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# Occupational characteristics moderate personality–performance relations in major occupational groups

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ABSTRACT

Personality predicts performance, but the moderating influence of occupational characteristics on its performance relations remains underexamined. Accordingly, we conduct second-order meta-analyses of the Big Five traits and occupational performance (i.e., supervisory ratings of overall job performance or objective performance outcomes). We identify 15 meta-analyses reporting 47 effects for 9 major occupational groups (clerical, customer service, healthcare, law enforcement, management, military, professional, sales, and skilled/semiskilled), which represent $N = 89{,}639$ workers across $k = 539$ studies. We also integrate data from the Occupational Information Network (O*NET) concerning two occupational characteristics: 1) expert ratings of Big Five trait relevance to its occupational requirements; and 2) its level of occupational complexity. We report three major findings. First, relations differ considerably across major occupational groups. Conscientiousness predicts across all groups, but other traits have higher validities when they are more relevant to occupational requirements: agreeableness for healthcare; emotional stability for skilled/semiskilled, law enforcement, and military; extraversion for sales and management; and openness for professional. Second, expert ratings of trait relevance mostly converge with empirical relations. For 77% of occupational groups, the top-two most highly rated traits match the top-two most highly predictive traits. Third, occupational complexity moderates personality–performance relations. When groups are ranked by complexity, multiple correlations generally follow an inverse-U shaped pattern, which suggests that moderate complexity levels may be a "goldilocks range" for personality prediction. Altogether, results demonstrate that occupational characteristics are important, if often overlooked, contextual variables. We close by discussing implications of findings for research, practice, and policy.

## 1. Introduction

The entire economy runs on individuals' occupational performance. Hence, occupational performance is the main dependent variable of industrial–organizational psychology (Campbell & Wiernik, 2015). Among performance predictors, personality stands out as a key human capital resource (Sackett et al., 2017). Meta-analyses show that personality, organized according to the Big Five trait taxonomy (agreeableness, conscientiousness, emotional stability, extraversion, and openness), predicts job performance in a cross-

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section of occupations (Barrick & Mount, 1991; Judge et al., 2013; Schmidt et al., 2008). However, cross-sectional designs and associated meta-analyses mask effects of occupational characteristics. In response, meta-analysts either examine personality–performance relations within homogeneous occupations (e.g. *Wang et al., 2016; Kim et al., 2019) or explore moderators of performance relations between occupations (e.g., Judge & Zapata, 2015; Salgado, 2017). However, no extant meta-analysis incorporates both approaches.

Occupations differ. One differentiating characteristic is *occupational requirements*. Each occupation has its associated tasks, contexts, job activities, and goals, as well as the knowledge, skills, abilities, and personal characteristics that are relevant to performance in that occupation (National Center for O*NET Development, 2021). If a personality trait shows more relevance to the occupational requirements of one occupation than another, then its relevance should manifest in different performance relations. Likewise, if a trait shows similar relevance to requirements of both occupations, then it should relate to performance similarly. A review of occupation-specific performance gives suggestive support for aligning trait relevance with requirements, but it uses no systematic metric of quantifying relevance, and is dated by two decades (Barrick et al., 2001).

A second differentiating characteristic is *occupational complexity*, which refers to the cognitive difficulty associated with its task demands (Hunter & Hunter, 1984). Occupations can be ranked by level of complexity, and this has performance implications. For example, cognitive ability is a strong predictor of occupational performance, but its validity increases for higher complexity occupations (Schmidt et al., 2008; Steel & Kammeyer-Mueller, 2009). In contrast, psychomotor abilities are modest performance predictors, but their validities are higher for lower complexity occupations (Hunter & Hunter, 1984; Levine et al., 1996). Effects of occupational complexity on personality–performance relations are comparatively understudied, but the extant evidence suggests some moderation for certain traits (Salgado, 2017; Wilmot & Ones, 2019).

Personality is an important predictor of occupational performance, but pressing questions about the nature of its occupational relations. Specifically, how do the Big Five traits relate to occupation-specific performance? Do some traits show stronger relations within and/or between occupations? Does trait relevance to occupational requirements help to illumine relations? And does occupational complexity affect personality–performance relations across occupations? These questions are difficult to answer because meta-analyses of personality and occupational performance are widely scattered across the literature. Further, they have never been integrated with empirical data quantifying occupational requirements and complexity. As a result, what is needed is an exhaustive quantitative review of personality–occupational performance relations in major occupational groups that examines the moderating effects of occupational characteristics, thereby enabling a synthesis and summary of decades of scholarship on this important subject.

Accordingly, we quantitatively review the relations of the Big Five personality traits and performance in occupations, as reported in extant meta-analyses. To represent occupations across the economy within the bounds of the available data, we use the U.S. Bureau of Labor Statistics' *Standard Occupational Classification* (SOC) system (U.S. Bureau of Labor Statistics, 2018) as an organizing framework. Specifically, we use the system's broadest level of classifying similar occupations to organize our data: *major groups*. Overall, we identify 15 meta-analyses reporting 47 independent personality–occupational performance effects for nine major groups (clerical, customer service, healthcare, law enforcement, management, military, professional, sales, and skilled/semiskilled), which represent $N = 89{,}639$ workers across $k = 539$ studies. We update all meta-analytic effects using a common set of corrections, which similarly address the statistical artifacts across contributing meta-analyses (Hunter & Schmidt, 2014). We then combine effects of independent meta-analyses using *second-order meta-analysis* (Schmidt & Oh, 2013). We also assemble an occupational characteristics database using the Department of Labor's *Occupational Information Network* (O*NET). For each major occupational group, we append five scores that quantify the ratings of job analysts about the relevance of each Big Five trait to its occupational requirements, and one score that quantifies its overall occupational complexity level. Finally, we rank-order the nine major occupational groups by their level of overall occupational complexity.

Using this integrated database, we answer three major research questions: 1) How do the Big Five traits relate to occupational performance in major occupational groups? 2) How do expert ratings of trait relevance to occupational requirements compare with empirical relations? And 3) does occupational complexity moderate personality–occupational performance relations across occupational groups?

