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# The German O*NET Interest Profiler Short Form

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**Abstract:** Holland's RIASEC model is the dominant framework to conceptualize vocational interests. It describes vocational interests with six broad domains: realistic, investigative, artistic, social, enterprising, and conventional. The O*NET Interest Profiler Short Form is a freely accessible inventory measuring vocational interests according to Holland's model with 60 items. With this manuscript, we provide a translation of the inventory into German and evaluate the scores' psychometric qualities, construct-related and criterion-related validity. We used data from an age-diverse (N = 276) and high-school sample (N = 672). Internal consistency estimates of the scale scores were adequate. Randomization tests and multidimensional scaling showed that the scores' structural properties mirrored the RIASEC theoretical model. Scale scores were sensitive to gender differences and could predict participants' actual and ideal occupations with reasonable hit rates. Overall, the German O*NET Interest Profiler Short Form seems apt for usage in career counseling and research settings.

**Keywords:** vocational interests, RIASEC, O*NET Interest Profiler, interest inventory

Vocational interests are defined as relatively stable preferences for activities, contexts, and outcomes that motivate behaviors (Rounds & Su, 2014). Vocational interests can direct, energize, and sustain behavior which makes them a relevant predictor for outcomes like job or study choice, engagement, and performance (e.g., Nye et al., 2012). Vocational interests even predict outcomes in nonwork life domains (Stoll et al., 2017), underlining their importance to describe human individuality.

An influential taxonomy of vocational interests is John Holland's theory of vocational personalities (1959, 1997). A key idea of Holland's theory is that persons can be described on six domains: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional interests, together referred to as RIASEC. Briefly, realistic refers to interest in working physically, with things or tools. Investigative captures interest in science, research, or thinking through problems. Artistic reflects appreciation for activities that allow creative expression. Social refers to interest in helping, serving, or teaching. Enterprising reflects interest in selling, managing, and leading. Conventional refers to interest in dealing with ordered, typically data-related activities. Along with describing persons' interests, the six domains can also describe (work) environments. By consequence, counselors and researchers can evaluate whether an individuals' interest matches their work environment.

The RIASEC interest domains are posited to reflect a hexagonal structure that represents the psychological similarity of the six domains (Holland, 1997; Prediger, 1982; Rounds & Tracey, 1993). Adjacent interest domains (e.g., realistic and investigative) are more closely related than alternate domains (e.g., realistic and artistic), which, in turn, are more closely related than opposite domains (e.g., realistic and social). The hexagonal structure implies that a person's score on one domain can entail information about remaining domains (Darcy & Tracey, 2007; Nagy et al., 2010; Rounds & Tracey, 1996). A wide range of studies has tested and generally corroborated or refined the hexagonal structure of vocational interests (Day & Rounds, 1998; Long & Tracey, 2006).

Vocational interests are integrated in a nomological network with other individual differences (Armstrong et al., 2008). Specific links with Big Five personality traits (Mount et al., 2005) have long been established. For example, persons with high levels of artistic interests typically score higher on the Big Five trait openness ($\rho$ = .41, Mount et al., 2005) or persons high on enterprising interests score higher on extraversion ($\rho$ = .40). Also, vocational interests are related to cognitive abilities (Ackerman & Heggestad, 1997), self-efficacy beliefs (Rottinghaus et al., 2003), values and goals (Stoll et al.,

2020). These relations might have led to Holland's assumption that RIASEC interests reflect broad personality types (1997). It is important to note, however, that although vocational interests and personality traits might share similar psychological processes (Hoff, Song, Einarsdóttir, et al., 2020; Mount et al., 2005), the two phenomena describe distinct aspects of human individuality (see also Roemer et al., 2023).

Vocational interests were moreover meta-analytically shown to exhibit relatively large gender differences (Su et al., 2009). While men tend to report higher realistic ($d = 0.84$) and investigative ($d = 0.26$) interests, women tend to report higher social ($d = -0.68$), artistic ($d = -0.35$), and conventional ($d = -0.33$) interests.

## Measuring Vocational Interests With the O*NET Interest Profiler

To date, several inventories to assess vocational interests exist (e.g., Bergmann & Eder, 2005; Campbell et al., 1992; Donnay et al., 2005; Holland et al., 1994; see Hansen, 2019; Chernyshenko et al., 2019 for overviews), many of which are copyright-restricted. The O*NET Interest Profiler (O*NET IP; Lewis & Rivkin, 1999) was developed to provide publicly available scales for assessing vocational interests as conceptualized in Holland's model. Use and integration of the Interest Profiler is offered free of charge via the O*NET Career Exploration Tools Content License (https://www.onetcenter.org/license_tools.html). Within the United States, the Interest Profiler is widely disseminated, with annual usage in the millions, primarily via its web-based versions (e.g., https://www.mynextmove.org/explore/ip, https://www.miproximopaso.org/, and https://services.onetcenter.org/ip; for details on the usage, see https://www.onetcenter.org/reports/omb2021.html [e.g., Supporting Statement Part A]). The O*NET RIASEC scales have different lengths. The (now retired) 180-item O*NET IP Long Form (Rounds et al., 1999) built upon a broad list of work activities and occupations, which was iteratively screened, reduced, re-extended, reviewed, and psychometrically evaluated (Lewis & Rivkin, 1999). The O*NET Interest Profiler Long Form formed the basis for the 60-item O*NET IP Short Form (Rounds et al., 2010). In selecting the items for the Short Form, items' content coverage and adherence to the hexagonal structure, and psychometric properties of the resulting scale scores were considered (Rounds et al., 2010).

