

A German Adaptation of the UPPS Impulsive Behavior Scale: Psychometric Properties and Factor Structure

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ABSTRACT

Impulsivity occupies a prominent place in psychopathology, yet the precise nature of its implication in mental disorders is still poorly understood. This is partly due to inconsistencies among existing conceptualizations and measurements of impulsivity. In an attempt to overcome these inconsistencies, S. P. Whiteside and D. R. Lynam (2001) developed the UPPS Impulsive Behavior Scale, which distinguishes four facets of impulsivity: urgency, lack of premeditation, lack of perseverance, and sensation seeking. The present study examined the psychometric properties of a German adaptation of the UPPS Impulsive Behavior Scale by administering it to a sample of psychology students. Exploratory and confirmatory factor analyses of the responses of 310 native German speaking participants suggested a four-factor solution similar to that found in the original study. Results indicated that these four subscales possess very good internal consistency.

Impulsivity is a key construct in psychology, psychopathology, and neuropsychology. Research into its implication in mental disorders has for a long time suffered from a proliferation of partly inconsistent conceptualizations and measurements (cf. Evenden, 1999). In an attempt to overcome this state of affairs, Whiteside and Lynam (2001) administered 17 widely used measures of impulsivity, as well as the items of three impulsivity-related domains (neuroticism, extraversion, and conscientiousness) of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992), to a sample of 437 undergraduates enrolled in an introductory psychology course. They then performed a factor analysis on the impulsivity scales and on the impulsivity-related facets of the NEO-PI-R (impulsiveness, deliberation, self-discipline, and excitement seeking). Results revealed a robust four-factor solution. Based on content analysis, the authors labeled the four factors urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking. Finally, the UPPS Impulsive Behavior Scale was elaborated through selection of the items that loaded most highly on each of these factors, respectively.

The first facet of impulsivity, urgency, “refers to the tendency to experience strong impulses, frequently under conditions of negative affect” (Whiteside & Lynam, 2001, p. 685). The second facet, premeditation, “refers to the tendency to think and reflect on the consequences of an act before engaging in that act” (p. 685). The third dimension, perseverance, “refers to an individual’s ability to

remain focused on a task that may be boring or difficult” (p. 685). The fourth and final facet, sensation seeking, “incorporates two aspects: 1) a tendency to enjoy and pursue activities that are exciting and 2) an openness to trying new experiences that may or may not be dangerous” (p. 686).

Attesting to the robustness of the four-factor model of impulsivity, Whiteside and Lynam’s (2001) principal findings have recently been replicated in different samples (e.g., Miller, Flory, Lynam, & Leukefeld, 2003) and in other languages (e.g., French; Van der Linden et al., 2006). Consistent with Whiteside and Lynam’s expectations, the four facets of impulsivity have also been demonstrated to be differentially related to various forms of psychopathology, such as alcohol abuse in individuals who are high or low in antisocial personality traits (Whiteside & Lynam, 2003), borderline personality disorder (Whiteside, Lynam, Miller, & Reynolds, 2005), eating disorders (Claes, Vandereycken, & Vertommen, 2005), depression in adolescents (d’Acremont & Van der Linden, 2007), or insomnia (Schmidt, Gay, & Van der Linden, in press). In a similar vein, it has been shown that the dimensions of impulsivity are differentially involved in addictive behaviors, such as cigarette smoking (Billieux, Van der Linden, & Ceschi, 2007) or mobile phone use (Billieux, Van der Linden, d’Acremont, Ceschi, & Zermatten, 2007). In addition, there is growing evidence that the facets of impulsivity might have different neural underpinnings (Bechara & Van der Linden, 2005). Taken together, these findings suggest that the UPPS scale constitutes a valuable tool for unraveling the intricate interplay between different forms of impulsivity and various types of psychopathology.

