	62	−.04	−.07	−.05	.10					
	Antisocial	62	−.17	−.22	−.14	.10					

Note: ABSQ = Anger-related Bodily Sensations Questionnaire, F1: Factor 1, F2: Factor 2, F3: Factor 3, BSQ = Body Sensations Questionnaire, IIS = Inventory of Interpersonal Situations, STAS = State-Trait Anger Scale, AQ-SF = Aggression Questionnaire Short Form, RPQ = Reactive Proactive Questionnaire, PCL-R = Psychopathy Checklist-Revised.

*$p < .05$.

**$p < .01$ (two-tailed).

†The BSQ and PCL-R were not completed in the student population.

positive correlation between the ABSQ and IIS total scores was found for the offenders as well as for the students. The ABSQ factor scores and the IIS total score were also significantly and positively correlated in the offender sample, whereas only factor 1 and factor 2 of the ABSQ were significantly and positively correlated to the IIS in the student sample.

The ABSQ total score was also significantly and positively correlated to trait anger as measured with the STAS for both offenders and students. The expected positive correlation between the ABSQ total score and anger, as measured with a subscale of the AQ-SF, was also confirmed for the offenders and the students. Furthermore, the ABSQ total score was significantly and positively correlated to aggressive behavior in general, as measured with the total score of AQ-SF, for both offenders and students. The ABSQ total score displayed also significant and positive correlations with RPQ reactive aggression for the offenders and the students, while the correlations with proactive aggression were non-significant for both offenders and students.

In contrast to our expectations, there were no significant correlations between the ABSQ total score and the PCL-R total or factor scores, although all correlations were in the expected negative direction. Similar correlations were found between the ABSQ factors and the PCL-R.

Offenders vs. students

Table 3 shows the mean scores (and standard deviations) on all instruments for the offenders and the students. For the ABSQ, no significant differences were found between the two samples with regard to the total score, factor 1, and factor 3. However, offenders had a significantly higher score on the factor 2. Note also that the offenders had significantly higher scores on STAS trait anger, RPQ reactive aggression, and RPQ proactive aggression. No significant differences between both samples were found regarding social anxiety (IIS), aggression (AQ-SF), and anger (AQ-SF).

Discussion

The ABSQ was specifically developed for the assessment of the awareness of physical responses during anger, using a sample of 70 violent offenders and a sample of 100 secondary vocational students. The initial version of the instrument contained 42 items describing different forms of bodily sensations that can be experienced during anger-eliciting social situations. Ten items were removed following a readability and ambiguity check by three clinical psychologists, leaving 32 items for the pilot version of the ABSQ. Because of a skewed distribution or moderate test-retest reliability, 14 further items were removed from the questionnaire, yielding a final instrument of 18 items. An EFA revealed three provisional factors. Internal consistency and test-retest reliability of the questionnaire were modest to good. An exploration of the concurrent validity, which was not

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Table 3. Mean scores (standard deviations) on the ABSQ scales and various other measures in the samples of forensic offenders and vocational students.

		Offenders ($n = 70$)			Students ($n = 100$)			ANCOVA	
Measure	Subscales	n	M	SD	n	M	SD		
ABSQ	Total score	70	35.47	12.30	100	35.01	12.54	F (2163) =	00.90
	Factor 1	70	16.07	5.99	100	16.53	6.92	F (2163) =	00.35
	Factor 2	70	6.87	2.64	100	6.22	2.54	F (2163) =	04.01*
	Factor 3	70	4.39	2.18	100	4.79	2.28	F (2163) =	00.71
BSQ†	Bodily sensations	69	31.26	12.09					
IIS	Anxiety total score	61	62.28	19.66	100	65.75	23.00	F (2158) =	00.60
STAS	Trait anger	64	19.75	7.93	100	17.83	5.93	F (2157) =	04.98*
AQ-SF	Total score	67	30.10	9.80	100	26.42	9.67	F (2160) =	01.60
	Anger	67	7.28	3.07	100	6.66	3.41	F (2160) =	00.38
RPQ	Reactive	61	23.70	4.13	100	20.60	4.89	F (2154) =	10.19**
	Proactive	61	20.18	5.58	100	16.33	3.74	F (2154) =	12.45**
PCL-R†	Total score	62	23.05	8.15					
	Interpersonal	62	3.61	2.57					
	Affective	62	5.08	2.03					
	Lifestyle	62	4.61	1.83					
	Antisocial	62	6.45	2.48					

Note: ABSQ = Anger-related Bodily Sensations Questionnaire, BSQ = Body Sensations Questionnaire, IIS = Inventory of Interpersonal Situations, STAS = State-Trait Anger Scale, AQ-SF = Aggression Questionnaire Short Form, RPQ = Reactive Proactive Questionnaire, PCL-R = Psychopathy Checklist-Revised.
*$p < .05$.
**$p < .01$ (two-tailed).
†The BSQ and the PCL-R were not completed in the student population.

only conducted in the offender sample but also in a sample of secondary vocational students, revealed significant positive correlations with the BSQ, which measures fear of bodily sensations during anxiety, and the IIS, which measures social anxiety. Although individual physiological response patterns to anxiety and anger provoking situations differ to some extent, there is quite some overlap with respect to somatic symptoms (e.g. Frijda, 1986). However, while the ability to identify bodily sensations might be equal for various emotions, it should also be noted that the bodily sensations might be interpreted in a different way for each type of emotion (Nemiah, Freyberger, & Sifneos, 1976). In addition, there are indications that these different interpretations are related to the context in which these emotions are experienced (e.g. Stemmler, Heldmann, Pauls, & Scherer, 2001). All in all, these results seem to support the ability of the ABSQ to assess bodily sensations which are associated with the emotional response of anger.