The primary use of the O*NET IP is career exploration and planning. The instrument can be also used for research purposes (Rounds et al., 2021). Career exploration is most pressing in younger adults but continues to be relevant across adulthood. The target population of the O*NET IP therefore consists of the adult workforce with a focus on young adults and of populations commonly sampled in psychological research settings.

## The Current Study: Measuring Vocational Interests with the O*NET IP in Germany

The aim of the current study was to translate the O*NET IP Short Form into German and validate resulting scale scores. Since vocational activities might be differently valued and prevalent in the United States and in Germany, it needs to be studied whether the scores from the translated version adequately mirror the underlying theoretical model (Holland, 1997). To this aim, we assessed the psychometric properties, construct-related and criterion-related validity of the German O*NET IP scale scores in samples of two populations that are commonly targeted in vocational interest research and practice.

# Methods

## Translation Process and Adaptation

The O*NET IP Short Form was translated into German by a bilingual person and backtranslated by another bilingual person. Any discrepancies between the original and backtranslated versions were discussed and if necessary revised. In the original English web-based O*NET IP Short Form, participants indicate their liking and disliking of the 60 activities on a five-point rating scale (Rounds et al., 2010). Since 2017, the five response options are depicted by five emojis representing different intensities of likes and dislikes (Rounds et al., 2016). For the German version, we slightly diverged from this response format due to difficulties of appropriately translating *dislike* in this context. We asked participants to indicate their interest in the respective activities, using a five-point rating scale. Anchors were verbally labeled with 1 = *not at all interesting* (German: *interessiert mich überhaupt nicht*) and 5 = *very interesting* (*interessiert mich sehr*). No emojis were included (Phan et al., 2019). The Appendix shows the German O*NET IP Short Form along with the English translation.

## Samples and Procedure

### Age-Diverse Sample
Participants of the age-diverse sample were 276 adults who were recruited by psychology students from

Humboldt-Universität zu Berlin in Germany. As part of their coursework, students should distribute a questionnaire which included the German O*NET IP Short Form. The students distributed a link to an online questionnaire among their acquaintances, and participants rated themselves on vocational interests and other individual differences not relevant for the current study. All considered participants consented to the use of their data for research purposes. To ensure data quality, we excluded 11 participants who provided the same answer in min. 85% of the interest items. No additional data screening techniques were employed. Participants were on average 32 years ($SD = 14.1$); 59% were women. About 40% were employed, 33% were students, and 13% were students with a next job.

### High-School Sample

Participants of the high-school sample were 672 students at 12 academic track schools in Germany (Gymnasium) who were in their final years of secondary education. Data were collected as part of a larger study project on a study aptitude test. Underage students were required to bring written parental consent to participate. In an online questionnaire, participants provided information on their vocational interests and Big Five personality traits. Afterward, further constructs not relevant for the current study were assessed. To ensure data quality, we excluded 13 participants who provided the same answer in min. 85% of the interest items. No additional data screening techniques were employed. Participants were on average 17.3 years ($SD = 1.2$); 57% were women. The majority (51%) was in 12th grade, 34% were in 11th grade, and 15% were in 13th grade.

### Measures

Participants in both samples filled out a web-based German O*NET IP Short Form. Participants rated their interest in 60 vocational activities, with 10 items for each interest domain. Mirroring the implementation of the web-based English O*NET IP, items were ordered such that after every second item, another interest domain was measured (see Appendix). The six scale scores were computed as unit-weighted means over the 10 items.

To assess the discriminant validity of the German O*NET IP scale scores, we administered the Big Five Inventory 2 (Danner et al., 2019; Soto & John, 2017) in the high-school sample. Each of the five personality traits was answered with 12 items on a 5-point rating scale. McDonald's omega total estimates (Kelley, 2018) ranged between $\omega = .80$ (agreeableness) and .87 (conscientiousness).

To assess the criterion-related validity of the German O*NET IP scale scores, we asked participants in the age-diverse sample with open questions about their actual and ideal occupations. Their answers were translated to English and searched on the O*NET Occupation Quick Search (Morris, 2021) for the RIASEC Occupational Interest Profile codes (Rounds et al., 2008, 2013). For each occupation, we selected the first letter of the Occupational Interest Profiles code (high-point code), which reflects the RIASEC domain that best characterizes the participants' occupation.

