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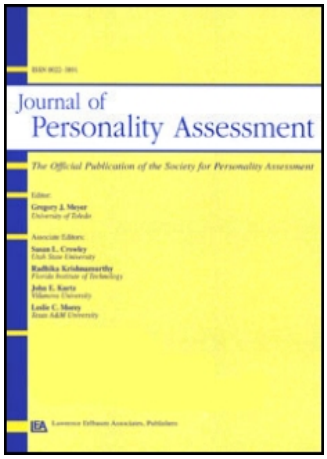

Journal of Personality Assessment
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t775653663

Development and Validation of a Dutch Translation of the Big Five Inventory (BFI)

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Online Publication Date: 01 March 2008
To cite this Article: Denissen, Jaap J. A., Geenen, Rinie, van Aken, Marcel A. G., Gosling, Samuel D. and Potter, Jeff (2008) 'Development and Validation of a Dutch Translation of the Big Five Inventory (BFI)', Journal of Personality Assessment, 90:2, 152 - 157
To link to this article: DOI: 10.1080/00223890701845229
URL: http://dx.doi.org/10.1080/00223890701845229

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Journal of Personality Assessment, *90*(2), 152–157, 2008
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ISSN: 0022-3891 print / 1532-7752 online
DOI: 10.1080/00223890701845229

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Development and Validation of a Dutch Translation of the Big Five Inventory (BFI)

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In this article, we describe the translation and validation of the Dutch Big Five Inventory (BFI; John & Srivastava, 1999), a short instrument designed to measure the Big Five factors of personality. We obtained evidence of the instrument's good psychometric properties in terms of factorial equivalence to the English original and other BFI translations and the relative independence and internal consistency of the five scales. The findings suggest that the instrument can be used in diverse age groups without substantial changes in factor structure. The Dutch BFI scales showed similar demographic correlates as the English original, with higher Agreeableness and Conscientiousness and lower Neuroticism values in older participants, higher Neuroticism values in women, and higher Openness and Conscientiousness values in better educated participants. Use of the Dutch BFI will allow researchers to integrate their findings with the extant Big Five research literature. The brevity of the instrument will be appealing to researchers who are concerned about taxing the time and motivation of their participants.

We examined the psychometric characteristics of a Dutch translation of the Big Five Inventory (BFI; John & Srivastava, 1999), an instrument designed to measure the Big Five factor structure of personality. The Big Five is the most established and well-validated model of personality (John & Srivastava, 1999; McCrae & Costa, 1987) consisting of Extraversion, Neuroticism (vs. Emotional Stability), Conscientiousness, Agreeableness, and Openness to Experience (Costa & McCrae, 1992). The five factors are generally found across cultures (Hofstee, Kiers, de Raad, Goldberg, & Ostendorf, 1997), have been shown to have strong predictive validity (Ozer & Benet-Martínez, 2006; Paunonen, 2003), interrater agreement (McCrae & Costa, 1987), and hereditability (Bouchard, Lykken, Tellegen, & McGue, 1996), and children as early as in middle childhood can be characterized by them (Asendorpf & van Aken, 2003).

An ever-increasing number of researchers incorporate the Big Five in their research, allowing them to compare their findings with other studies. However, time or space to include additional questionnaires is often limited, as is the motivation and attention of participants, so several short instruments to assess the Big Five have been developed (e.g., Gosling, Rentfrow, & Swann, 2003). The BFI is especially interesting in this regard because it is freely available and therefore widely used in Internet assessment (e.g., Srivastava, John, Gosling, & Potter, 2003).

The aim of the BFI was to measure the Big Five dimensions using as few items as possible while achieving adequate levels of reliability. The scales of the BFI demonstrated good internal consistency ($M\alpha = .83$) and convergent validity with corresponding scales of Goldberg's (1992) adjectives and Costa and McCrae's (1992) NEO Five-Factor Inventory (NEO–FFI; John & Srivastava, 1999). To fully realize the cumulative potential of the Big Five, practical instruments need to be developed in many languages. In this study, we evaluated the psychometric properties of the Dutch translation of the BFI according to four criteria: (a) the degree of correspondence between the factor structure of the Dutch translation with the English original and other translations; (b) the internal consistency of the BFI scales; (c) the factor structure of the Dutch BFI across different age groups; and (d) correlations with age, gender, and education.