The aim of the present study was to examine the psychometric properties of a German adaptation of the UPPS Impulsive Behavior Scale. In view of long-standing debates on the factorial structure of impulsivity (e.g., Evenden, 1999), the question of whether the four-factor model of impulsivity could be replicated in a German-speaking sample was of particular interest. Given that it had already been validated in English and French, a validation in German would provide further evidence for the cross-cultural robustness of the four-factor model of impulsivity.

Method

PARTICIPANTS

The German UPPS Impulsive Behavior Scale was administered to 368 psychology students (295 women and 73 men) from the Universities of Basel, Berne, Fribourg, and Zurich. The gender imbalance is due to the low proportion of male psychology students at these universities. The UPPS scale was completed collectively during class; anonymity was guaranteed. Only the data of students who indicated that they were native German speakers ($n = 335$) were considered for analysis; 25 of them had one or two missing values and were therefore excluded. The final sample consisted of 310 participants (245 women and 65 men) whose age ranged from 18 to 48 ($M = 22.57$, $SD = 4.54$).

INSTRUMENT

The original English version of the UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) contains 45 items that are rated on a 4-point Likert scale ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). It comprises four subscales corresponding to the four distinct, yet related, facets of impulsivity as identified by Whiteside and Lynam: (a) urgency (e.g., “In the heat of an argument, I will often say things that I later regret.”), (b) (lack of) premeditation (e.g., “I usually make up my mind through careful reasoning.”), (c) (lack of) perseverance (e.g., “Once I start a project, I almost

always finish it.”), and (d) sensation seeking (e.g., “I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.”). Answers to some items are reversed so that higher scores always indicate a higher level of impulsivity. Both the English and the French versions (Van der Linden et al., 2006) of the UPPS Impulsive Behavior Scale have evidenced robust four-factor dimensionality and sound internal consistency for each subscale (Cronbach’s α range = .77 to .91); the correlations among subscales ranged from .45 for (lack of) premeditation and (lack of) perseverance to $-.14$ for (lack of) perseverance and sensation seeking.

The German UPPS Impulsive Behavior Scale was elaborated as follows: (a) The first author of this study translated the 45 items of the original UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) into German; (b) two English-German bilinguals translated the German version back into English; and (c) discrepancies between the original UPPS scale and the back-translations were analyzed and adjustments made to the German UPPS scale accordingly. The items of the German UPPS Impulsive Behavior Scale are rated on a 4-point Likert scale ranging from 1 (*sehr zutreffend*) to 4 (*sehr unzutreffend*). The German translations of the previously reported representative items of the four facets of impulsivity are as follows: (a) urgency (“In der Hitze eines Wortgefechts sage ich oft Dinge, die ich später bereue.”), (b) (lack of) premeditation (“Entscheidungen fälle ich gewöhnlich nach reiflicher Überlegung.”), (c) (lack of) perseverance (“Wenn ich erst einmal mit einem Projekt beginne, führe ich es fast immer zu Ende.”), and (d) sensation seeking (“Ich mag neue und aufregende Erfahrungen und Erlebnisse, selbst wenn sie ein bisschen furchterregend und unkonventionell sind.”).

STATISTICAL ANALYSIS

The number of factors to extract was determined by Velicer’s Minimum Average Partial Test, performed on the correlation matrix (Velicer, 1976). Next, an exploratory factor analysis was performed on the covariance matrix using the maximum likelihood (ML) estimation method of the R factor analysis function (R Development Core Team, 2006). We opted for the data-driven, bottom-up approach of a factor extraction method and an exploratory factor analysis as initial analyses because questionnaire research has repeatedly demonstrated that the number of factors to extract and the pattern of factor loadings may vary from one study to another, especially when a translated version of a questionnaire is used (e.g., Fehm & Hoyer, 2004; Wells & Davies, 1994). Regarding the ML estimation method, it presupposes on principle continuous and normally distributed variables. Univariate normality in our data set was explored by calculating skewness and kurtosis for each item of the German UPPS scale; absolute values for skewness and kurtosis greater than 3 and 20, respectively, are considered to be extreme (Weston & Gore, 2006). Analysis of the results revealed that skewness ranged from -0.47 to 0.98 and kurtosis from 1.61 to 3.65 , indicating that the variables did not depart in important ways from a normal distribution. Provided that ordinal variables may be considered as normally distributed, they are amenable to being analyzed using the ML estimation method, so this method was deemed legitimate in the present case.

