

Validation of the STAXI-2: A study with prison inmates

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Abstract

This study investigates the reliability and validity of the State-Trait-Anger-Expression-Inventory-2 (STAXI-2; in the German version by Rohrmann et al., 2013) in a sample of $n=57$ male inmates (aged 25-67 years). Internal consistencies reveal a high reliability of the STAXI-2 and subscale intercorrelations are close to those of the standardization sample. A confirmatory factor analysis confirms the four-dispositional-factor structure of the STAXI-2. Construct validity is supported by correlations with personality traits of inmates that play a key role in inmate misconduct (e.g., aggressiveness & social adjustment). Anger-Expression-Out and Anger-Expression-In are significant predictors of the length of sentence and Trait-Anger is associated with the age of first offense, both indicating criterion-related validity. These results support the use of the STAXI-2 for inmates and suggest that it can serve as an diagnostic tool in correctional institutions.

Keywords: STAXI-2, Anger, inmates, validity

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Anger is an elementary emotion that plays an important role in daily life. Anger is defined as an emotional reaction when an organism is blocked in the attainment of a goal or fulfillment of a need, or as reaction to a provocation (Izard, 1991; Novaco, 1975). Anger is assumed to be a multidimensional construct (Scherer, 1990) which consists of an emotional, a physiological, an expressive, a behavioral, and a cognitive component (Hodapp & Bongard, 2009). Spielberger (1988) suggested discriminating two components of Anger, State-Anger and Trait-Anger: State-Anger represents the emotional component that is present in a specific situation and may change within a subject across different situations. In contrast, Trait-Anger is the general disposition to experience anger frequently and intensively. It is assumed not to vary within a subject across situations but to be a stable disposition. Furthermore, Spielberger (1988) demarcated Trait-Anger itself from the processing and handling of angry emotions. He suggested differentiating three tendencies in the handling of angry feelings: First, subjects may tend to introvert anger (Anger Expression-In), second, they may frankly express or show their feelings of anger (Anger Expression-Out), and third, subjects may tend to control angry feelings and suppress them (Anger-Control).

The State-Trait-Anger-Expression-Inventory (STAXI, STAXI-2; Spielberger, 1988, 1999) is based on this definition and allows for a differentiated measurement of these five dimensions: based on self-report, the STAXI assesses how a person feels at a given moment (*State-Anger*), how frequently, easily, and intensely the person feels angry (*Trait-Anger*) and what the person does when feeling angry (*Anger Expression-In*, *Anger Expression-Out*, *Anger-Control*). The STAXI exhibits good reliability, with alpha coefficients ranging from .81 to .93 (Spielberger, 1988). The structure of the anger expression subscales (Spielberger, Johnson, Russel, Crane, Jacobs, & Worden, 1985) has been replicated in an offender sample (Kroner & Reddon, 1992). There are several findings that support the validity of STAXI and STAXI-2. There are, for example, associations between Trait-Anger and Hostility, Anger Expression-In and Anxiety as well as blood pressures, which indicate that the STAXI measures anger in a highly valid manner (Spielberger, 1988; Schwenkmezger, Hodapp, & Spielberger, 1992). The STAXI has been validated on a variety of normal and clinical populations and has good psychometric properties (Müller, Bongard, Heiligtag & Hodapp, 2001). The revised and extended version, STAXI-2 (Spielberger, 1999), contains new items for the subscales Anger-Control and State-Anger to increase psychometric properties. The German version of the STAXI-2 (Rohrman, Hodapp, Schnell, Tibubos, Schwenkmezger, & Spielberger, 2013) shows good reliability, with Cronbach-alpha coefficients ranging from $\alpha = .82$ to $\alpha = .90$. It displays factorial validity and correlations with anger reactions, aggressiveness, negative affectivity as well as physical discomfort (Rohrman et al., 2013).

In this article, we report additional support for the validity of the German version of the STAXI-2 for a specific subgroup of inmates. Since increased anger may be associated with physical aggression or general hostility, application of the STAXI-2 in inmate samples may be of special interest for treatment recommendations or other diagnostic situations. In the following section, we therefore review the main findings concerning the relationship between anger and criminal behavior.