## Results

### Descriptive Statistics and Reliability

The $M$s, $SD$s, and internal consistency estimates of the scale scores in the two samples are shown in the left part of Table 1. Across both samples, realistic and conventional sores had lowest $M$s and $SD$s, which has similarly been reported for other (well-educated) samples in Germany (e.g., Nagy et al., 2010; Stoll et al., 2017). Internal consistency was estimated as McDonald's omega total (using the R package MBESS; Kelley, 2018). In all cases, internal consistency estimates were $\omega \geq .80$ and as such within the range of reliability estimates reported for the original O*NET IP Short Form in prior studies (ranging from .60 to .98; Rounds et al., 2021; p. 66f).

### Construct-Related Validity

#### Structural Validity

The right part of Table 1 shows the correlations among the scale scores in the two samples. Correlations were mostly positive, ranging between $-.09 \leq r \leq .58$. In both samples, the highest correlation occurred for realistic and conventional interests ($r \geq .54$), which indicates a stronger relation than reported in meta-analysis ($\rho = .27$; Mount et al., 2005) or in prior results based on the O*NET IP (e.g., $r = .22$ in the validation sample; Rounds et al., 2021). In general, correlations between adjacent interest domains tended to be larger (e.g., $r = .34$ between realistic and investigative in the high-school sample) than between alternate (e.g., $r = .11$, realistic and artistic) and opposite domains (e.g., $r = .06$, realistic and social). This is consistent with the assumed hexagonal structure among the interest domains (Holland, 1997).

To test whether the correlations between interest domains reflected the order implied by the hexagonal structure, we used randomization tests (Hubert & Arabie, 1987; Rounds et al., 1992; Tracey, 1997; but see also Nagy

**Table 1.** *M*, *SD*s, internal consistency estimates, and scale score correlations

| Interest domain | Age-diverse sample | | | High-school sample | | | R | I | A | S | E | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | ω | *M* | *SD* | ω | | | | | | |
| Realistic | 1.89 | 0.77 | .86 | 1.85 | 0.74 | .87 | | .34** | .11** | .06 | .16** | .54** |
| Investigative | 2.53 | 0.93 | .87 | 2.72 | 0.96 | .89 | .37** | | .20** | .24** | .07 | .20** |
| Artistic | 2.71 | 0.98 | .88 | 2.48 | 0.94 | .88 | .06 | .22** | | .34** | .17** | −.01 |
| Social | 2.92 | 0.80 | .80 | 2.75 | 0.78 | .80 | .12* | .33** | .33** | | .17** | .04 |
| Enterprising | 2.17 | 0.80 | .84 | 2.64 | 0.81 | .83 | .32** | .17** | −.01 | .13** | | .42** |
| Conventional | 1.89 | 0.79 | .88 | 1.91 | 0.71 | .86 | .58** | .24** | −.09 | .01 | .49** | |

*Note.* $N_{\text{Age diverse}}$ = 265; $N_{\text{High school}}$ = 659. Items were answered on a 1–5 scale. *p < .05. **p < .001. Correlations below the diagonal are from the age-diverse sample; correlations above the diagonal are from the high-school sample.

et al., 2010). Randomization tests evaluate predictions about the order of the correlations and yield significance levels of the number of predictions met versus the null assumption of a random order (Tracey, 1997). The result is a correspondence index (CI), ranging between −1 and 1. Higher values indicate better fit to the hypothesized order. CIs were .64 (*p* = .03) and .86 (*p* = .02) for the age-diverse and high-school sample. These values are comparable to the estimate of .69 reported in the original validation study (Rounds et al., 2010) and to the meta-analytic estimate of .63 (*SD* = .18; Tracey & Rounds, 1993). This suggests that scores from the German O*NET IP adhered similarly well to the order implied by the hexagonal structure as the original version.

To visualize the relations between the RIASEC domains in a two-dimensional space, we applied multidimensional scaling (MDS, Torgerson, 1952). We first converted the correlation matrix into a distance matrix and then applied ordinal MDS (using smacof; Mair et al., 2022). Stress values were .01 and .05 for the age-diverse and high-school sample, indicating only small discrepancies between the distances in the original data and distances in the two-dimensional solution. As shown in Figure 1, the six interest domains were circularly ordered as theoretically expected. In the age-diverse sample, the position of artistic interest somewhat staked out, suggesting that artistic interest was slightly more distant from the other interests than expected. In the high-school sample, a likewise observation occurred for enterprising interest. Similar anomalies are commonly found in structural analyses of RIASEC scales (e.g., Rounds et al., 2021) and, in fact, reflect Holland's notion that relations among RIASEC domains form a *misshapen polygon* (Holland & Gottfredson, 1992, p. 165), rather than an equilateral hexagon. Overall, the results suggest that the scale scores of the German O*NET IP Short Form reflected the theoretical basis of Holland's (1997) model.