METHOD

Translation Procedure

Equivalence with the original meaning of the items was the guiding principle in the translation process. Two persons independently translated the 44 items of the English original BFI. Five expert judges decided on the best translation by joint consensus. Next, two Dutch-English bilingual students independently translated the Dutch version back to English. When the back translation differed from the English original, the final translation was chosen by consensus between R. Green, M. van Aken, and the two bilingual students.

Data Collection Method

Given our validation criteria, we required a sample that was (a) sufficiently large to obtain a stable factor solution, (b) characterized by a wide age range to compare factor solutions across age groups, and (c) diverse in terms of educational background (i.e., not just college students). Internet studies offer an efficient way to collect large samples and have been shown to be at least as representative as the convenience samples usually used in psychological research (Gosling, Vazire, Srivastava, & John, 2004). With regard to gender and geographic location, the use of Internet surveys can lead to the inclusion of even more diverse samples of participants than conventional methods, and data from well-designed Internet studies are comparable to those

Received April 19, 2006; Revised March 6, 2007.
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obtained with traditional paper–and-pencil methods (Gosling et al., 2004; Skitka & Sargis, 2005).

Instrument

Between February 2005 and February 2006, the translated version was published on the multilingual Internet site www.outofservice.com, which hosts a variety of personality tests. Using the items displayed in the appendix, participants were asked to rate their agreement with each statement regarding their perceptions of themselves in a variety of situations using a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). As an incentive for participation, a personal feedback profile was offered after the end of the test. Links to the test also appeared on popular Dutch sites dedicated to psychology.

Sample Description

After filling out the BFI, participants reported their nationality, age, sex, and education level. The sample consisted of 6,948 Dutch-speaking Internet users, of which 83% lived in the Netherlands and most of the rest in Flanders (Belgium). The average age was 30.21 years ($SD = 11.58$), with 64% being female and 35% having completed tertiary (postsecondary) education. Of the 2,942 participants who were still being educated, 61% were being educated at a university; the remaining participants were in (high) school. In total, 55% were either students or had already completed a tertiary education, reflecting an overrepresentation of the 27% of the Dutch population that ever attains a corresponding degree (Organisation for Economic Co-Operation and Development, 2003), yet it compares favorably to the average paper-and-pencil study using convenience samples (Gosling et al., 2004). In sum, our Internet recruitment generally succeeded in collecting a sufficiently large and diverse sample needed to evaluate the Dutch BFI against the four empirical criteria listed previously.

RESULTS

Item Means and Standard Deviations

Item means fell out of the 2 to 4 range (see appendix) for only three items: The Openness items "Is curious about many different things" and "Likes to reflect, play with ideas" and the Conscientiousness item "Is a reliable worker." These items' above-midpoint endorsement levels are perhaps related to their high levels of social desirability. However, in no case was the standard deviation of an item lower than .80 (range = 0.87–1.38), indicating that restriction of range was not a problem.

Factor Solution of Dutch BFI Items and Comparison With Published Results for the English Original and the German and Spanish Translations

We factor analyzed items using principal components analysis with varimax rotation. Because the goal was to compare the factor solution of the Dutch BFI translation with that of the English original, we imposed a (rotated) five-factor structure on the data. As can be seen in the appendix, the five-factor solution explained 45% of the variance, with absolute primary loadings ranging from .24 to .81 and with an average value of .62. In contrast, absolute cross-loadings were no higher than .36, with an average value of .10. These findings suggest that the items of the Dutch BFI show a relatively high degree of specificity in terms of the underlying personality construct they tap into.