### 1.1. Occupational characteristics

An early quantitative review of personality and occupational-specific performance found that conscientiousness displays consistent, moderate prediction across five occupations, whereas the remaining traits only predict in certain occupations (e.g., extraversion and sales; Barrick et al. 2001). Despite suggestive support, the review did not quantify trait relevance. It also included few meta-analyses (one to three per occupation), and its methods ignored the variability between meta-analyses. The ensuing years have seen advances on all these accounts, including additional occupation-specific meta-analyses (Salgado et al., 2015), meta-analyses of formerly unstudied occupations (e.g., Darr, 2011), and the development of methods for second-order meta-analysis (Schmidt & Oh, 2013). In addition, other work shows the predictive and explanatory advantages of aligning traits to relevant requirements, such as properties of work contexts (Judge et al., 2013), job characteristics (McCloy, 1994), higher-order goals (Barrick et al., 2013), and specific performance criteria (Hogan & Holland, 2003). Nevertheless, a quantification of trait relevance to the occupational requirements of specific occupational groups is absent.

The U.S. Department of Labor's Occupational Information Network (O*NET) is the preeminent source of occupational information in the U.S. (O*NET OnLine, 2021). Its database contains hundreds of standardized, occupation-specific descriptors for nearly 1000 occupations across the economy. It is publicly available and regularly updated based on information provided by occupational incumbents and job analysts. Among its myriad descriptors, O*NET reports data relevant to occupational requirements. For all

occupations in its database, O*NET reports ratings of *work styles*, which refer to personal characteristics that affect how well a person performs in an occupation (O*NET OnLine, 2021). Ratings are given by job analysts who rated the relevance of 16 work styles to requirements of the occupation. Prior research links these work styles to Big Five traits (Sackett & Walmsley, 2014), which enables the possibility of constructing scales that reflect expert ratings of trait relevance to occupational requirements. In this context, job analyst ratings are judgments about the content validity of personality constructs. A debate exists about whether content validity and criterion-related validity converge in the domain of cognitive ability (Murphy, 2009; Schmidt, 2012, 2012b), which has implications for establishing job relevance in validation studies. However, this question has not been tested in the domain of personality. Thus, we examined the correspondence between content-related and criterion-related validity evidence.

Occupational complexity is another relevant occupational characteristic; if it is aligned to a corresponding predictor, it can moderate relations to performance. For example, the validity of cognitive ability increases in higher complexity occupations (for a review, see Ones, Dilchert, Deller, et al., 2012), whereas validities of psychomotor abilities increase in lower complexity occupations (Hunter & Hunter, 1984; Levine et al., 1996). Compared to these abilities, less is known about the effect of occupational complexity on personality–performance relations. Extant results indicate that higher complexity attenuates relations for certain traits (i.e., conscientiousness; Wilmot & Ones, 2019), but it accentuates relations for others (i.e., openness; Salgado, 2017). However, neither of these two meta-analyses systematically examined the effect of occupational complexity across major occupational groups for each Big Five trait individually or collectively. If an updated review of personality–performance relations in occupations were to incorporate the potential moderating effect of this key occupational characteristic, then it would significantly advance the literature. It is noteworthy then that O*NET also reports occupational complexity data. Job analysts rated the complexity of occupations across the dimensions of data, people, and things (U.S. Employment Service, 1997). Typically, these ratings are combined to form an index of overall occupational complexity (Hunter & Hunter, 1984; Steel & Kammeyer-Mueller, 2009; Wilmot & Ones, 2019). Thus, O*NET has high-quality, occupational characteristics data relevant to the present study.

### 1.2. The present study

Personality predicts occupational performance. However, previous cross-sectional meta-analyses did not systematically test the moderating effects of key occupational characteristics. Drawing on 15 meta-analyses reporting 47 effects for nine major occupational groups ($k = 539$ studies, $N = 89{,}639$), and integrating them with O*NET data on occupational requirements and complexity, we aim to answer the following research questions: How do the Big Five traits relate to occupational performance across major occupational groups? How do expert ratings of trait relevance to occupational requirements compare to the empirical relations (i.e., how strongly do content validity ratings and criterion-related validities converge)? And, finally, does complexity moderate personality–occupational performance relations across major occupational groups?

## 2. Methods

### 2.1. Literature search

We used five search strategies to locate personality and occupation-specific performance meta-analyses appearing between January 1990 and July 31, 2020. We used the following search string in 1) PsycINFO [(meta-analy* OR quantitative review OR systematic review).m_titl. AND (personality OR trait OR temperament OR (five factor model) OR FFM OR (Big Five) OR conscientiousness OR extraversion OR openness OR agreeableness OR (emotional stability) OR neuroticism).mp] and 2) a parallel string in Web of Science, both of which limited records to the English language only, 3) gathered studies from reference sections of reviews of Big Five meta-analyses (Barrick et al., 2001; Borghans et al., 2008; Brandstatter, 2011; Connelly et al., 2014; Judge et al., 2008; ; Ones et al., 2007; Ones et al., 2005; Ozer and Benet-Martínez, 2006; Roberts et al., 2007; Wilmot, 2017; Wilmot & Ones, 2019; Wilmot et al., 2019), and 4) completed manual searches, on July 31, 2020, for in-press articles in journals that publish occupation relevant meta-analyses (i.e., *European Journal of Personality, European Journal of Work and Organizational Psychology, Human Performance, International Journal of Selection and Assessment, Journal of Applied Psychology, Journal of Management, Journal of Occupational and Organizational Psychology, Journal of Personality and Social Psychology, Journal of Research in Personality, Journal of Vocational Behavior, Personality and Individual Differences, Personality and Social Psychology Review, Personnel Psychology, Psychological Bulletin*). The total number of records identified through our electronic, reference, and manual searches was 5020. After removing duplicates, 2026 records remained eligible for screening.

### 2.2. Inclusion criteria

A record had to meet five criteria to be included in our final database. It had to be 1) a meta-analysis (i.e., primary studies excluded), 2) published (i.e., unpublished dissertations and conference papers excluded), 3) in the English language, 4) reporting the zero-order relation of at least one Big Five trait to *occupational performance*, which was defined as supervisory ratings of overall job performance or objective performance outcomes (i.e., productivity; cf. Barrick & Mount, 1991), in 5) a major occupational group (U.S. Bureau of Labor Statistics, 2018). After our initial screening, 1560 records were excluded because they were not meta-analyses or did not report personality trait relations. We also rejected 49 unpublished records, as well as 417 other records that did not report performance relations in a specific occupation. Thus, after our initial screening, 19 published meta-analytic records were included in our final database.