In addition, we explored the structure separately for women and men (see OSF for detailed results). Generally, adherence to the assumed structure slightly deteriorated in the gender-specific analyses. In the age-
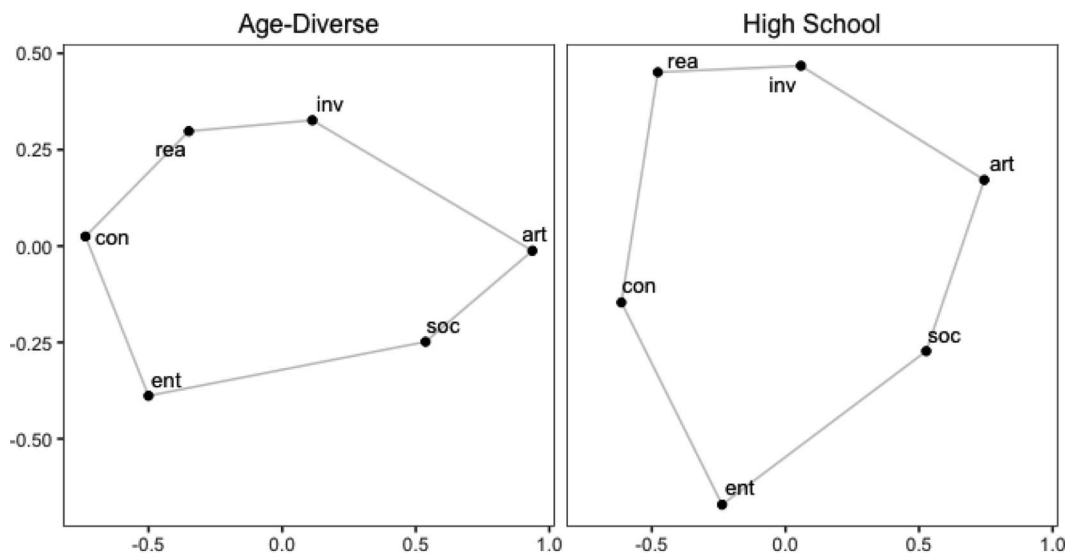


**Figure 1.** Nonmetric multidimensional scaling solutions for the RIASEC Scales in the two samples.

**Table 2.** Correlations between vocational interest scores and Big Five personality trait scores

| Personality traits | Realistic | Investigative | Artistic | Social | Enterprising | Conventional |
|---|---|---|---|---|---|---|
| Extraversion | −.10* | .01 | .08* | .20*** | .33*** | −.03 |
| Agreeable | −.13** | .02 | .07 | .32*** | −.11** | −.14** |
| Conscientious | −.04 | .03 | −.11** | .15*** | .13*** | .10* |
| Neuroticism | −.15*** | −.04 | .10** | −.04 | −.16*** | −.15*** |
| Openness | −.05 | .13*** | .55*** | .18*** | .04 | −.10* |

*Note.* $N = 658$; high-school sample. Correlations of $r \geq |.08|$ are significant with $p < .05$.

diverse sample, CIs for both women and men remained at .64 ($p = .03$). MDS suggested that for men, the theoretical order of interest domains clearly emerged (Stress = .003), whereas for women, the order of social and artistic interests changed in the two-dimensional space (Stress = .04). In the high-school sample, CIs reduced to .80 ($p = .02$) and .72 ($p = .03$) for women and men, respectively. Here, for women, MDS showed adherence to the theoretical order (Stress = .08), whereas for men, the position of artistic interest staked out as being less related with the other interests than theoretically expected (Stress = .01). Previous studies on the interest structure generally indicated trivial to small gender differences (Beinicke et al., 2014; Nagy et al., 2010; Pässler et al., 2014). Similar to these findings, our results suggest that gender-specific interpretations somewhat deviated from the theoretical structure, in our case most strongly for artistic and social interests (see also below).

### Discriminant Validity

To explore the discriminant validity (e.g., Wehner et al., 2018) of the German O*NET IP scale scores, we analyzed the correlations with the Big Five personality scale scores in the high-school sample (see Table 2). As expected from previous meta-analytic findings (Mount et al., 2005), we observed moderate to high correlations between artistic interests and openness ($r = .55$), enterprising interests and extraversion ($r = .33$), and social interests and extraversion ($r = .20$). A relatively high correlation between social interests and agreeableness ($r = .32$) was similarly reported for the original O*NET IP ($r = .38$; Rounds et al., 2021). Somewhat deviating from the previous results, social interests also correlated moderately with conscientiousness ($r = .15$), which was

not the case in the original version ($r = −.04$; Rounds et al., 2021) or in the meta-analysis ($\rho = .07$, Mount et al., 2005). Apart from this exception that may reflect cultural differences, the strongest relations between vocational interests and personality traits converged with previous findings on the nomological net of vocational interests.