As a follow-up analysis, a confirmatory factor analysis was computed using the ML estimation method with Mplus (Muthén & Muthén, 2006). Goodness of fit was tested with X^2 (whereby a nonsignificant value indicates acceptable fit). However, X^2 is known to increase with sample size,

and Byrne (1994) noticed that it is unusual to obtain a nonsignificant X^2 when performing confirmatory factor analyses on self-report questionnaires. Therefore, we complemented X^2 by examining other indices that depend on conventional cutoffs. Hu and Bentler (1998) recommended the use of two indices: the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). When compared with other fit indices, the RMSEA and the SRMR present the advantage of being less sensitive to small misspecifications of the factor structure, which are very common in the domain of personality research (Beauducel & Wittmann, 2005). An RMSEA between 0 and 0.05 indicates good fit and that between 0.05 and 0.08 an acceptable fit. An SRMR between 0 and 0.05 indicates good fit and that between 0.05 and 0.10 an acceptable fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

Pearson's point-biserial correlation (r_{pb}) was used to evaluate the effect of gender on impulsivity. Correlations are reported within the 95% confidence interval (CI); an asterisk indicates that zero is not included in the 95% CI. Women were set at -1 and men at 1 ; thus, a positive correlation corresponds to a higher score for men. According to Cohen (1988), a correlation between .10 and .30 corresponds to a small effect, between .30 and .50 to a medium effect, and above .50 to a large effect.

Results

Answers to some items were reversed so that a value of 1 always corresponded to a low level and a value of 4 to a high level of impulsivity.³ Means and standard deviations for each UPPS subscale are reported in Table 1. Cronbach's α was .82 for urgency, .80 for lack of premeditation, .85 for lack of perseverance, and .83 for sensation seeking; the UPPS subscales thus demonstrated very good internal consistency. The corresponding α coefficients in Whiteside and Lynam's (2001) original study were .86, .91, .82, and .90, respectively, and the corresponding coefficients for the French version of the UPPS were .83, .83, .81, and .77, respectively (Van der Linden et al., 2006).

Table 1 - Cronbach's Alphas, Means, and Standard Deviations of the UPPS Subscales

Subscale	No. of items	α	Mean	SD
Urgency	12	.82	27.39	5.26
Lack of premeditation	11	.80	23.94	4.54
Lack of perseverance	10	.85	19.99	4.78
Sensation seeking	12	.83	31.84	6.61

A Minimum Average Partial test (Velicer, 1976) suggested the extraction of four factors, which were then rotated using promax rotation; when compared with the orthogonal method of varimax rotation, the oblique method of promax rotation presents the double advantage of being generally better adapted to intercorrelated factors and of being better able to identify the presence of a "simple structure" (e.g., DeVellis, 2003; Fabrigar, Wegener, MacCallum, & Strahan, 1999). The sums

³ Items 2, 3, 6, 7, 8, 10, 11, 14, 15, 18, 19, 21, 24, 25, 28, 29, 32, 33, 36, 37, 38, 41, 42, 44, and 45 were reversed.

of the squared loadings were 4.26, 4.21, 4.07, and 3.34, with the first three factors accounting for a similar amount of variance and the last factor for a slightly smaller amount (9.5%, 9.4%, 9.1%, and 7.4%, respectively). The total percentage of variance explained was modest (35.3%), but the maximum loading of each item was found on the predicted factor. Thus, the original clustering of items in four factors was replicated. Lack of perseverance items loaded more on Factor 1, urgency items on Factor 2, sensation seeking items on Factor 3, and lack of premeditation items on Factor 4. Values greater than .30 are usually interpreted as high loadings. The maximum loading of each item was greater than .30, except for items 9 and 17. A loading equal to or greater than .30 was also found on a second factor (cross-loadings) for items 5, 12, 31, and 38 (Table 2).