As expected, the ABSQ total score was also positively correlated to indices of anger and aggression, and this appeared true for offenders as well as students. Moreover, the expected significant positive correlation between the ABSQ and reactive aggression was found in both samples, whereas no significant associations with proactive aggression emerged. Although the expected negative relationship between the ABSQ and proactive aggression was not found, these findings are largely in line with earlier studies (e.g. Blair, 2003; Houston, Stanford, Villemarette Pittman, Conklin, & Helfritz, 2003; Scarpa & Raine, 1997, 2000). It can be concluded that autonomic arousal is mainly present in individuals who exhibit reactive aggression and minimal in persons who display proactive aggression, and this can be taken as support for the convergent and divergent validity of the ABSQ. The hypothesized (negative) relation with psychopathy, as measured with the PCL-R in the offenders sample, was not substantiated by the data. That is, correlations between ABSQ and the PCL-R scores were all non-significant (even those between ABSQ and PCL-R factors assessing primary psychopathy). Yet, the sample size was fairly small and therefore further exploration of the relation between psychopathy and its factors and the ABSQ in larger samples is recommended.

Offenders and students did not substantially differ from each other on the total ABSQ score. Offenders only scored higher on one of the three ABSQ factors. However, the reliability of this finding has to be corroborated in other and larger samples. Notwithstanding this, an explanation with respect to the present findings might be the rather heterogeneous samples of offenders, including both reactive and proactive offenders. For offenders who primarily display reactive aggression, relatively low scores on the ABSQ may be indicative for a low level of awareness of bodily sensations during anger. Furthermore, these patients may be inclined to display an aggressive response pattern during anger. Therefore, for these offenders, the focus of anger therapy should not only be on improving awareness of bodily sensations and their interpretation, but also on teaching them more adaptive response patterns during anger.

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The current study has several limitations. First, as mentioned before, the two investigated samples had a relatively small sample size. To further examine psychometric qualities of the ABSQ, a larger sample is needed. A second limitation is that not all offenders who were approached for the study actually participated. This might have resulted in a selection of offenders who were more cooperative than the offenders who refused. Third, all concurrent validity measures were based on self-report. Therefore, it remains unclear to what extent the parameters of physiological arousal and the awareness of specific bodily sensations are related. Research using the ABSQ in combination with psychophysiological assessments (e.g. skin conductance reactivity or heart rate reactivity) in conflict situations (e.g. Gottman et al., 1995) might shed more light on this relationship. Fourth, discriminant validity was not addressed, although no significant correlations were found with proactive aggression which can be considered as a form of aggression with minimal physiological activation (Scarpa & Raine, 1997). Fifth, the factor analysis was conducted in a combined sample of 70 offenders and 100 vocational students, whereas it would be preferable to conduct such analysis in the separate samples. However, due to the limited number of participants, this was not possible in the current study. Finally, two ABSQ factors had only moderate α coefficients. However, it should be noted that the results of the factor analysis were preliminary and therefore need to be interpreted with caution. It remains unclear whether factors can be regarded as subscales and hence should receive labels. More research in larger and more homogeneous samples of offenders is certainly needed.

In our opinion, the ABSQ might have the potential for being useful during the diagnostic process as well as for the evaluation of treatment outcome. Relatively high scores on the ABSQ might indicate that treatment should include strategies to lower physiological arousal or activation and to improve emotion regulation skills, especially in individuals who display reactive aggressive behavior (Lochman & Wells, 2004). The regulation of emotions to a more optimal level can result in a better appraisal and a more socially acceptable response (Anderson & Bushman, 2002; Gross, 1998), and is therefore often included in cognitive behavioral treatment programs for aggressive offenders (e.g. Kassinove & Tafrate, 2002; Novaco, 1975). On the other hand, relatively low scores on the ABSQ might indicate underawareness, denial, or even an absence of physical sensations during anger-eliciting social situations, and may also be an indication for the presence of alexithymia which is a personality construct that includes the difficulty to identify and distinguish between feelings and bodily sensations of emotional arousal (Nemiah et al., 1976). Furthermore, scores on the ABSQ may provide information about the nature of an offenders' aggressive behavior. In contrast to reactive aggression (e.g. Schore, 2003), proactive aggression is characterized by the absence of heightened levels of autonomic arousal (Scarpa & Raine, 1997). As described in Damasio's somatic marker hypothesis (Damasio, 1996), bodily sensations may have an

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important function in guiding decision-making. According to this theory, persons who have attenuated sensitivity to bodily sensations may not be warned by their somatic markers when they are about to exhibit risky behaviors, like aggressive behavior. Therefore, unlike offenders whose aggressive behavior is preceded by elevated levels of emotions, the focus of the treatment of these so-called 'cold-blooded' offenders (Dodge et al., 1997) should rather be on changing the expectation of positive outcomes of aggression in the long term than on emotion regulation. In spite of the shortcomings, it can be concluded that the first results of the psychometric properties of the ABSQ are promising and that this instrument provides a useful tool for measuring anger-related bodily sensations.

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