To qualify for inclusion in our second-order review, an occupational effect had to meet three criteria. It had to 1) have sufficient data for analysis, 2) use personality self-reports, and 3) come from an independent meta-analysis. When an occupational effect was reported in multiple, non-independent meta-analyses, we selected the effect from the more comprehensive meta-analysis; when an occupational effect was reported in multiple, independent meta-analyses, we combined effects using second-order meta-analysis. Because occupational effects from newer and/or more comprehensive meta-analyses were available, we excluded four records from our second-order review (i.e., Klassen & Tze, 2014; Mount et al., 1998; Tett et al., 1991; Vinchur et al., 1998). Altogether, 15 meta-analyses reporting 47 independent effects met inclusion criteria across nine major occupational groups: clerical, customer service, healthcare, law enforcement, management, military, professional, sales, and skilled/semiskilled.

**Table 1**
Summary of second-order meta-analyses of the big five traits and occupational performance across major occupational groups.

| Variable | *m* | *k* | *N* | $\bar{r}$ | $SD_r$ | $\bar{\rho}_M$ | $SD_\rho$ | *95% CI* | | *80% CR* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | LO | HI | LO | HI |
| Agreeableness | | | | | | | | | | | |
| Skilled/semiskilled | 6 | 70 | 12,191 | 0.05 | 0.12 | **0.08** | 0.03 | 0.02 | 0.08 | 0.04 | 0.12 |
| Clerical | 3 | 13 | 2337 | 0.11 | 0.08 | **0.18** | 0.03 | 0.07 | 0.16 | 0.14 | 0.22 |
| Sales | 6 | 49 | 6374 | 0.02 | 0.15 | **0.03** | 0.01 | −0.02 | 0.06 | 0.02 | 0.04 |
| Military | 3 | 14 | 3453 | 0.06 | 0.11 | **0.10** | 0.00 | 0.01 | 0.12 | 0.10 | 0.10 |
| Healthcare | 3 | 11 | 1230 | 0.16 | 0.13 | **0.25** | 0.00 | 0.08 | 0.23 | 0.25 | 0.25 |
| Customer service | 2 | 10 | 1401 | 0.07 | 0.11 | **0.11** | 0.00 | 0.003 | 0.14 | 0.11 | 0.11 |
| Law enforcement | 4 | 24 | 3206 | 0.06 | 0.11 | **0.10** | 0.00 | 0.01 | 0.10 | 0.10 | 0.10 |
| Management | 6 | 90 | 17,539 | 0.03 | 0.09 | **0.05** | 0.03 | 0.01 | 0.05 | 0.02 | 0.09 |
| Professional | 7 | 65 | 5250 | 0.02 | 0.09 | **0.04** | 0.01 | 0.003 | 0.05 | 0.02 | 0.06 |
| Conscientiousness | | | | | | | | | | | |
| Skilled/semiskilled | 6 | 86 | 16,303 | 0.15 | 0.11 | **0.24** | 0.11 | 0.13 | 0.17 | 0.09 | 0.38 |
| Clerical | 3 | 20 | 4182 | 0.16 | 0.09 | **0.25** | 0.00 | 0.12 | 0.19 | 0.25 | 0.25 |
| Sales | 6 | 71 | 9991 | 0.17 | 0.13 | **0.27** | 0.05 | 0.14 | 0.20 | 0.21 | 0.33 |
| Military | 4 | 38 | 13,950 | 0.19 | 0.08 | **0.31** | 0.04 | 0.17 | 0.22 | 0.26 | 0.35 |
| Healthcare | 3 | 22 | 1820 | 0.21 | 0.10 | **0.33** | 0.05 | 0.17 | 0.25 | 0.26 | 0.40 |
| Customer service | 4 | 23 | 3410 | 0.14 | 0.12 | **0.23** | 0.03 | 0.09 | 0.19 | 0.19 | 0.26 |
| Law enforcement | 4 | 29 | 3785 | 0.15 | 0.15 | **0.23** | 0.12 | 0.09 | 0.20 | 0.08 | 0.38 |
| Management | 9 | 116 | 21,570 | 0.11 | 0.10 | **0.17** | 0.02 | 0.09 | 0.13 | 0.15 | 0.20 |
| Professional | 6 | 83 | 7467 | 0.09 | 0.15 | **0.14** | 0.01 | 0.05 | 0.12 | 0.12 | 0.15 |
| Emotional stability | | | | | | | | | | | |
| Skilled/semiskilled | 6 | 77 | 11,495 | 0.09 | 0.12 | **0.14** | 0.06 | 0.06 | 0.11 | 0.06 | 0.22 |
| Clerical | 2 | 11 | 2049 | 0.11 | 0.05 | **0.17** | 0.00 | 0.08 | 0.14 | 0.17 | 0.17 |
| Sales | 6 | 54 | 6424 | 0.06 | 0.13 | **0.10** | 0.00 | 0.03 | 0.10 | 0.10 | 0.10 |
| Military | 4 | 36 | 9633 | 0.16 | 0.08 | **0.25** | 0.03 | 0.13 | 0.19 | 0.21 | 0.29 |
| Healthcare | 3 | 21 | 1741 | 0.06 | 0.12 | **0.09** | 0.00 | 0.004 | 0.11 | 0.09 | 0.09 |
| Customer service | 3 | 10 | 1482 | 0.08 | 0.08 | **0.13** | 0.00 | 0.03 | 0.13 | 0.13 | 0.13 |
| Law enforcement | 4 | 29 | 3691 | 0.09 | 0.09 | **0.14** | 0.08 | 0.06 | 0.12 | 0.04 | 0.24 |
| Management | 8 | 112 | 19,908 | 0.04 | 0.09 | **0.07** | 0.04 | 0.03 | 0.06 | 0.02 | 0.12 |
| Professional | 7 | 90 | 9238 | 0.03 | 0.09 | **0.04** | 0.03 | 0.01 | 0.05 | 0.01 | 0.08 |
| Extraversion | | | | | | | | | | | |
| Skilled/semiskilled | 6 | 74 | 12,322 | 0.02 | 0.10 | **0.04** | 0.04 | 0.001 | 0.05 | −0.02 | 0.10 |
| Clerical | 3 | 15 | 2720 | 0.09 | 0.12 | **0.14** | 0.03 | 0.03 | 0.15 | 0.11 | 0.17 |
| Sales | 6 | 59 | 7606 | 0.09 | 0.13 | **0.14** | 0.02 | 0.06 | 0.12 | 0.11 | 0.17 |
| Military | 4 | 29 | 7411 | 0.08 | 0.11 | **0.13** | 0.00 | 0.04 | 0.12 | 0.13 | 0.13 |
| Healthcare | 3 | 17 | 1439 | 0.07 | 0.09 | **0.11** | 0.00 | 0.02 | 0.11 | 0.11 | 0.11 |
| Customer service | 3 | 13 | 1961 | 0.08 | 0.13 | **0.13** | 0.00 | 0.01 | 0.16 | 0.13 | 0.13 |
| Law enforcement | 4 | 27 | 3490 | 0.07 | 0.11 | **0.10** | 0.05 | 0.02 | 0.11 | 0.04 | 0.16 |
| Management | 7 | 114 | 21,993 | 0.09 | 0.13 | **0.14** | 0.04 | 0.06 | 0.11 | 0.08 | 0.19 |
| Professional | 6 | 82 | 6306 | 0.02 | 0.13 | **0.02** | 0.08 | −0.01 | 0.04 | −0.08 | 0.13 |
| Openness | | | | | | | | | | | |
| Skilled/semiskilled | 5 | 55 | 9341 | 0.02 | 0.10 | **0.03** | 0.01 | −0.01 | 0.05 | 0.02 | 0.04 |
| Clerical | 3 | 13 | 2454 | 0.11 | 0.12 | **0.17** | 0.03 | 0.05 | 0.17 | 0.14 | 0.21 |
| Sales | 5 | 35 | 4254 | 0.02 | 0.14 | **0.03** | 0.00 | −0.03 | 0.06 | 0.03 | 0.03 |
| Military | 3 | 12 | 2441 | 0.10 | 0.07 | **0.16** | 0.08 | 0.06 | 0.14 | 0.06 | 0.25 |
| Healthcare | 3 | 9 | 1107 | 0.01 | 0.10 | **0.02** | 0.09 | −0.05 | 0.08 | −0.10 | 0.14 |
| Customer service | 3 | 9 | 1337 | 0.07 | 0.10 | **0.11** | 0.00 | 0.01 | 0.13 | 0.11 | 0.11 |
| Law enforcement | 4 | 23 | 3104 | 0.04 | 0.11 | **0.06** | 0.05 | −0.01 | 0.08 | 0.002 | 0.12 |
| Management | 6 | 79 | 16,353 | 0.05 | 0.11 | **0.08** | 0.04 | 0.03 | 0.07 | 0.03 | 0.13 |
| Professional | 7 | 86 | 6925 | 0.13 | 0.13 | **0.20** | 0.04 | 0.10 | 0.15 | 0.15 | 0.26 |