Next, a confirmatory factor analysis was performed on the 45 items of the UPPS Impulsive Behavior Scale. To define a model with four related dimensions of impulsivity, the four latent variables were allowed to correlate. The χ^2 statistic was significant, $\chi^2(939) = 2039.17, p < .001$ (Model 1a, Table 3). As in the validation study of the French UPPS scale (Van der Linden et al., 2006), high modification indices in the Θ - Δ matrix (covariance between errors on observed variables) were found between Items 1 and 31 and between Items 15 and 42.

On the basis of the modification index analysis, we let the two pairs of errors covary because Items 1 and 31 were very similar and Items 15 and 42 both referred to water sports. The resulting model (Model 1b) produced a significant χ^2 statistic, $\chi^2(937) = 1963.00, p < .001$, and provided a better fit than the previous one (Model 1a), $\Delta\chi^2(2) = 76.16, p < .001$. As regards the other fit indices, we obtained an SRMR of .088 and an RMSEA of .059. Taken together, the two indices suggested an acceptable fit of the model. Next, the reliability of each latent factor in Model 1b was calculated using the formula of Dillon and Goldstein (1984, reported by Raines-Eudy, 2000, p. 126). The resulting indices were .82 for urgency, .80 for lack of premeditation, .85 for lack of perseverance, and .82 for sensation seeking (diagonal of Table 4). These values are comparable to the aforementioned Cronbach's α s and confirm that the UPPS subscales demonstrated good to very good internal consistency. Finally, it is noteworthy that each latent variable in this model was correlated with at least one other variable (Table 4).

In order to evaluate whether alternative models that had already been tested for the French version of the UPPS Impulsive Behavior Scale (Van der Linden et al., 2006) might yield a better fit, two additional analyses were conducted. Model 2 was calculated under the assumption that there is only one dimension of impulsivity: Its χ^2 statistic was significant, $\chi^2(943) = 3608.20, p < .001$, and its elevated SRMR (.127) suggested a bad fit between the factor covariance and the data (Table 3). Model 3 was calculated under the assumption that there are four independent dimensions of impulsivity, that is, with uncorrelated latent variables. Given that two facets of impulsivity (lack of premeditation and sensation seeking) were uncorrelated in Whiteside and Lynam's (2001) original study on the UPPS scale, a test of a model involving four independent dimensions of impulsivity seemed warranted. The χ^2 -statistic was significant, $\chi^2(943) = 2144.74, p < .001$, and its elevated SRMR (.134) revealed a poor fit of the factor covariance (Table 3). Given that the three mentioned models were hierarchically nested, χ^2 -difference tests could be conducted to compare their fit. Model 1b with four related dimensions of impulsivity was retained because it provided a better fit to the data than Model 2 with only one dimension, $\Delta\chi^2(6) = 1645.20, p < .001$, or Model 3 with four independent dimensions, $\Delta\chi^2(6) = 181.73, p < .001$.