TABLE 1.—Average primary factor loadings and cross-loadings of the Dutch and English BFI versions and coefficients of congruence (Tucker's φ) between the versions.

	N	E	O	C	A	*M*
Dutch						
Average primary loadings	.68	.65	.55	.63	.59	.62
Average cross-loadings	.10	.11	.14	.09	.04	.10
English						
Average primary loadings	.58	.67	.50	.57	.51	.57
Average cross-loadings	.07	.09	.09	.17	.10	.10
Correspondence with Dutch	.96	.93	.72	.96	.92	.92

Note. N = Neuroticism; E = Extraversion; O = Openness to Experience; C = Conscientiousness; A = Agreeableness. Fisher r-to-z transformations were used to calculate means.

Table 1 compares the average absolute primary loadings and cross-loadings of the Dutch BFI items with the equivalent loadings from the English original (Benet-Martínez & John, 1998). The average primary factor loading of .62 in the Dutch BFI is slightly higher than that of the English original (.57); this is a reassuring finding given that the English BFI was developed to yield a clean factor structure. The primary loadings of the Dutch BFI compare even more favorably to loadings of .52 and .50 for the published German (Lang, Lüdtke, & Asendorpf, 2001) and Spanish (Benet-Martínez & John, 1998) translations, respectively. The mean cross-loading of .10 for the Dutch BFI compares favorably to its German counterpart (.15) and is on par with the English original and the Spanish translation (.11). In short, the Dutch translation of the BFI yields a relatively clean factor structure when held to the standards of the original English version and other translations.

To measure the degree of correspondence of the pattern of factor loadings, we calculated coefficients of congruence (Tucker's φ) indicating the similarity of the Dutch factor solution with the English original and the German and Spanish counterparts. Coefficients of .90 (Bentler & Bonett, 1980) or higher have been suggested to indicate a similar underlying factor structure. In our study, the average congruence coefficient comparing the Dutch and English versions was .92, suggesting overall similarity in factor structures. Only Openness showed some dissimilarity ($\varphi = .72$). A closer inspection of the Dutch factor solution using the original (i.e., not recoded) scale format revealed that factor loadings for 33 of the 34 non-Openness items were positive, whereas only 9 of these loadings were positive for the English original. Thus, Dutch participants who rated themselves as high on Openness tended to respond to the remaining items in an affirmative manner regardless of their content. This suggests that an acquiescent response bias may affect the Dutch Openness factor more than the English original.

The average congruence coefficient (after Fisher r-to-z transformation and back transformation) between the Dutch and the German BFI version was .87, ranging from .71 (Agreeableness) to .94 (Extraversion). By comparison, the average congruence between the Dutch and the Spanish version was .90, ranging from .71 (Openness) to .94 (Conscientiousness). These average congruence coefficients approximated or equaled the .90 benchmark indicating close correspondence.

Corrected Item-Total Correlations, Internal Consistencies, and Intercorrelations

Because of the relatively clear factor structure of the Dutch BFI, we averaged item scores according to their a priori scale

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TABLE 2.—Scale reliabilities (Cronbach α), intercorrelations, and external correlates of the BFI scales.

	N	E	O	C	A	Age	Gender	Educ
N	(.86)	−.43	−.10	−.30	−.35	−.15	−.25	−.15
E		(.84)	.23	.26	.23	.00	−.02	.03
O			(.83)	.09	.08	.10	.04	.18
C				(.79)	.27	.24	.00	.15
A					(.73)	.14	−.05	.05

Note. N = 6,108–6,948. N = Neuroticism; E = Extraversion; O = Openness to Experience; C = Conscientiousness; A = Agreeableness; Educ = education level. Positive correlations with gender reflect higher levels for women. Reliabilities (Cronbach α) are displayed in parentheses.