*Note.* $m$ = total number of independent meta-analyses, $k$ = number of independent samples, $N$ = total sample size, $\bar{r}$ = mean sample-size weighted observed correlation, $SD_r$ = mean observed standard deviation, $\bar{\rho}_M$ = second-order, grand mean population correlation (bold) corrected for unreliability in the predictor and the criterion, $SD_\rho$ = standard deviation of population correlation, *95% CI* = 95% confidence interval around observed correlation, *80% CR* = 80% credibility interval around population correlation.

### 2.3. Meta-analytic database and procedures

We systematically extracted descriptive information from qualifying records, including the name of the major occupational group; the personality trait(s) assessed, and inventory used; the total number of independent samples ($k$); the total sample size ($N$); the mean sample-size weighted observed correlation ($\bar{r}$); and an index of between-studies variability. We also coded reliability and/or range restriction information for the Big Five traits, as well as for occupational performance. Some meta-analyses did not report complete descriptive data, so some estimation was required (for details, see Supplementary Methods in the online supplementary material).

### 2.4. Statistical corrections

No new first-order meta-analyses were conducted in this review. Instead, we used procedures from psychometric meta-analysis (Hunter & Schmidt, 2014) to update estimates from qualifying meta-analyses with a common set of statistical corrections that addressed sampling error, measurement error, and range restriction. To correct for measurement error and range restriction in personality traits, we used frequency-weighted artifact distributions reported by Park et al. (2020) and $u$-values from meta-analyses reporting them (i.e., Barrick & Mount, 1991; Hurtz & Donovan, 2000; Lado & Alonso, 2017; Salgado, 1997). We corrected for attenuation in the criterion using the estimate from Salgado et al. (2015). The estimates used in our corrections are as follows: agreeableness ($\bar{r}_{xx} = 0.75$, $u_{xx} = 0.92$), conscientiousness ($\bar{r}_{xx} = 0.79$, $u_{xx} = 0.91$), emotional stability ($\bar{r}_{xx} = 0.81$, $u_{xx} = 0.91$), extraversion ($\bar{r}_{xx} = 0.80$, $u_{xx} = 0.92$), openness ($\bar{r}_{xx} = 0.75$, $u_{xx} = 0.93$), and occupational performance ($\bar{r}_{yy} = 0.61$).

### 2.5. Second-order meta-analyses

Second-order meta-analysis extends psychometric meta-analysis by enabling the cumulation of independent meta-analytic estimates, which helps refine population parameter estimates and accounts for second-order sampling error (Schmidt & Oh, 2013). As inputs, the method requires basic descriptive statistics (i.e., $k$, $N$, $\bar{r}$, and $SD_r$) and mean population correlations ($\bar{\rho}$) from two or more meta-analyses. Second-order meta-analysis reports a common set of statistics. First, $m$ summarizes the total number of contributing meta-analyses. Second, the grand mean population correlation ($\bar{\rho}_M$) and its variance ($VAR_{True}$) are estimates of second-order parameters, having accounted for measurement error, range restriction, and second-order sampling error. Third, confidence and credibility intervals are also calculated. Confidence intervals (*CI*s) are based on the standard error of the mean observed variance between meta-analyses. Credibility intervals (*CR*s) are based on the mean corrected variance between meta-analyses; estimates with 80% CRs excluding zero are typically interpreted as generalizing across contexts (Hunter & Schmidt, 2014). Altogether, we conducted a total of 45 second-order meta-analyses (for details, see Supplementary Results in the online supplementary material).