### Gender Differences

We next examined whether the German O*NET IP is sensitive to gender differences. As shown in Table 3, the results converged across the two samples and were largely consistent with meta-analytic findings (Su et al., 2009). That is, largest gender differences occurred for realistic and social interest scores. Also consistent with meta-analysis, women had higher artistic interest scores. The greatest discrepancy from meta-analysis was for conventional interests, where results in our samples indicated higher scores for men, particularly in the high-school sample. This might be due to the relatively high correlation between conventional and realistic interest ($r > .50$), which, in turn, could be driven be a relatively high number of conventional interest items focusing on software/computer-related activities. Such activities might evoke gender stereotypes, which, particularly in the high-school sample, could have contributed to the empirical gender difference. Overall, the results indicate sensitivity of the German O*NET IP to gender differences and encourage a nuanced examination of gender differences across cultural contexts.

## Criterion-Related Validity

To assess whether the German O*NET IP predicts career choice in the German employment landscape, we examined the hit rates of the inventory for occupational

**Table 3.** Gender difference effect sizes (Cohen's $d$)

| Sample | Realistic | Investigative | Artistic | Social | Enterprising | Conventional |
|---|---|---|---|---|---|---|
| Age-diverse | 0.70 | 0.09 | −0.38 | −0.36 | 0.35 | 0.22 |
| High school | 0.80 | 0.08 | −0.30 | −0.60 | 0.23 | 0.51 |
| Meta-analytic findings reported in Su et al. (2009) | 0.84 | 0.26 | −0.35 | −0.68 | 0.04 | −0.33 |

*Note.* Age-diverse sample: $n_{women} = 156$, $n_{men} = 103$. High-school sample: $n_{women} = 378$, $n_{men} = 271$. Positive values indicate higher scores for men.

membership (see Hanna & Rounds, 2020) in the age-diverse sample. Broadly, hit rates are the percentages of correctly predicted occupations. We recorded a hit when an individual's highest RIASEC interest score matched the first letter of their occupation's RIASEC code. We computed the hit rates per interest domain, separated for actual and ideal occupations. Note that a hit rate depends on the frequency of a given RIASEC occupation code in the population: If occupations with a given RIASEC code are relatively common (i.e., high base rate), then the hit rate of correctly predicting this RIASEC occupation code is increased by chance alone. To correct for this dependency, we divided the hit rate by the base rate of the given RIASEC occupation code. The resulting accuracy ratio describes how much more often people are classified into a given occupational field *if* they have the corresponding interest, compared to the base rate of people generally classified into this occupational field. To our knowledge, no base rate exists for actual or ideal occupations in Germany at population level, which is why we used (1) sample-based base rates and (2) base rates reported for the actual occupations in the Swiss labor market (Ghetta et al., 2018).

The results are shown in Table 4. The first column denotes the proportion of people with a high-point interest in the given domain, the second shows the base rate of occupations in that domain in our sample, and the third is the base rate reported for the Swiss labor market (Ghetta et al., 2018). Hit rates are shown in the fourth column. Across domains, overall hit rates were 35.3% for actual jobs and 44.6% for ideal jobs. These rates are similar to the overall hit rate of 41% reported for career aspirations using the original O*NET IP (Rounds et al., 2021; p. 105). Given the huge number of career options, these hit rates imply substantial predictive accuracy. Separated per domain, hit rates ranged between 17% and 69%, largely falling into the meta-analytic provided hit rate confidence interval (Hanna & Rounds, 2020). An exception were the low hit rates for conventional interest (0% and 14%, for actual and ideal occupations, respectively), which could be because few people had high conventional interest scores (≤ 6%), and the base rates for conventional occupations were also relatively low (15% and 3%).

Correcting for the sample base rate, the accuracy ratio was in all but one case > 1, meaning that participants' occupations were more accurately predicted based on participants' interest scores than based on the base rate alone. For example, participants with high realistic interests were 3.0 × more likely to have a realistic occupation, compared to what would have been expected by the empirical base rate in our sample. Correcting for the Swiss labor market base rate yielded a somewhat different pattern, which is most likely explained with our sample over-representing higher-educated individuals, preferring nonrepresentative jobs. In most cases, these additional accuracy ratios increased compared with the ratios corrected for the sample base rate. Only for realistic interests the ratio decreased, which may be due to fewer than average individuals holding realistic jobs in our sample. While the differences between the two baseline corrections showcase restrictions of our sample's representativeness, they converge on the notion that the German

**Table 4.** High point interest rates, base rates of occupation, hit rates, and accuracy ratio

| Interest domain | High point interest rate | Sample base rate occupation[a] | Swiss base rate occupation[b] | Hit rate | Accuracy ratio: hit rate/ emp. base rate[a] | Accuracy ratio: hit rate/ Swiss base rate[b] |
|---|---|---|---|---|---|---|
| Predicting actual occupation | | | | | | |
| Realistic | 6.00% | 9.50% | 30.20% | 28.60% | 3.0 | 0.9 |
| Investigative | 19.80% | 19.00% | 8.80% | 43.50% | 2.3 | 4.9 |
| Artistic | 25.00% | 5.20% | 2.60% | 17.20% | 3.3 | 6.6 |
| Social | 31.90% | 26.70% | 15.90% | 40.50% | 1.5 | 2.5 |
| Enterprising | 11.02% | 25.00% | 24.90% | 69.20% | 2.8 | 2.8 |
| Conventional | 6.00% | 14.70% | 17.70% | 0.00% | 0.0 | 0.0 |
| Predicting ideal occupation | | | | | | |
| Realistic | 3.40% | 8.00% | | 33.30% | 4.2 | |
| Investigative | 20.60% | 27.40% | | 55.90% | 2.0 | |
| Artistic | 29.70% | 20.60% | | 42.30% | 2.1 | |
| Social | 32.00% | 21.10% | | 37.50% | 1.8 | |
| Enterprising | 10.30% | 20.00% | | 66.70% | 3.3 | |
| Conventional | 4.00% | 2.90% | | 14.30% | 5.0 | |