$p < .05$ for $|r| \geq .03$.

membership. The appendix displays the corrected item-total correlations of the Dutch items. Correlations were above the generally accepted level of .30 except for one Openness item (Number 35). This is the only item that refers to a work context as opposed to the other items of the openness scale, which have a more artistic and philosophical content. Dropping this item did not increase the internal consistency of the scale (.79 vs. .80). Therefore, to ensure maximum compatibility between the Dutch and English versions and to maximize content validity, we retained this item. As can be seen in Table 2, the internal consistencies of the five scales were high, with Cronbach α ranging from .73 (Agreeableness) to .86 (Neuroticism). Most of the scales were relatively independent from each other, with an average absolute scale intercorrelation (after Fisher r-to-z transformation) of .24. However, there were some exceptions, most notably the moderate negative correlation between Neuroticism and Extraversion (–.43, $p < .01$).

Comparison of BFI Factor Structure and Internal Consistency Across Age Groups

To test whether the BFI's factor structure is comparable across age, we factor analyzed responses separately for six different age groups: 10 to 16, 17 to 20, 20 to 30, 30 to 40, and 50 to 70. We created a group ranging from 10 to 16 because these adolescents might not yet posses the cognitive maturation and experience required to fill out personality inventories. It is an open question as to whether the Dutch BFI is suited for use in this group. Because of the relatively small number of older participants, we joined the age groups of 50 to 60 and 60 to 70 years. An analysis of the convergence (Tucker's φ) of the BFI factor solutions across the different age groups[1] showed that the factor structure was highly stable across the different phases of the life span, with average values across scales ranging between .91 and .98, thus exceeding the .90 benchmark in each case. In addition, coefficient alpha did not differ substantially across the age groups, with average values across scales ranging from .79 to .82.

Correlations of Big Five Scales With Age, Gender, and Education

Table 2 shows age was negatively correlated with Neuroticism and positively with Openness, Conscientiousness, and Agreeableness, whereas no correlation with Extraversion was found.

[1]The factor solutions for the different age groups can be obtained from J. J. A. Denissen.

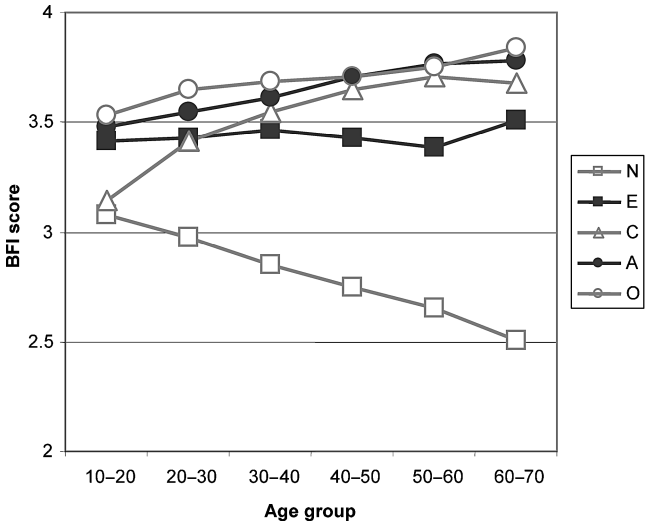

FIGURE 1.—Plot of mean Big Five Inventory (BFI) scale scores of different cross-sectional age groups; N = 1,370 (age 10–20), N = 2,231 (age 20–30), N = 1,487 (age 30–40), N = 1,066 (age 40–50), N = 404 (age 50–60), and N = 41 (age 60–70). N = Neuroticism; E = Extraversion; C = Conscientiousness; A = Agreeableness; O = Openness to Experience.

Figure 1 plots the means of the different BFI scales for six different decades of the life span. Neuroticism was lower in older versus younger age groups, whereas the reverse was found for Conscientiousness, Agreeableness, and Openness. Females had higher Neuroticism scores, with an average effect size of r = .25 (.52 *SD*s). Correlations did not exceed .10 in for any other BFI scale. Education level (ranging from 1 = primary education/vocational training to 5 = higher professional education/university) was correlated positively with Openness and Conscientiousness and negatively with Neuroticism (Table 2). These correlations remained virtually unchanged after adjusting for age. The other correlations did not exceed .10.