### 2.6. Synthetic meta-matrices

Meta-analysis is often combined with multiple regression to investigate how the Big Five traits relate to a criterion of interest. A common approach in such analyses is to construct a synthetic correlation matrix by combining meta-analyses of Big Five–criterion correlations with a previously published meta-analytic intercorrelation matrix among the Big Five. Several Big Five meta-analytic intercorrelation matrices exist in the literature and evidence suggests that matrix selection can impact conclusions (Park et al., 2020). Accordingly, we constructed synthetic meta-matrices for our regression analyses. To do so, we made a list of personality inventories used in the primary studies included in the 15 meta-analyses qualifying for our review. We gathered personality inventory information from the text or appendix of the meta-analysis (e.g. Lado & Alonso, 2017; Salgado, 1997; Salgado et al., 2015), by contacting the corresponding author of the meta-analysis, or by manually retrieving and coding the constituent primary studies included in the References. Afterward, we created a set of weights based on the percentage of studies using a particular inventory in an occupation-specific second-order meta-analysis (for details of inventories and associated percentage weights [out of 100%] represented in second-order meta-analyses of major occupational groups, see the Supplementary Results).

Using the aforementioned weights and their associated inventory specific Big Five meta-analytic intercorrelation matrices found in Park et al. (2020, p. 1514), we constructed synthetic meta-matrices for each major occupational group. We corrected all Big Five intercorrelations for attenuation using the same coefficients reported above. Thus, each major occupational group had its own synthetic meta-matrix representative of inventories cumulated in its second-order meta-analyses. We combined each synthetic meta-matrix with its associated occupational performance correlations from Table 1 and then used these data as inputs for our multiple regression analyses.

### 2.7. Multiple regression analyses

We estimated nine multiple regression models to estimate the contribution of the Big Five traits to occupational performance in each major occupational group. We used harmonic means for each occupational group from Table 1 as the sample sizes in these analyses. To determine the relative importance of each Big Five trait, we computed *general dominance weights* (Azen & Budescu, 2003), which consist of the mean predictive contribution of each trait across all possible subset regression models. For ease of interpretability, we rescaled dominance weights by $R^2$ to sum to 100%. In reporting, we focus on relative importance weights $\geq$10% (for regression output and relative importance analyses, see the Supplementary Results).

### 2.8. Operationalizing occupational characteristics

#### 2.8.1. Occupational requirements

We used expert ratings to quantify occupational relevance of the Big Five across occupational groups. For each occupation in its database, O*NET reports a set of relevance ratings across 16 work styles.[1] Job analysts rate the work styles based on how important they are to requirements of an occupation. Work style ratings range from 0 to 100, with higher scores indicating greater relevance. Prior work (Sackett & Walmsley, 2014) indicates that 11 work styles map to one Big Five trait, whereas the remaining five styles map to multiple traits (e.g., integrity is linked with conscientiousness, agreeableness, and emotional stability). Using these theoretical links, we constructed five scales that reflect expert ratings of traits' occupational relevance. To do so, we used the name of a specific occupation to gather a *details report*,[2] which lists occupational relevance ratings across the work styles (for full details of specific occupations included and associated O*NET ratings, see Table S1). We then used occupation-specific ratings to compute a set of summary ratings for all nine major occupational groups (for mean relevance ratings of O*NET work styles across groups, as well as within- and between-group means and *SD*s, see Table S2; the table also reports links among the 16 work styles and the Big Five traits).[3]

In constructing occupational relevance ratings from O*NET works styles for the Big Five traits, we determined that each trait needed to be represented by a minimum of one work style. If multiple work styles were relevant to a particular Big Five trait, then the mean rating would be used as an index for that trait. However, we also incorporated two work style exclusion criteria: 1) trait irrelevance and 2) occupational irrelevance. Regarding the former, if a certain work style did not map to a single Big Five trait, then it would be excluded. Regarding the latter, if a certain work style was generally irrelevant across all occupational groups, then it would be excluded. To operationalize irrelevance, we excluded a work style if its rating met two sub-criteria: a) its mean relevance rating was in the bottom 33% of ratings across groups, which corresponded to a mean rating of $<75.00$; and b) its associated *SD* was small (i.e., $<10.00$; for full details, see Table S2).

Based on these criteria, we excluded the five work styles that map to multiple Big Five traits (i.e., adaptability/flexibility, independence, integrity, leadership, social orientation) for trait irrelevance. Next, we also excluded two work styles (i.e., achievement/effort, innovation) based on their irrelevance across all occupational groups. Following these exclusions, nine work styles remained: two mapped to agreeableness, four to conscientiousness, two to emotional stability, and one to openness. Extraversion, however, had no corresponding work style. Because it was unacceptable to be without an extraversion marker, we ultimately decided to retain leadership as its indicator. We made this decision for two reasons. First, although multiple Big Five traits map to leadership, extraversion displays the strongest empirical relations to leadership variables (cf. Wilmot et al., 2019). Second, leadership did not fail the second exclusion criterion. Although its mean rating across occupational groups was slightly lower than the cut-off score ($M = 72.03$), its associated *SD* was the highest across all work styles included ($SD = 13.92$), which indicates that leadership differs meaningfully in relevance across major occupational groups (see Table S2).

In the end, we used 10 work styles as expert-rated measures of trait relevance to the requirements of nine major occupational groups. We computed trait ratings from the following work styles: agreeableness (concern for others, cooperation), conscientiousness (attention to detail, dependability, initiative, persistence), emotional stability (self control, stress tolerance), extraversion (leadership), and openness (analytical thinking; for details, see Tables S3 and S4).

#### 2.8.2. Occupational complexity

Next, we arranged major occupational groups by their level of occupational complexity. We again used O*NET, which contains a catalogue of occupations reported in the U.S.: *Dictionary of Occupational Titles* (DOT; U.S. Employment Service, 1997). In the DOT, job analysts rated more than 12,000 occupations for complexity levels. Occupations are classified by a nine-digit code (e.g., 189.117–022; manager, industrial organization), with the fourth, fifth, and sixth digits respectively indicating the complexity with data, people, and things. DOT ratings range from 0 to 9, with smaller scores representing greater occupational complexity.