Anger and criminal behavior

Agnew's General Strain Theory (Agnew, 1992, 2001, 2007) is one of the most prominent theories that can be applied to formulate the relationship between anger and criminal behavior. Agnew (1992) assumed that a subject's exposition to specific types of strain causes increased feelings of anger. Agnew therefore defined three types of strain: the failure to achieve positively valued goals, the removal of positively valued stimuli from a person, and the presentation of negative stimuli to an individual. Being confronted with such stimuli, feelings of anger are accompanied by an urge to take corrective steps. One way of taking corrective steps is to resort to criminal or aggressive behavior (Agnew, 1992). An outwardly aggressive and criminal behavior is most likely, if there are few legal alternatives from the person's perspective and if the strain is assumed to be caused by another person. In situations where the strain cannot be removed directly, aggressive behavior can serve as revenge. For instance, Deffenbacher et al. (1996) showed for a sample of college students that those persons who scored at or above the 75th percentile on the STAXI Trait-Anger reported significantly more aggressive behavior when angry than students who scored below the 25th percentile. Further research also documented that in community samples anger is associated with different forms of antisocial behavior (Hazaleus & Deffenbacher, 1986; Maiuro et al., 1988; Novaco, 1994). These results support Agnew's theory that anger is involved in criminal behavior in non-incarcerated samples.

Spielberger and Sydeman (1994) postulated that particularly the outward expression of anger is associated with violent behavior, whereas an inward expression is associated with anxiety. Besides violence and criminal behavior, which are extreme forms of an outward expression of anger, weaker forms of antisocial behavior such as conflicts and interpersonal problems, are very likely to occur (Baumeister, Stillwell, & Wotman, 1990; Schmitt & Altstötter-Gleich, 2010). Although researchers emphasize the importance of anger and anger expression in criminological theories, empirical evidence does not always support a prevalence of increased anger in inmates in general. In their study on STAXI scores for male sexual offenders, Dalton, Blain, and Bezier (1998) revealed that scores of inmates were very similar to those of non-incarcerated men, except for a slightly higher State-Anger. Additionally, research has not always indicated a direct relationship between anger and criminal behavior or criminal recidivism (Loza & Loza-Fanous, 1999a, 1999b; Mills & Kroner, 2003).

These findings are in accordance with the theory of Anger, Aggression and Hostility ("AHA"-Syndrome; Spielberger, 1988), which postulates that anger is the basic and necessary but not sufficient condition to develop hostile cognitions or manifestations of aggressive behavior (Spielberger & Reheiser, 2010). Mills & Kroner (2003) concluded that, although some offenders exhibited serious anger problems which were involved in committing their crimes, there might be several criminal behaviors for which anger only plays a subordinate role. And finally, there is the possibility that anger plays a different role in criminal behavior in inmate samples than in student samples (e.g., Deffenbacher et al., 1996). These findings suggest that there is no linear relationship, but an interaction between anger and a third moderator variable which is not yet known. This moderator

variable might be categorical, such as different types of offenses, or continuous, such as the degree of the ability to apply stress-reducing coping strategies.

Findings concerning the identification of subgroups with increased anger scores are mainly based on the type of offense committed. These results are inconclusive: Zamble and Quinsey (1997) revealed that anger differentiated assaulters from other offenders. Cherek, Scott, Dougherty, Moeller, and White (2000) found that violent female offenders showed higher Trait-Anger, Anger Expression-Out, and lower Anger-Control than non-violent female offenders. Kalichman (1991) revealed higher Trait-Anger in sexual offenders who committed their crimes on prepubescent children than in offenders with adult victims. Shealy, Kalichman, Henderson, Szymanowski, and McKee (1991) found that STAXI scales helped to identify several subgroups of sexual offenders. Up until now, there is no evidence that a specific type of offense, for example, sexual or violent offense, can be identified that is associated with an unambiguously increased Trait-Anger or an increased outward anger expression. But, one may at least conclude that anger is involved in criminal behavior if not to the same extent in each offense. Mills and Kroner (2003) discuss an interaction effect between anger and the continuous moderator coping strategies. Increased anger may abet criminal behavior in delicate situations where subjects do not dispose of coping skills to handle the situation legally. Consequently, higher Trait-Anger leads to criminal behavior if third variables (e.g., coping skills) are not available.