DISCUSSION

In this study, we evaluated the quality of a Dutch translation of the BFI. Specifically, we examined the (a) the factorial equivalence of the Dutch BFI to the English original and to German and Spanish translations, (b) the relative independence and internal consistencies of the five scales, (c) the comparability of the BFI factor structure across different age groups, and (d) the association with demographic variables. All of these tests supported the psychometric soundness and validity of the Dutch BFI, suggesting that it can be used when a short measure of personality is needed. In the following, we briefly discuss each of the preceding points.

Comparison of the factor loadings with various versions of the BFI indicated that the translation procedure left the original factor structure intact. Moreover, the internal consistency of the five factors was high, and intercorrelations among the different scales were generally low. The exception was the correlation of –.43 between Neuroticism and Extraversion, which is of similar magnitude to the one reported by Lang et al. (2001) for the German version. With the possible exception of Openness, our analyses suggest that the Dutch version of the BFI is more or less equivalent to the original English and to the German and Spanish versions.

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The comparison of age groups demonstrated that the factor structure of the BFI hardly changes with age. Even the group of 10- to 16-year-olds showed a valid factor structure. Accordingly, the BFI seems robust against age-related changes such as limited cognitive maturity in adolescents. In addition, the age differences obtained for the Dutch BFI were generally similar to those obtained in a large Internet sample using the English BFI (Srivastava et al., 2003), with the exception that the Dutch data showed a slight increase in Openness over age.

Women have been observed to obtain moderately higher scores than men on Neuroticism and Agreeableness, whereas no consistent effects have been found for the other Big Five factors (Costa, Terracciano, and McCrae, 2001; Feingold, 1994). Our findings replicated these previous results for Neuroticism, but in the case of Agreeableness, only a very slight association with gender was found. The item content of the corresponding BFI scale may be the underlying reason for the latter finding. Specifically, the BFI version of this scale taps more into the nonhostile, altruistic facets of Agreeableness and less into individual differences in tender-mindedness and empathy that have shown the most consistent gender differences (Feingold, 1994).

Consistent with previous studies (Paunonen, 2003; Paunonen & Ashton, 2001), Openness and Conscientiousness were positively related to educational attainment. The Openness finding can be explained by the known association between Openness and crystallized intelligence (knowledge; Ashton, Lee, Vernon, & Lang, 2000), whereas the association between achievement and Conscientiousness can be explained by this factor's association with goal setting and persistence (Barrick, Mount, & Strauss, 1993). Although we did not expect Neuroticism to correlate negatively with attainment, this finding calls into mind Eysenck's (1988) contention that this factor is associated with lower academic achievement. Overall, however, the pattern of associations with the Dutch BFI scales is quite consistent with previous observations, supporting the external validity of the Dutch translation.

Finally, we note that more research is needed to further evaluate the psychometric soundness of the Dutch BFI. Future studies should investigate test–retest reliability, agreement between self-reports and peer reports, and correlations with other Big Five instruments such as Goldberg's (1992) adjectives or the NEO questionnaires (Costa & McCrae, 1992).

General Conclusion

If the focus in research or clinical assessment is on specific facets of personality, then the use of a more fine-grained and longer instrument may be more advisable than the use of the BFI. For such purposes, several well-validated instruments are available in Dutch such as the Revised NEO Personality Inventory (Hoekstra, Ormel, & De Fruyt, 1996) and the Five-Factor Personality Inventory (Hendriks, Hofstee, & de Raad, 1999) for adults and the Hierarchical Personality Inventory for Children (Mervielde & De Fruyt, 2002). The high levels of internal consistency, factorial and external validity, and good applicability in different age groups of the Dutch BFI are consistent with the psychometric quality of the English original (John & Srivastava, 1999). Together with the supportive evidence regarding its cross-cultural applicability, we therefore recommend the use of the BFI when a short Big Five instrument is needed. Such an instrument will allow researchers to integrate their findings with the extant Big Five research literature.