To determine the occupational complexity of contributing occupations, we reviewed the Methods sections of their source meta-

[1] O*NET work styles and associated definitions are as follows: *achievement/effort* (job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks); *adaptability/ flexibility* (job requires being open to change [positive or negative] and to considerable variety in the workplace); *analytical thinking* (job requires analyzing information and using logic to address work-related issues and problems); *attention to detail* (job requires being careful about detail and thorough in completing work tasks); *concern for others* (job requires being sensitive to others' needs and feelings and being understanding and helpful on the job); *cooperation* (job requires being pleasant with others on the job and displaying a good-natured, cooperative attitude); *dependability* (job requires being reliable, responsible, and dependable, and fulfilling obligations); *independence* (job requires developing one's own ways of doing things, guiding oneself with little or no supervision, and depending on oneself to get things done); *initiative* (job requires a willingness to take on responsibilities and challenges); *innovation* (job requires creativity and alternative thinking to develop new ideas for and answers to work-related problems); *integrity* (job requires being honest and ethical); *leadership* (job requires a willingness to lead, take charge, and offer opinions and direction); *persistence* (job requires persistence in the face of obstacles); *self control* (job requires maintaining composure, keeping emotions in check, controlling anger, and avoiding aggressive behavior, even in very difficult situations); *social orientation* (job requires preferring to work with others rather than alone, and being personally connected with others on the job); *stress tolerance* (job requires accepting criticism and dealing calmly and effectively with high stress situations).

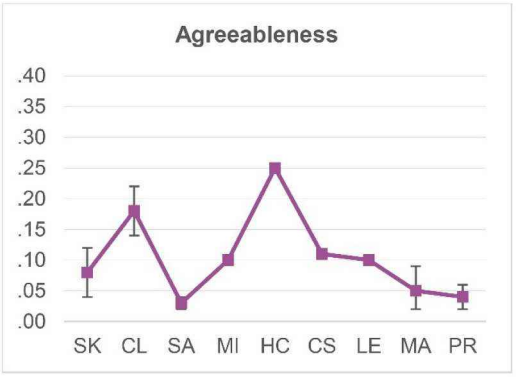
[2] For an example details report, see: https://www.onetonline.org/link/details/41-4012.00.

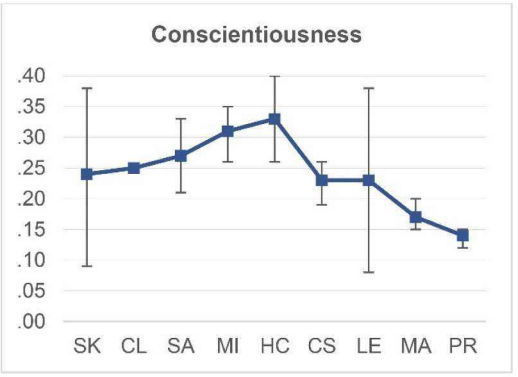
[3] O*NET does not provide work style ratings for military occupations. As a result, we combined ratings for the law enforcement occupational group with ratings for police officer and police supervisor to serve as proxies for enlisted service members and military officers, respectively (for details, see Table S1).

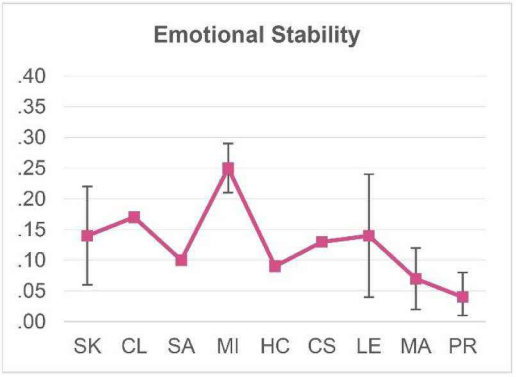
analyses to determine which specific occupations were reported as being included in the meta-analysis of a major occupational group (e.g., engineers, architects, attorneys, accountants, teachers, and doctors cumulated in the 'professional' group; cf. Barrick & Mount, 1991). When authors reported specific occupations, we used them to search the DOT to find the nearest corresponding occupational title and its complexity ratings across data, people, and things dimensions. When authors did not list a specific occupation, but reported a larger, occupational group (e.g., sales; Hurtz & Donovan, 2000), we searched the DOT for an occupational title that most closely approximated this group (for details on specific occupations included in meta-analyses and associated DOT occupational complexity ratings, see Table S1).

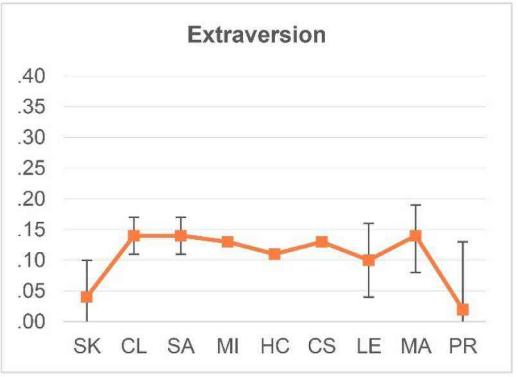
Finally, to form an index of occupational complexity for all major occupational groups, we computed the overall rating across data, people, and things dimensions: skilled/semiskilled (6.04), clerical (5.20), sales (4.99), military (4.83), healthcare (4.37), customer service (4.06), law enforcement (4.00), management (3.17), and professional (2.93; for details, see Table S3).

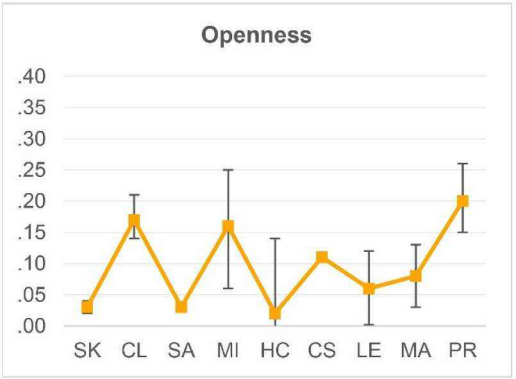
Finally, for heuristic purposes, we classified these nine groups into categories of lower (>5.50), moderate (5.50 > 3.25), and higher (<3.25) occupational complexity (cf. Wilmot & Ones, 2019). In summary, using an integrated database of second-order meta-analyses and the expert ratings of professional job analysts from O*NET, we offer answers to our three main research questions.




| Major occupational group & abbreviations | | Occupational complexity rating |
|---|---|---|
| SK | Skilled/Semiskilled | 6.04 |
| CL | Clerical | 5.20 |
| SA | Sales | 4.99 |
| MI | Military | 4.83 |
| HC | Healthcare | 4.37 |
| CS | Customer service | 4.06 |
| LE | Law enforcement | 4.00 |
| MA | Managerial | 3.17 |
| PR | Professional | 2.93 |

**Fig. 1.** Second-order meta-analyses of the Big Five traits and occupational performance in nine major occupational groups ranked by overall occupational complexity. Squares represent estimated population correlations corrected for unreliability and range restriction. Vertical bars are 80% credibility intervals around each population correlation (also see Table 1).