The behavior of perpetrators who are sentenced to imprisonment continues to be influenced by anger, its expression, and its control. Thus, theories concerning anger and deviant behavior may also be applied to imprisoned persons. For example, Cornell, Peterson, and Richards (1999) present evidence that anger may be related to conduct problems in incarcerated adolescents. As an indication of construct validity of the STAXI-2 for incarcerated men, we expect a relationship between Trait-Anger, Anger Expression-Out and self-reported traits concerning interpersonal behavior, i.e. aggressiveness and social adjustment. Furthermore, we hypothesize that Anger Expression-In shows strong associations with traits that represent internalized dispositions, i.e., a positive association with emotional instability and a negative association with optimism. Finally, we assume that in correctional institutions high Anger-Control is accompanied by high social adjustment and weak Experience of incompetence.

Based on the implications of these criminological theories and on empirical findings, we do not expect STAXI scores to be generally increased in inmates. But, in accord with Agnew's theory, we expect that anger is associated with indices of severity of criminal behavior. The severity of criminal behavior implies the severity of damage that is produced by one particular offence (e. g., very brutal crimes) as well as the frequency of several offences. Both alternatives typically lead to longer sentences when subjects are convicted, so we first operationalized the severity of criminal behavior as length of sentence.

Furthermore, Deffenbacher et al. (1996) demonstrated that individuals who scored high in Trait-Anger on the STAXI tended to experience more negative consequences as a result of their anger than did individuals scoring lower on this scale. For persons with an increased Trait-Anger, the probability of feeling angry in intense situations is higher;

therefore, they are also more likely to react with criminal behavior to the perceived strain, especially when the situation involves criminal stimuli. Thus, increased Trait-Anger scores should lead to a higher frequency of criminal behavior, which shows a high association with the Age of the first offense (Tolman, 1987), our second operationalization of the severity of criminal behavior.

Aim of the study

In order to examine psychometric properties in the population of prison inmates, this study examines reliability coefficients. First, we expect the STAXI-2 to show reliability coefficients of an acceptable magnitude ($\alpha \geq .70$; in line with suggestions by Schermelleh-Engel & Werner, 2011). Second, we expect subscale intercorrelations of the STAXI-2 in the current sample of inmates to approach the intercorrelations of subscales in the standardization sample assuming that the STAXI-2 measures anger in an equivalent manner across these two populations. In order to validate the STAXI-2 for the population of prison inmates, the factorial (i.e. construct) validity of the STAXI-2 will be analyzed. Factorial validity will be proven for the STAXI-2 if the postulated factor model fits the data. To examine construct validity, we will analyze correlations between anger dimensions and personality traits that play a role in inmate misconduct. We hypothesize that outward anger will show the strongest associations with self-reported personality dispositions of inmate misconduct and expect a pattern of correlation which fits the theory. For the assessment of criterion validity, we will analyze the relationship between the STAXI-2 and indices of general criminality. Outward anger expression, which relates to violent behavior, should be associated with some measures of criminal behavior, such as age of first offense and the length of sentence.

Method

Participants

The sample consisted of 57 incarcerated male offenders from a state correctional institution in Frankfurt/Main, Germany. Participants took part in the study on a voluntary basis, they were allowed to fill out the questionnaire in their spare time, and received a small allowance (e.g., chocolate) afterwards. 98% of these inmates were finally convicted; their prison sentences ranged from 2.6 months to 4.25 years with a mean of 21 months. Subjects were mainly convicted for offenses like violation of the narcotics law, robbery, fraud, or theft. Detailed demographic statistics for the sample are presented in Table 1. Participants' ages ranged from 25 to 67 years (Mean = 37.11; SD = 9.19). 59.6% of the $n = 57$ participants had never been married, 22.8% lived in a relationship, 10.5% were divorced, and 5.3% were married at the time of the investigation. Most of the subjects had left school after the 9th or 10th grade (40.4%, respectively), 8.8% were classified as