Acknowledgments

We gratefully acknowledge our Master students Femke Ponte, Ronald Huiskes, and Coraline Barends for their help in translating the BFI.

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APPENDIX

Item numbers, content, means, standard deviations, corrected item-total correlations, factor loadings, and communalities of the Dutch BFI items.

						Factor Loadings					
No.	Dutch Translation	English Original	*M*	*SD*	*r*(it)	*N*	*E*	*O*	*C*	*A*	λ
19	Zich veel zorgen maakt	Worries a lot	3.33	1.24	.67	.76	−.13	.09	.00	−.06	.61
14	Gespannen kan zijn	Can be tense	3.52	1.11	.64	.75	−.07	.11	.01	−.05	.58
9(r)	Ontspannen is, goed met stress kan omgaan	Is relaxed, handles stress well	3.29	1.20	.69	.74	−.14	−.18	−.11	−.02	.61
39	Gemakkelijk zenuwachtig wordt	Gets nervous easily	2.93	1.23	.63	.72	−.14	−.02	−.09	−.02	.54
24(r)	Emotioneel stabiel is, niet gemakkelijk overstuur raakt	Is emotionally stable, not easily upset	3.32	1.25	.65	.71	−.09	−.15	−.14	−.09	.56
34(r)	Kalm blijft in gespannen situaties	Remains calm in tense situations	3.59	1.10	.55	.63	−.01	−.30	−.16	−.05	.51
4	Somber is	Is depressed, blue	2.42	1.23	.58	.59	−.36	.07	−.09	−.10	.50
29	Humeurig kan zijn	Can be moody	3.22	1.18	.43	.51	−.06	.17	−.10	−.09	.31
1	Spraakzaam is	Is talkative	3.61	1.11	.69	.02	.81	.13	.05	.02	.68
21(r)	Doorgaans stil is	Tends to be quiet	2.60	1.21	.68	−.09	.78	−.08	−.02	.03	.63
16	Veel enthousiasme opwekt	Generates a lot of enthusiasm	3.65	1.02	.60	−.10	.67	.30	.13	.05	.56
36	Hartelijk, een gezelschapsmens is	Is outgoing, sociable	3.74	1.05	.53	−.02	.66	.10	.02	.11	.45
6(r)	Terughoudend is	Is reserved	2.91	1.15	.59	−.22	.65	−.09	−.01	.04	.49
31(r)	Soms verlegen, geremd is	Is sometimes shy, inhibited	3.30	1.22	.55	−.29	.60	−.15	.04	.00	.47
11	Vol energie is	Is full of energy	3.64	1.05	.52	−.32	.51	.21	.27	.07	.48
26	Voor zichzelf opkomt	Has an assertive personality	3.61	1.11	.47	−.20	.49	.18	.16	.01	.34
40	Graag nadenkt, met ideeën speelt	Likes to reflect, play with ideas	4.04	0.94	.56	.01	.03	.70	.14	.01	.51
25	Vindingrijk is	Is inventive	3.78	0.93	.54	−.15	.19	.65	.16	.04	.51
30	Waarde hecht aan kunstzinnige ervaringen	Values artistic, aesthetic experiences	3.24	1.28	.57	.04	−.09	.63	−.05	−.01	.41
5	Origineel is, met nieuwe ideeën komt	Is original, comes up with new ideas	3.63	1.01	.54	−.11	.29	.62	.11	.00	.50
15	Scherpzinnig, een denker is	Is ingenious, a deep thinker	3.95	0.94	.43	.16	.20	.57	−.18	.03	.39
20	Een levendige fantasie heft	Has an active imagination	3.84	1.09	.41	.07	−.07	.57	.24	.00	.43
10	Benieuwd is naar veel verschillende dingen	Is curious about many different things	4.25	0.87	.46	−.11	.25	.56	.12	.04	.40
44	Het fijne weet van kunst, muziek, of literatuur	Is sophisticated in art, music, or literature	2.83	1.24	.45	.03	−.04	.53	−.12	−.01	.29
41(r)	Weinig interesse voor kunst heeft	Has few artistic interests	2.72	1.38	.48	−.06	−.10	.48	−.08	.02	.25
35(r)	Een voorkeur heeft voor werk dat routine is	Prefers work that is routine	2.39	1.19	.23	−.24	.13	.24	.00	.03	.13
3	Grondig te werk gaat	Does a thorough job	3.78	1.00	.62	.03	.06	.17	.75	.03	.60
28	Volhoudt tot de taak af is	Perseveres until the task is finished	3.80	1.05	.60	−.07	.10	.14	.71	.07	.54
18(r)	Doorgaans geneigd is tot slordigheid	Tends to be disorganized	2.82	1.31	.58	−.07	−.05	−.23	.66	.06	.50
23(r)	Geneigd is lui te zijn	Tends to be lazy	2.68	1.27	.57	−.12	.12	−.19	.63	.08	.47
13	Een werker is waar men van op aan kan	Is a reliable worker	4.17	0.92	.51	−.03	.16	.15	.62	.08	.43
33	Dingen efficiënt doet	Does things efficiently	3.73	0.95	.52	−.11	.07	.20	.61	.08	.44
38	Plannen maakt en deze doorzet	Makes plans and follows through with them	3.59	1.03	.52	−.13	.24	.19	.60	.06	.48
43(r)	Gemakkelijk afgeleid is	Is easily distracted	3.17	1.25	.48	−.29	−.12	−.06	.53	.03	.38
8(r)	Een beetje nonchalant kan zijn	Can be somewhat careless	3.34	1.14	.41	.03	−.09	−.30	.52	.05	.37
32	Attent en aardig is voor bijna iedereen	Is considerate and kind to almost everyone	3.71	1.00	.54	.00	.05	.14	.06	.68	.49
17	Vergevingsgezind is	Has a forgiving nature	3.60	1.03	.50	.06	.14	.08	.04	.64	.44
7	Behulpzaam en onzelfzuchtig ten opzichte van anderen is	Is helpful and unselfish with others	3.71	1.00	.49	−.08	.03	−.08	.04	.62	.42