Table 2 - Loadings of the Exploratory Factor Analysis

Question	Lack of perseverance	Urgency	Sensation seeking	Lack of premeditation
Q2	-.05	.40	.17	.05
Q6	.20	.33	.03	.06
Q10	.10	.43	-.01	-.02
Q14	.23	.51	.07	-.20
Q18	.05	.49	-.10	-.17
Q24	-.03	.65	-.00	.05
Q28	-.14	.64	-.11	.02
Q32	-.05	.32	-.02	.18
Q36	-.03	.73	-.01	.10
Q41	-.13	.70	.03	.00
Q43	-.17	.37	-.07	.27
Q45	-.01	.74	.14	-.03
Q1	-.19	-.15	.29	.41
Q5	.41	.04	-.02	.43
Q9	.10	.15	-.04	.19
Q13	.01	.06	-.04	.59
Q17	-.12	-.20	.15	.25
Q23	.19	.15	-.05	.43
Q27	.18	.02	.04	.62
Q31	-.05	-.03	.36	.50
Q35	.02	-.01	.13	.50
Q39	.13	.00	.02	.69
Q40	.00	.01	.00	.66
Q4	.72	-.15	.05	.01
Q8	.57	.19	-.16	-.03
Q12	.43	-.21	-.04	.32
Q16	.34	-.25	-.11	.26
Q20	.43	.23	-.02	-.08
Q22	.79	-.04	-.06	.11
Q26	.64	.05	.06	-.04
Q30	.68	.00	.06	.10

Q34	.78	-.06	.03	.09
Q38	.41	.30	.14	-.04
Q3	-.25	.12	.46	.14
Q7	.00	.15	.44	.06
Q11	-.10	.08	.38	-.01
Q15	.04	-.12	.54	-.09
Q19	-.07	.19	.60	.21
Q21	.09	.00	.72	-.10
Q25	-.08	.02	.67	.15
Q29	.10	-.10	.61	-.11
Q33	-.06	.13	.55	.11
Q37	.09	-.06	.58	-.10
Q42	.18	-.23	.49	-.04
Q44	.15	.11	.50	-.11

Note. Values greater than or equal to .30 are highlighted in italics.

Table 3 - Fit Indices of the Confirmatory Factor Analyses

Model	χ^2	df	SRMR	RMSEA
Model 1a	2039.17***	939	.089	.061
Model 1b	1963.00***	937	.088	.059
Model 2	3608.20***	943	.127	.095
Model 3	2144.74***	943	.134	.064

Note. Model 1b had the best fit and was retained. SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

*** $p < .001$.

Table 4 - Correlations Between Latent Variables of the UPPS Impulsive Behavior Scale

Latent variables	1.	2.	3.	4.
1. Urgency				
2. Lack of premeditation	[.82]			
3. Lack of perseverance	.27* (.14, .39)	[.80]		
4. Sensation seeking	.40* (.29, .51)	.54* (.44, .63)	[.85]	
	.08 (-.05, .21)	.49* (.39, .60)	.13 (-.00, .25)	[.82]

Note. Confidence intervals are given in parentheses, reliabilities in brackets.

* 0 not included in the 95% confidence interval.

In view of the relatively low number of men in the sample, a two-group confirmatory factor analysis to compare genders was not conducted. Whiteside and Lynam (2001), who performed such a comparison, did not find any significant difference between men's and women's factor loadings or covariances. Assuming this to also be true for our sample, we limited ourselves to a comparison of men's and women's respective means on each UPPS subscale. Men obtained a higher score on lack of perseverance ($M=21.12$, $SD = 4.78$) than women did ($M = 19.69$, $SD = 4.75$), $r_{pb} = .12^*$, $CI = (.01, .23)$. Men also scored higher on sensation seeking ($M = 35.03$, $SD = 5.93$) than women did ($M = 30.99$, $SD = 6.54$), $r_{pb} = .25^*$, $CI = (.14, .35)$. Though statistically significant, these gender differences had small effect sizes. As for urgency, the men's mean score ($M = 26.68$, $SD = 5.58$) did not significantly differ from the women's ($M = 27.58$, $SD = 5.17$), $r_{pb} = -.07$, $CI = (-.18, .04)$. As for lack of premeditation, the men's ($M = 24.45$, $SD = 4.22$) and women's ($M = 23.80$, $SD = 4.62$) mean scores were similar, $r_{pb} = .06$, $CI = (-.05, .17)$. In sum, men appeared to be more impulsive than women on two UPPS subscales: lack of perseverance and sensation seeking.