Table 1:
Participants' Demographics

	Mean	SD
Age	37.11	9.19
	Absolute number	Percentage
Marital status		
Single	34	59.6
Married	3	5.3
Relationship	13	22.8
Divorced	6	10.5
Widowed	0	0.0
Educational level		
Early school leavers (without graduation)	5	8.8
Grade 9 (Hauptschule)	23	40.4
Grade 10 (Realschulabschluss)	23	40.4
Grade 12 or more (Fachhochschulreife)	5	8.8
Qualification for university entrance (Abitur)	1	1.8
Treatment during arrest	26	45.6

early school leavers (without school-leaving certificate), 8.8% had left school after the 12th grade, and 1.8% had obtained the qualification for university entrance. In total, 45.6% of the subjects had received at least one treatment during their arrest (including psychotherapy, apprenticeships, or other skill trainings).

Measures

The State-Trait-Anger-Expression-Inventory-2 (STAXI-2; Spielberger, 1999) is a self-report questionnaire that contains 51 items measuring five domains of anger: State-Anger, Trait-Anger, Anger Expression-In, Anger Expression-Out, and Anger-Control. Responses to the items are indicated on a 4-point graded scale, ranging from 1 (completely disagree) to 4 (completely agree). In the current study, the subscale State-Anger was omitted in all analyses, because information on the subjects' emotional state during participation was only of limited interest.

Persönlichkeitsfragebogen für Inhaftierte (Personality Questionnaire for inmates; PFI; Seitz & Rautenberg, 2010). The PFI is a German-language questionnaire that assesses personality traits of inmates which are relevant to prison life by presenting items which pertain to daily life in prison. The PFI measures ten facets of personality. For economic reasons, we administered only seven of ten personality facets (i.e. Experience

of Incompetence, Emotional Instability, Optimistic Recklessness, Social Adjustment, Need for Attention and Encouragement from Inmates, Perceived Autonomy and Dominance against Inmates, and Aggressiveness) with those items with the highest discriminability index (3 to 5 items per facet). The reliability coefficients for these short facets ranged from .48 (acceptable reliability) to .80 (good reliability) considering the rather small number of items per scale. Results concerning the validity of the PFI are based on the original version of the questionnaire. Concerning internal validity, substantial relationships were found between corresponding subscales such as aggressiveness and depression from the Freiburger Persönlichkeitsinventar (FPI; Fahrenberg, Hampel, & Selg, 2001) and the PFI (Seitz & Rautenberg, 2010). Mean differences between relevant subsamples (socio-demography, intelligence, attitude towards criminal, and legal behavior, etc.) confirm the external validity of the PFI (see Seitz & Rautenberg, 2010).

Statistical analysis

T-Scores were calculated for the four scales of the STAXI-2 in order to examine the differences between our prison sample and the standardization sample of the STAXI-2 (Spielberger, 1999).

Missing data were observed for 15 subjects for at least one item of the STAXI-2 (total missingness was 6.02%). Missingness was assumed to be Missing At Random (MAR) and was accounted for in the analysis of validity by imputing scale scores using the EM algorithm (Dempster, Laird, & Rubin, 1977; Little & Rubin, 2002). For the analysis of factorial validity, the missing data in the item parcels was accounted for appropriately (under the MAR assumption), that is by applying the full information maximum likelihood estimator in *Mplus* (Muthén & Muthén, 1998-2012), or the Gibbs sampler for the Bayesian analysis (Gelman, Carlin, Stern, & Rubin, 2004).