*Note.* Data are from the age-diverse sample; n with a coded actual occupation = 116; n with a coded ideal occupation = 175. [a] Sample Base Rate Occupation, derived from the present data. [b] Swiss Base Rate Occupation, reported in Ghetta et al., (2018). Note that these estimates for Switzerland are close to the US occupation base rate, estimated from more than 150 million employees (DeCeanne et al., 2017; as cited in Hanna & Rounds, 2020).

O*NET IP proves useful to predict individuals' career choice, and it does so similarly well as many other interest inventories (Hanna & Rounds, 2020).

# Discussion

The O*NET IP Short Form is a publicly available 60-item vocational interest inventory to assess the six interest domains of Holland's (1997) RIASEC model. With this manuscript, we provided a German translation of this inventory and evaluated its psychometric properties in two samples from populations commonly targeted in vocational interest research and practice.

The results revealed satisfactory psychometric properties of the German O*NET IP scale scores. In terms of structural validity, the correlations among the six interest scores well mirrored the theoretically posited hexagonal structure (Holland, 1997). Also, correlations between the interest scores and personality trait scores converged with previous findings (Mount et al., 2005; Rounds et al., 2021), suggesting that the scores of the German O*NET IP were adequately located in the nomological network of vocational interests. Moreover, the German O*NET IP predicted participants' career choice and aspirations. Given the vast amount of career opportunities and influences on career choice, the obtained overall hit rates of 35%–45% conveyed substantial predictive accuracy. In sum, the results suggest that the German O*NET IP can be used in research and career exploration settings to validly assess the RIASEC vocational interests as defined in Holland's model.

The findings imply additional recommendations for usage of the German O*NET IP. First, our data showed the predictive accuracy of the German O*NET IP scores in the age-diverse sample. This suggests that vocational interests do not lose their relevance upon job entry. Instead, assessing vocational interests throughout the career might help to identify motivational tendencies or career orientations that continue to be important at different career stages (Hanna & Rounds, 2020; Hoff, Song, Wee, et al., 2020). The German O*NET IP might lend itself to this purpose.

Second, although the German O*NET IP proved useful to predict participants' actual and ideal occupations, prediction was not perfect. For usage in career guidance or counseling, vocational interests should therefore be explored in tandem with other individual differences, such as personality, skills, or values.

Third, while the hexagonal structure was generally supported, the position of artistic interests slightly diverged from the other domains in the age-diverse sample. Similarly, in the gender-specific analyses, adherence to the assumed structure somewhat deteriorated, deterioration was mainly associated with artistic and social interests, and for women in the age-diverse sample, the order of artistic and social interests even reverted. Potentially, this might be because artistic and social interests covered activities frequently pursued as leisure activities (e.g., play a musical instrument, teach children how to play sports). Identifying as a man or a woman or being part of the workforce could contribute to evaluating these activities from a different perspective. It is also possible that sample characteristics had an impact here, and future structural analyses should explore these possibilities in greater depth (e.g., Nagy et al., 2019). Overall, this finding underlines the importance of instructing participants to rate the activities in terms of *occupational* activities.

## Limitations and Directions for Further Research and Application

While this study provided evidence for the theory-consistent interpretation of the German O*NET IP scores, several limitations and directions for further research should be considered. First, and most generally, our results should be interpreted considering sample restrictions. For example, over-representation of individuals with higher educational background in both samples might contribute to the relatively low scores on realistic and conventional interests (see also Nagy et al., 2010). Such restriction of range could propagate to estimated gender differences or correlations, potentially contributing to discrepancies from earlier findings. Thus, our results should not be taken as representative for the German population. Instead, they validate usage of the German O*NET IP in two subpopulations commonly targeted in vocational interest research and practice, but for further populations, validation is still pending.

Second, we did not formally examine the measurement invariance with the original version, such that direct comparisons between the scores of the German O*NET IP and of the original English version are not yet warranted. To enable cross-cultural comparisons – for example in terms of the interest profiles – future research should explore the measurement invariance of the translated version (Bader et al., 2021).

Third, we examined the psychometric qualities of the German O*NET IP scores with cross-sectional data. Therefore, we could not explore the test-retest reliability or predictive validity of the test scores. Based on prior studies (e.g., Hanna & Rounds, 2020; Low et al., 2005; Rounds et al., 2021), we assume the German O*NET IP scores to remain relatively consistent and predictive over time. Follow-up longitudinal studies should set out to test this assumption.