(*Continued on next page*)

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Item numbers, content, means, standard deviations, corrected item-total correlations, factor loadings, and communalities of the Dutch BFI items. (*Continued*)

No.	Dutch Translation	English Original	*M*	*SD*	*r*(it)	Factor Loadings *N*	*E*	*O*	*C*	*A*	λ
12(r)	Snel ruzie maakt	Starts quarrels with others	2.28	1.13	.48	−.01	.09	.14	.06	.62	.4
37(r)	Soms grof tegen anderen is	Is sometimes rude to others	2.64	1.26	.48	−.12	−.09	−.09	.09	.61	.41
27(r)	Koud en afstandelijk kan zijn	Can be cold and aloof	2.65	1.22	.46	−.12	.02	−.10	.02	.59	.37
22	Mensen over het algemeen vertrouwt	Is generally trusting	3.42	1.03	.43	−.01	.01	.06	.03	.58	.34
2(r)	Geneigd is kritiek te hebben op anderen	Tends to find fault with others	3.19	1.10	.40	−.06	−.06	−.15	−.01	.54	.32
42	Graag samenwerkt met anderen	Likes to cooperate with others	3.64	1.05	.33	−.04	.08	.07	.08	.46	.23
	% Variance (rotated)					9.82	9.32	9.25	9.06	7.48	

Note. BFI = Big Five Inventory; N = Neuroticism; E = Extraversion; O = Openness to Experience; C = Conscientiousness; A = Agreeableness; λ = communalities. Items are sorted according to a priori scale membership and (absolute) primary loading. Negatively framed items (indicated by an r behind the item number) were reverse coded before being entered into the analyses.