Results

Descriptives and reliability

Means, standard deviations, Cronbach's α coefficients, and correlations between the four subscales of the STAXI-2 (Trait-Anger, Anger Expression-In, Anger Expression-Out, and Anger-Control) are presented in Table 2. The subscales of the STAXI-2 showed high reliabilities for the sample of inmates, with Cronbach's α coefficients ranging from .79 to .88. Intercorrelations among the subscales were comparable to correlations of the standardization sample. As can be seen, almost all correlations of the inmate sample were close to those of the standardization sample. The only exception was the correlation between Trait-Anger and Anger Expression-Out, where the inmate sample exhibited a weaker association between the two subscales ($r = .48$) than subjects in the standardization sample ($r = .70$). We applied a multivariate test to the two correlation matrices in order to examine if all correlation coefficients were the same (Bollen, 1989). Therefore,

we specified two models: A restricted model that assumed the same population correlation matrices for both samples ($R_{\text{inmate}}=R_{\text{stand}}$), and an unrestricted comparison model that assumed different population matrices ($R_{\text{inmate}}\neq R_{\text{stand}}$). We used the χ^2 values provided by Mplus (Muthén & Muthén, 1998-2012) to carry out a χ^2 difference test that tested the invariance of the correlation matrices (based on the sample correlation matrices given in Table 2). The unrestricted model fitted the data significantly better ($\chi^2_{\text{diff}} = 19.54$, $df = 6$, $p < .05$) which indicated a significant difference between the two groups when all correlations were assumed to be equal. An additional model that assumed equal correlations across the two samples except the one between Trait Anger and Expression-Out showed no significant difference to the unrestricted model ($\chi^2_{\text{diff}} = 8.89$, $df = 5$, $p = .08$). This implied that the correlational pattern of the scales was the same for inmates and subjects from the standardization sample except for the correlation between Trait Anger and Expression-Out.

Table 2:
Means, Standard Deviations, α Coefficients, and Subscale Intercorrelations
(with Confidence Intervals) of the STAXI-2

	M	(SD)	α	Correlations		
				Anger Expression- In	Anger Expression- Out	Anger-Control
Trait-Anger	19.55	(5.54)	.88	.32* (.06; .53)	.48* (.25; .66)	-.24 (-.48; .02)
				.21* _a	.70* _a	-.44* _a
Anger Expression-In	18.96	(5.53)	.83		.30* (.04; .52)	.10 (-.16; .36)
					.05 _a	.25* _a
Anger Expression-Out	12.90	(3.96)	.79			-.46* (-.65; -.23)
						-.53* _a
Anger-Control	29.46	(6.51)	.87			

Note: $n = 56$, * $p < .05$. _a Correlations of the standardization sample

Factorial validity: Confirmatory factor analysis

The STAXI-2 assumes five anger dimensions, from which four dispositional constructs were included into the analysis⁴: Trait-Anger, Anger-Control, Anger Expression-In, and Anger Expression-Out. In the present study, we investigated whether the four-

⁴ Due to the lack of systematic variation of the situation an appropriate differentiation between states and traits (e.g., with the Latent-State-Trait-Model; Steyer, 1987) was not possible. Hence the state items were not included into the analysis.

dimensional structure could be confirmed in the prison sample by analyzing the data with a confirmatory factor analysis (CFA; see e.g., Bollen, 1989). Because of the small sample size, complexity of the item information was reduced by forming item parcels (Bandalos, 2002). For each latent dimension, three item parcels were formed by aggregating two to four items. We applied two different estimators to the data: A standard Maximum Likelihood estimator (Mplus; Muthén & Muthén, 1998-2012) and a Bayesian estimator (MCMC estimator implemented in OpenBugs; Lunn, Spiegelhalter, Thomas, & Best, 2009). For small sample sizes the Bayesian estimator has been shown to give reliable results (Dunson, 2000; Lee & Song, 2004, 2012). Though, information on the prior distribution is crucial.

The ML analysis of the factor model indicated a good model fit with a non-significant χ^2 -value of 49.60 ($df = 60$, $p = .83$). Descriptive fit indices also suggested a good or acceptable fit of the data to the model (RMSEA = .00, SRMR = .08, CFI = 1.00, NFI = 1.05, BIC = 2,532.89). No additional residual covariances needed to be specified to enhance model fit, which would have complicated the interpretation of latent constructs (Bollen, 1989). Additionally, a one-factor model was analyzed that modeled a general Anger construct in order to test whether a more parsimonious one-dimensional structure suffices to explain the construct. Fit indices indicated a clearly worse fit than the four factor model (BIC = 2,646.62) and the same was true with regard to the χ^2 test ($\chi^2 = 187.37$, $df = 66$, $p < .05$).