## 3. Results

### 3.1. Big five traits and occupational performance in major occupational groups

Table 1 presents a summary of second-order meta-analyses of the Big Five personality traits and occupational performance in nine major occupational groups, which are ranked by their level of occupational complexity; Fig. 1 displays the information visually. In our

**Table 2**
Summary of expert ratings and empirical relations of the big five traits and occupational performance across major occupational groups.

| Major occupational group | Expert ratings | | Empirical relations | | | |
|---|---|---|---|---|---|---|
| | Observed | Standardized | $\bar{\rho}_M$ | 80% $CR_{LO}$ | 80% $CR_{HI}$ | % |
| Skilled/semiskilled | | | | | | |
| Agreeableness | 67.45 | 0.52 | **0.08** | 0.04 | 0.12 | 4 |
| Conscientiousness | 70.32 | 0.81 | **0.24** | 0.09 | 0.38 | 76 |
| Emotional stability | 70.69 | 0.84 | **0.14** | 0.06 | 0.22 | 18 |
| Extraversion | 50.61 | −1.19 | **0.04** | −0.02 | 0.10 | 1 |
| Openness | 52.69 | −0.98 | **0.03** | 0.02 | 0.04 | 1 |
| Clerical | | | | | | |
| Agreeableness | 79.94 | 0.81 | **0.18** | 0.14 | 0.22 | 16 |
| Conscientiousness | 79.97 | 0.81 | **0.25** | 0.25 | 0.25 | 44 |
| Emotional stability | 77.06 | 0.52 | **0.17** | 0.17 | 0.17 | 14 |
| Extraversion | 58.25 | −1.34 | **0.14** | 0.11 | 0.17 | 7 |
| Openness | 63.75 | −0.80 | **0.17** | 0.14 | 0.21 | 19 |
| Sales | | | | | | |
| Agreeableness | 71.60 | 0.10 | **0.03** | 0.02 | 0.04 | 4 |
| Conscientiousness | 81.40 | 1.04 | **0.27** | 0.21 | 0.33 | 75 |
| Emotional stability | 8.00 | 0.91 | **0.10** | 0.10 | 0.10 | 5 |
| Extraversion | 59.40 | −1.08 | **0.14** | 0.11 | 0.17 | 15 |
| Openness | 6.60 | −0.96 | **0.03** | 0.03 | 0.03 | 1 |
| Military | | | | | | |
| Agreeableness | 80.25 | −0.47 | **0.10** | 0.10 | 0.10 | 2 |
| Conscientiousness | 84.92 | 0.35 | **0.31** | 0.26 | 0.35 | 53 |
| Emotional stability | 91.00 | 1.41 | **0.25** | 0.21 | 0.29 | 30 |
| Extraversion | 82.88 | −0.01 | **0.13** | 0.13 | 0.13 | 4 |
| Openness | 75.55 | −1.29 | **0.16** | 0.06 | 0.25 | 11 |
| Healthcare | | | | | | |
| Agreeableness | 91.39 | 1.04 | **0.25** | 0.25 | 0.25 | 30 |
| Conscientiousness | 88.08 | 0.28 | **0.33** | 0.26 | 0.40 | 63 |
| Emotional stability | 90.28 | 0.79 | **0.09** | 0.09 | 0.09 | 2 |
| Extraversion | 82.44 | −1.03 | **0.11** | 0.11 | 0.11 | 4 |
| Openness | 82.22 | −1.08 | **0.02** | −0.10 | 0.14 | 1 |
| Customer service | | | | | | |
| Agreeableness | 81.34 | 0.60 | **0.11** | 0.11 | 0.11 | 7 |
| Conscientiousness | 82.36 | 0.72 | **0.23** | 0.19 | 0.26 | 62 |
| Emotional stability | 82.91 | 0.79 | **0.13** | 0.13 | 0.13 | 11 |
| Extraversion | 65.33 | −1.41 | **0.13** | 0.13 | 0.13 | 11 |
| Openness | 71.00 | −0.70 | **0.11** | 0.11 | 0.11 | 9 |
| Law enforcement | | | | | | |
| Agreeableness | 79.50 | −0.39 | **0.10** | 0.10 | 0.10 | 6 |
| Conscientiousness | 84.88 | 0.55 | **0.23** | 0.08 | 0.38 | 68 |
| Emotional stability | 89.50 | 1.37 | **0.14** | 0.04 | 0.24 | 17 |
| Extraversion | 80.25 | −0.26 | **0.10** | 0.04 | 0.16 | 7 |
| Openness | 74.50 | −1.27 | **0.06** | 0.00 | 0.12 | 2 |
| Management | | | | | | |
| Agreeableness | 78.38 | −0.82 | **0.05** | 0.02 | 0.09 | 2 |
| Conscientiousness | 83.75 | 0.18 | **0.17** | 0.15 | 0.20 | 55 |
| Emotional stability | 82.88 | 0.01 | **0.07** | 0.02 | 0.12 | 4 |
| Extraversion | 91.25 | 1.56 | **0.14** | 0.08 | 0.19 | 32 |
| Openness | 77.75 | −0.93 | **0.08** | 0.03 | 0.13 | 7 |
| Professional | | | | | | |
| Agreeableness | 81.30 | −0.33 | **0.04** | 0.02 | 0.06 | 1 |
| Conscientiousness | 85.72 | 1.15 | **0.14** | 0.12 | 0.15 | 29 |
| Emotional stability | 82.39 | 0.04 | **0.04** | 0.01 | 0.08 | 1 |
| Extraversion | 77.84 | −1.48 | **0.02** | −0.08 | 0.13 | 3 |
| Openness | 84.14 | 0.62 | **0.20** | 0.15 | 0.26 | 66 |

*Note. Expert ratings*: expert ratings of the relevance of the Big Five traits to requirements of a major occupational group based on work style ratings. Observed ratings and standardized within occupational group for interpretability. *Empirical relations:* $\bar{\rho}_M$ = second-order, grand mean population correlation (bold) corrected for unreliability in the predictor and the criterion, *80% CR* = 80% credibility interval around population correlation. *%* = percentage of accountable variance attributable to each trait (i.e., rescaled general dominance weights).

reporting, we focus on estimated population correlations for each Big Five trait and associated 80% credibility intervals (CR). To interpret effect sizes, we use the empirical benchmarks of nil/negligible ($\bar{\rho} = 0.05$), small ($\bar{\rho} = 0.10$), medium ($\bar{\rho} = 0.20$), and large ($\bar{\rho} = 0.30+$; cf. Funder et al., 2019).