Discussion

The purpose of the present study was to examine the psychometric properties of a German adaptation of the UPPS Impulsive Behavior Scale developed by Whiteside and Lynam (2001). To this end, we administered the German UPPS scale to a sample of 368 psychology students. Analysis was restricted to 310 native German speakers who did not have missing values. We obtained the following results: (a) A factor extraction method suggested a model with four dimensions of impulsivity; (b) an exploratory factor analysis revealed that the items of the German UPPS scale loaded on the expected factors; (c) a confirmatory factor analysis indicated an acceptable fit for the four-factor model (more specifically, a model with four related dimensions of impulsivity showed a better fit than did a model with only one dimension or a model with four independent dimensions); and (d) according to different indicators, the internal consistency of the four UPPS subscales could qualify as very good. Taken together, the results demonstrate that the German version of the UPPS Impulsive Behavior Scale possesses sound psychometric properties.

The four-factor model of impulsivity that underlies the UPPS scale was developed on the basis of the responses of undergraduate psychology students in a Midwestern university of the U.S. (Whiteside & Lynam, 2001). Recently, this model has been successfully replicated in French-speaking samples of adolescents without a psychology background (d'Acremont & Van der Linden, 2005) and of undergraduate psychology students (Van der Linden et al., 2006). The fact that the same four-factor solution now also emerges from a study with German-speaking psychology students suggests that the UPPS model of impulsivity possesses a considerable degree of cross-cultural robustness. Given that the two aforementioned studies with French-speaking individuals and the present study with German-speaking students were all conducted in Switzerland, one might object that there could not have been important cultural differences between these samples. Yet, despite their belonging to the same country, Swiss-French and Swiss-German people have been shown to differ

substantially on some personality dimensions: For example, within the NEO-PI-R framework, the former score especially high and the latter score particularly low on neuroticism (McCrae et al., 2005). In view of these culturally forged personality differences, the present finding, according to which the same UPPS model of impulsivity applies to Swiss-French and Swiss-German people, is far from self-evident.

A limitation of the present study resides in the fact that the sample was not balanced in terms of gender: Only 21% of the participants were men. In the original UPPS study (Whiteside & Lynam, 2001), as well in the French validation study (Van der Linden et al., 2006), men were also underrepresented (26% and 17% of the participants, respectively). The large sample size of the former study nevertheless permitted a comparison of men and women: The authors did not find any significant gender difference in terms of factor loadings or covariances. These findings are in accord with those of d'Acremont and Van der Linden (2005), who found similar factor loadings and covariances when administering the French UPPS scale to adolescent boys and girls. Given the limited number of male participants in the present study, a separate test of the UPPS model of impulsivity in men and women was not deemed legitimate. Nonetheless, we compared men's and women's mean scores on each UPPS subscale. As in the validation study of the French UPPS scale (Van der Linden et al., 2006), men appeared to be more impulsive on two subscales: lack of perseverance and sensation seeking. Clearly, further research is warranted before drawing any definite conclusions about gender-related differences in impulsivity.

In conclusion, the German version of the UPPS Impulsive Behavior Scale has been shown to possess psychometric properties similar to those of the original English version (Whiteside & Lynam, 2001) and the French adaptation (Van der Linden et al., 2006). Impulsivity is a key construct in psychopathology and appears in at least 18 separate disorders in the fourth edition of the *Diagnostic and Statistic Manual of Mental Disorders* (American Psychiatric Association, 1994). The UPPS scale has proven to be a valuable instrument for studying impulsivity because it not only covers the traditionally assessed dimensions of impulsivity, but also contains facets (such as urgency and lack of perseverance) that are not well represented in other measures of impulsivity. Therefore, the UPPS scale opens up new avenues for investigating the implication of impulsivity in a wide range of mental disorders.

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