For the Bayesian analysis, we used informative conjugate priors (e.g., Gelman et al., 2004) with information for the priors stemming from a factor analysis of the standardization sample (Rohrmann et al., 2013). Convergence criteria (Gelman plot and density plots, see Gelman, 1996) indicated convergence after about 1,500 iterations, which were discarded as burn-in iterations. The four-factor model showed better fit ($DIC^5 = 2,187$) than a one-factor model ($DIC = 2,537$).

Results for parameter estimation are presented in Table 3. The results for both analyses were fairly similar. All factor loadings were significant and had medium to large effect sizes, with standardized factor loadings ranging from .58 to .93 (for the ML estimator) and from .56 to .99 (for the Bayesian estimator). The correlations between the latent factors approached the correlations between scales reported in Table 2 above. In all, results of the CFA, i.e., good model fit, low to medium-sized correlations, and high factor loadings support the hypothesized four-dimensional structure for the STAXI-2 in the prison sample.

⁵ Deviance information criterion (Spiegelhalter, Best, Carlin, & van der Linde, 2002; Celeux, Forbes, Robert, & Titterton, 2006).

Table 3:
Parameter Estimates for the Factor Loadings of the Four-Factor Model Based on Item Parcels
for a Standard ML Estimator and a Bayesian Estimator

	ML factor analysis			Bayesian factor analysis		
	Factor loading	S.E.	Standardized factor loading	Factor loading	S.E.	Standardized factor loading
<i>Trait-Anger</i>						
Item parcel 1	1.00		.58	1.00		.56
Item parcel 2	1.75	.41	.91	1.99	.36	.99
Item parcel 3	1.29	.31	.89	1.47	.29	.97
<i>Anger-Control</i>						
Item parcel 1	1.00		.80	1.00		.77
Item parcel 2	.83	.15	.78	.93	.18	.84
Item parcel 3	.81	.14	.80	.90	.18	.85
<i>Anger Expression-In</i>						
Item parcel 1	1.00		.66	1.00		.61
Item parcel 2	1.42	.29	.83	1.67	.34	.89
Item parcel 3	1.53	.30	.87	1.79	.34	.94
<i>Anger Expression-Out</i>						
Item parcel 1	1.00		.75	1.00		.81
Item parcel 2	.77	.18	.67	.74	.16	.70
Item parcel 3	1.05	.21	.76	1.08	.20	.84

Construct validity

In order to investigate the construct validity, we examined relationships between the STAXI-2 and seven subscales of the PFI. Correlations are reported that are significant on the 5% Type I error level. As Table 4 shows, Trait-Anger and Social Adjustment were significantly and negatively correlated ($r = -.29$), which implies a tendency that higher Trait-Anger is related to a lower Social Adjustment. Anger Expression-In was correlated with Emotional Instability and Optimistic Recklessness with $r = .25$ and $r = -.26$, respectively, which tended towards significance. While the increase of Anger Expression-In was accompanied by increased Emotional Instability, high scores in Anger Expression-In were associated with lower Optimistic Recklessness. The associations between Anger Expression-Out and the PFI scales showed three significant results. Besides a high negative association of Anger Expression-Out and Social Adjustment ($r = -.31$), two Anger Expression-Out correlated positively with Perceived Autonomy and Dominance against Inmates and Aggressiveness ($r = .30$ and $r = .32$, respectively).

Table 4:
Correlations of STAXI-2 and PFI Scales

	Trait-Anger	Anger Expression -In	Anger Expression -Out	Anger-Control
Experience of Incompetence	.02	.05	.15	-.26
Emotional Instability	-.04	.25	.12	-.04
Optimistic Recklessness	-.09	-.26	-.12	.26
Social Adjustment	-.29*	.16	-.31*	.25
Need for Attention and Encouragement from Inmates	.21	.05	.17	-.18
Perceived Autonomy and Dominance against Inmates	.19	.15	.30*	.07
Aggressiveness	.20	.18	.32*	.00

Note: * $p < .05$.