Fourth, the O*NET IP conceptualizes vocational interests at a relatively high level of aggregation. More specific, so-called basic interests were shown to yield more precise

predictions than RIASEC domain scores (Hanna & Rounds, 2020; Ones & Viswesvaran, 1996; Ralston et al., 2004). However, the O*NET IP does not explicate basic interests and resulting scores cover a variety of basic interests. To unfold the basic interests contained in the O*NET IP scores, nuanced comparisons with basic interest taxonomies (e.g., Su et al., 2019) have proven useful (Chu et al., 2022; Rounds et al., 2022).

Fifth, we could not explore the convergent validity of the scores of the German O*NET IP. Although our analyses suggest that the scores validly assess vocational interest as conceptualized in Holland's model, future research should examine the convergence and divergence with other vocational interest measures in Germany (see also Chu et al., 2022). This seems particularly relevant for conventional interests, where the atypical gender differences in our data suggest that the conventional items might be somewhat differentially interpreted.

Finally, to leverage its usage in career exploration and orientation, the German O*NET IP should be more widely disseminated (e.g., with permanent, publicly available websites, similar to the English web-based O*NET IP) and closely integrated with information about the German workforce system. Providing easily accessible information on how individuals' interest profiles match potential careers could greatly increase the applied potential of this publicly available, free-of-charge inventory.

## Conclusion

Overall, the German O*NET IP performed well to assess the six interest domains as proposed in Holland's (1997) theory in two samples of populations that are commonly targeted in vocational interests research and practice. The German O*NET IP is free to use, and we look forward to studies using this measure, yielding insights into the nature and power of vocational interests or providing valuable information for career exploration and guidance.

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## History

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## Conflict of Interest

Phil Lewis is a staff member of the National Center for O*NET Development. The other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Publication Ethics

Informed consent was obtained from all participants included in the study. All procedures in studies involving human participants were performed in accordance with common ethical standards; an ethics committee approval was not obtained.

## Open Science

Open Data: The information needed to reproduce all of the reported results is not openly available.

Open Materials: The authors confirm that there is sufficient information for an independent researcher to reproduce all of the reported methodology. Analysis code and output are available at https://osf.io/xhk93/ (Roemer, 2023).

For the randomization test, we used the R code provided by Tracey: https://web.asu.edu/tracey/software-0 (last accessed November 9, 2022).

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# Appendix

German O*NET Interest Profiler.

| | The next questions concern work activities that some people do on their jobs. Read each question carefully and decide how you would feel about doing each type of work:<br>1 = Not at all interesting<br>2 = Not interesting<br>3 = Unsure<br>4 = Interesting<br>5 = Very interesting<br><br>Try not to think whether you have enough education or training to do the work; or how much money you would make doing the work.<br>Just think about if you would like or dislike doing the work.<br>There are no right or wrong answers!<br>Please respond to all questions.<br>Please indicate how interested you are in these activities. | Die folgenden Fragen betreffen Arbeitsaktivitäten, die manche Leute an ihren Arbeitsplätzen tun. Lesen Sie jede Frage aufmerksam durch und entscheiden Sie, wie gerne Sie diese Arbeiten tun würden:<br>1 = Interessiert mich überhaupt nicht<br>2 = Interessiert mich nicht<br>3 = Unsicher<br>4 = Interessiert mich<br>5 = Interessiert mich sehr<br><br>Versuchen Sie nicht darüber nachzudenken, ob Sie die passende Ausbildung haben, um die Arbeit zu machen; oder wie viel Sie mit dieser Arbeit verdienen würden.<br>Versuchen Sie nur darüber nachzudenken, ob Sie die Arbeit gerne machen würden oder nicht.<br>Es gibt keine richtigen oder falschen Antworten!<br>Bitte beantworten Sie alle Fragen.<br>Bitte geben Sie an, wie interessant Sie diese Aktivitäten finden! |
|---|---|---|
| real_1 | Build kitchen cabinets | Küchenschränke bauen |
| real_2 | Lay brick or tile | Ziegel oder Fliesen verlegen |
| inve_1 | Develop a new medicine | Neue Medikamente entwickeln |
| inve_2 | Study ways to reduce water pollution | Wege erforschen, um die Wasserverschmutzung zu verringern |
| arti_1 | Write books or plays | Bücher oder (Theater-)Stücke schreiben |
| arti_2 | Play a musical instrument | Ein Musikinstrument spielen |
| soci_1 | Teach an individual an exercise routine | Jemandem eine Sportübung beibringen |
| soci_2 | Help people with personal or emotional problems | Menschen bei persönlichen oder emotionalen Problemen helfen |
| ente_1 | Buy and sell stocks and bonds | Aktien und Anleihen kaufen und verkaufen |
| ente_2 | Manage a retail store | Ein Einzelhandelsgeschäft leiten |
| conv_1 | Develop a spreadsheet using computer software | Softwaregestützt eine Tabelle erstellen |
| conv_2 | Proofread records or forms | Aufzeichnungen und Formulare korrekturlesen |
| real_3 | Repair household appliances | Haushaltsgeräte reparieren |
| real_4 | Raise fish in a fish hatchery | In einer Fischzucht Fische züchten |
| inve_3 | Conduct chemical experiments | Chemische Experimente durchführen |
| inve_4 | Study the movement of planets | Planetenbewegung beobachten |
| arti_3 | Compose or arrange music | Musik komponieren oder arrangieren |
| arti_4 | Draw pictures | Bilder zeichnen |
| soci_3 | Give career guidance to people | Karriereberatungen für Menschen anbieten |
| soci_4 | Perform rehabilitation therapy | Rehabilitationstherapien durchführen |
| ente_3 | Operate a beauty salon or barber shop | Einen Schönheitssalon oder Friseurgeschäft betreiben |
| ente_4 | Manage a department within a large company | Eine Abteilung in einem großen Unternehmen leiten |
| conv_3 | Install software across computers on large network | In einem großen Computernetzwerk Software installieren |
| conv_4 | Operate a calculator | Einen Taschenrechner bedienen |
| real_5 | Assemble electronic parts | Elektroteile zusammenbauen |
| real_6 | Drive a truck to deliver packages to offices and homes | Mit einem Lieferwagen Pakete an Büros und Wohnhäuser liefern |
| inve_5 | Examine blood samples using a microscope | Mit einem Mikroskop Blutproben untersuchen |