Criterion validity

In order to test whether the sample of incarcerated subjects showed higher T-Scores in the STAXI-2 scales, we calculated means, standard errors and confidence intervals for four subscales (see Table 5). In the current study, the subscale State-Anger was omitted, because information concerning the subjects' emotional state during participation was only of limited interest. Subjects showed a significantly increased average T-score of 54.61 (SD = 1.56, $p < .05$) for the Anger Expression-In scale with a 95% confidence interval ranging from 51.48 to 57.74. Average scores for the other three scales were close to 50 and did not differ significantly from the mean of the standardization sample.

Table 5:
Descriptive Statistics for T-scores of the STAXI Scales and their Confidence Intervals (CI) for STAXI-2

	Means	SD	CI (95%)
Trait-Anger	49.51	1.32	46.87 - 52.17
Anger Expression-Out	49.91	1.18	47.54 - 52.28
Anger Expression-In	54.61	1.56	51.48 - 57.74
Anger-Control	51.87	1.46	48.94 - 54.80

Note: $n = 56$.

To predict the length of sentence with the four constructs Trait-Anger, Anger Expression-In, Anger Expression-Out, and Anger-Control we conducted a multiple linear regression analysis. The variance explained by all four predictors together was 29.0% ($F = 4.29$, $df_h = 4$, $df_e = 42$, $p < .05$), but only Anger Expression-In and Anger Expression-Out contributed significantly to the prediction of length of sentence (with standardized coefficients of $\beta = .339$, $p < .05$, and $\beta = .295$, $p < .05$, respectively). A regression with these two predictors reduced the explained variance to 26.2% ($F = 7.81$; $df_h = 2$; $df_e = 44$, $p < .05$). The decrement was not significant ($F = .83$, $df_h = 2$, $df_e = 42$, $p = .45$).

Next, we examined the correlation between Trait-Anger and the Age of first offense, because we did not assume a direction of association between these two variables. Results indicated that there is a negative association between Trait-Anger and Age of first offense with $r = -.28$ ($p < .05$, $n = 55$). The higher a subject scored in Trait-Anger, the younger he was at the time of his first offense. The other scales showed no significant correlations with the Age of first offense.

Discussion

In this study, we examined the reliability, criterion validity, and construct-related validity of the STAXI-2 in a sample of incarcerated men. High reliability coefficients for the subscales indicated that a precise measurement of anger could be achieved with the STAXI-2 for the inmate sample. Also, correlations between the STAXI-2 subscales were mainly comparable to those found for the standardization sample of the STAXI-2. For the investigation of factorial validity, two confirmatory factor analyses were conducted which both assumed a four-dimensional measurement of anger. Fit indices showed a good model fit, which confirmed the postulated four-factor structure of the STAXI-2 and replicated findings of the standardization sample by Rohrmann et al. (2013). The fairly similar results in both the ML analysis and the Bayesian analysis suggest that the found four-dimensional is not purely artifactual due to the small sample size (cf. estimation properties of frequentist approaches in e.g., Dunson, 2000; Lee & Song, 2004, 2012). These results confirm that the STAXI-2 is a reliable and adequate instrument to be administered to inmates.

To examine the construct validity of the STAXI-2, we analyzed associations between STAXI-2 and a questionnaire of personality traits relevant to prison life (PFI; Seitz & Rautenberg, 2010). Correlations between the STAXI-2 and the PFI showed the expected pattern, which supports the assumptions concerning construct validity. A strong and negative correlation between Trait-Anger and Social Adjustment reflects the theory conform involvement of Trait-Anger in interpersonal problems and conflicts. Persons with high Trait-Anger scores are often reported to show a lack of skills of behaving in a socially adjusted manner. Furthermore, we found correlations between Anger Expression-Out and self-reported traits concerning interpersonal behavior, i.e., Aggressiveness, Social Adjustment, and Perceived Autonomy and Dominance against Inmates. This supports hypotheses concerning Anger and Aggression which were based on the "AHA"-Syndrome (Spielberger, 1988). Correlations between Anger Expression-In and Indices of

internalized dispositions (e.g., Emotional Instability) were obtained which tended towards significance. This pattern of relationships between STAXI-2 scales and inmates' personality traits thus confirms the construct validity of the STAXI-2.