(Continued)

| | | |
|---|---|---|
| inve_6 | Investigate the cause of a fire | Die Ursache für einen Brand ermitteln |
| arti_5 | Create special effects for movies | Spezialeffekte für Filme erstellen |
| arti_6 | Paint sets for plays | Bühnenbilder malen |
| soci_5 | Do volunteer work at a nonprofit organization | Ehrenamtlich für eine nonprofit Organisation arbeiten |
| soci_6 | Teach children how to play sports | Kindern Sport unterrichten |
| ente_5 | Start your own business | Ein eigenes Unternehmen gründen |
| ente_6 | Negotiate business contracts | Geschäftsverträge verhandeln |
| conv_5 | Keep shipping and receiving records | Über Wareneingang und-ausgang Buch führen |
| conv_6 | Calculate the wages of employees | Arbeitnehmerlöhne berechnen |
| real_7 | Test the quality of parts before shipment | Vor dem Versand (Einzel)Teile auf Qualität überprüfen |
| real_8 | Repair and install locks | Schlösser reparieren und installieren |
| inve_7 | Develop a way to better predict the weather | Eine Möglichkeit entwickeln, um das Wetter besser vorherzusagen |
| inve_8 | Work in a biology lab | In einem Biologie-Labor arbeiten |
| arti_7 | Write scripts for movies or television shows | Drehbücher für Filme oder Fernsehserien schreiben |
| arti_8 | Perform jazz or tap dance | Jazz-oder Stepptanz aufführen |
| soci_7 | Teach sign language to people who are deaf or hard of hearing | Gehörlosen Menschen Gebärdensprache beibringen |
| soci_8 | Help conduct a group therapy session | Bei der Durchführung einer Gruppentherapiesitzung helfen |
| ente_7 | Represent a client in a lawsuit | Bei einem Gerichtsverfahren einen Klienten vertreten |
| ente_8 | Market a new line of clothing | Eine neue Modekollektion vermarkten |
| conv_7 | Inventory supplies using a hand-held computer | Waren mit einem Taschencomputer inventarisieren |
| conv_8 | Record rent payments | Mietzahlungen aufzeichnen |
| real_9 | Set up and operate machines to make products | Maschinen für die Produktion einrichten und bedienen |
| real_10 | Put out forest fires | Waldbrände löschen |
| inve_9 | Invent a replacement for sugar | Einen Zuckerersatz erfinden |
| inve_10 | Do laboratory tests to identify diseases | Labortests zur Identifikation von Erkrankungen durchführen |
| arti_9 | Sing in a band | In einer Band singen |
| arti_10 | Edit movies | Filme schneiden |
| soci_9 | Take care of children at a day-care center | Kinder in einem Kindergarten betreuen |
| soci_10 | Teach a high-school class | Eine Schulklasse (ab 9. Klasse) unterrichten |
| ente_9 | Sell merchandise at a department store | In einem Kaufhaus Waren verkaufen |
| ente_10 | Manage a clothing store | Ein Bekleidungsgeschäft leiten |
| conv_9 | Keep inventory records | Inventarlisten führen |
| conv_10 | Stamp, sort, and distribute mail for an organization | Post für ein Unternehmen stempeln, sortieren und verteilen |

*Note.* The English instructions provided here are a direct translation from the instructions used in the German O*NET IP and slightly deviate from the instructions of the original web-based O*NET IP (https://www.mynextmove.org/explore/ip).