To investigate criterion-related validity, we compared the means of T-Scores of the inmate sample to those of the standardization sample, expecting no differences between both samples. Contrary to this expectation, Anger Expression-In was significantly higher in inmates than in non-incarcerated subjects. Based on the findings by Spielberger and Snyder (1992), who claimed a relationship between Anger Expression-In and Anxiety, it can be argued that persons in correctional institutions are in a situation that actually evokes increased feelings of anger. However, the only way to express this anger without risk of negative consequences is an inward expression of anger. This might result in an increased Anger Expression-In for inmates, which may be a consequence rather than the cause of a conviction. As we hypothesized, all other subscales showed no differences between the sample of inmates and the standardization sample.

We examined the prediction of length of sentence with four relevant STAXI-2 scales. The scales Trait-Anger and Anger-Control did not add substantially to the prediction of length of sentence. As expected, subjects with higher Anger Expression-Out reported a longer sentence, which can be attributed to a higher severity of criminal behavior. The significant prediction by Anger Expression-In, on the other hand, could also be interpreted as a consequence of a longer sentence (see above). Thus, the results can serve as an indicator for criterion validity; one may conclude that the STAXI-2 measures anger as it is theoretically defined. Inspection of the relationship between Trait-Anger and Age at the first offense indicated that the younger an inmate was at the time of his first offense, the higher the Trait-Anger he reported in the STAXI-2. Those with higher Trait-Anger showed a younger age of onset of criminal activity and research (Tolan, 1987) demonstrates younger age of onset of criminal activity is associated with greater involvement in criminal activity. This could be indirectly interpreted as a support of the assumption that persons with a higher Trait-Anger are more likely to be involved in situations that include criminal actions and thus may commit their first offense at an earlier age.

Limitations of the study

Although our results support the postulated reliability and validity of the STAXI-2 among inmates, some limitations of this study need to be discussed. Due to the small sample size, our results should be interpreted with caution. Future studies should be based on larger samples and they should include women, adolescents, and also offenders who committed more severe offenses, e.g., murder. But despite the small sample size of the current study and its potentially low power for inferential tests, the results can contribute substantially to the validation of the STAXI-2, because effect sizes, for example, for correlations between the scales of the STAXI-2, were very similar to those found in the standardization sample. This implies that the observed associations between these variables are comparable in both samples.

In this study, we examined the factorial validity of the STAXI-2 in a sample of incarcerated men. Further research should investigate whether measurement invariance can be assumed for incarcerated men and the standardization sample. But for an item-based analysis (e.g., by conducting a Multi Sample Analysis; Bollen, 1989) a larger sample size would be required.

In the current study, the data was based on self-report information. Therefore, measures might be biased by different kinds of response styles, for instance, exaggeration, minimization, malingering, and especially social desirability. Rohrmann et al. (2013) reported correlations of the STAXI-2 and social desirability which may also pertain to self-reports of offenders, who are probably motivated to underreport anger problems. Future research needs to examine the magnitude of effects of response styles on STAXI-2 scores in inmate samples by administering validation scales (e.g. for measuring social desirability) and by an additional consideration of behavioral variables (e.g., verbal anger expressions).

Another topic which could not be addressed in this study concerns potential interaction effects of anger-related variables and coping skills for the prediction of criminal behavior. Although theories postulate associations between anger and criminal behavior in particular, empirical research could not provide a precise definition of this relationship.

Conclusion

The current study indicates that the STAXI-2 has a good reliability, factorial validity, criterion validity, and construct validity within a sample of inmates. The results from this initial study suggest that further research of the STAXI-2 with inmates is in order. Clearly, the instrument needs to be tested in a much larger, representative sample of criminal offenders in prisons before recommending its widespread use. Diagnosticians should keep in mind that anger does not function as an empirically supported predictor of criminal recidivism. Nevertheless, measuring anger in correctional settings could be helpful to identify reasons for problems of conduct, or to develop treatment recommendations.

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