Across all traits, performance relations range from $\bar{\rho} = 0.02$ to 0.33, with a grand mean of 0.13 ($SD = 0.08$). Conscientiousness shows the strongest mean relation ($\bar{\rho} = 0.24$), agreeableness and openness show the weakest mean relations (both $\bar{\rho}$s = 0.10), and

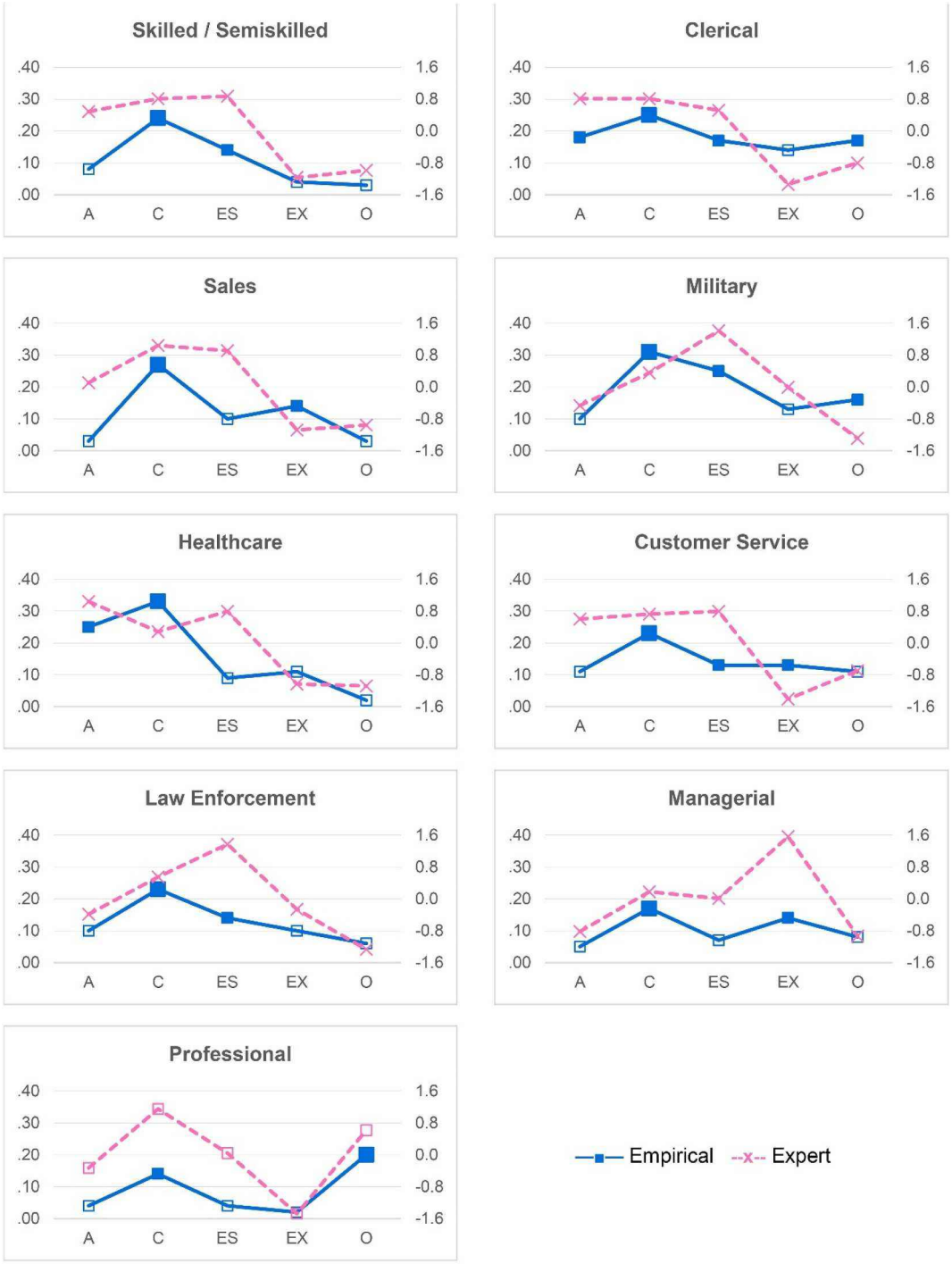



**Fig. 2.** Comparison of expert ratings of trait relevance to occupational requirements with empirical relations. Empirical relations presented on the left *y*-axis and expert ratings of job analysts (standardized within occupational group) presented on the right *y*-axis, with Big Five traits presented on the *x*-axis. For empirical relations, filled boxes represent relative importance weights that are ≥10% (also see Table 2).

mean relations of emotional stability ($\bar{\rho} = 0.13$) and extraversion ($\bar{\rho} = 0.11$) fall in between them. Although these grand mean correlations are consistent with heterogenous cross-sectional meta-analyses, similarities obscure meaningful variability in relations across traits and occupational groups, which we detail below.

### 3.2. Agreeableness

Performance relations range from $\bar{\rho} = 0.03$ to 0.25, with a mean of 0.10 ($SD = 0.07$). As Fig. 1 displays, relations peak for healthcare and clerical occupational groups, but are otherwise small in moderate complexity occupational groups, except for sales, which has a nil effect. Relations are nil in both lower (i.e., skilled/semiskilled) and higher (i.e., management and professional) complexity occupational groups (see Table 1). All 80% CRs exclude zero.

### 3.3. Conscientiousness

Performance relations range from $\bar{\rho} = 0.14$ to 0.33, with a mean of 0.24 ($SD = 0.06$). As Fig. 1 shows, moderate-to-strong relations increase toward healthcare, but then decline to small relations for the higher occupational complexity groups of management and professional (see Table 1; cf. Wilmot & Ones, 2019). All 80% CRs exclude zero.

### 3.4. Emotional stability

Performance relations range from $\bar{\rho} = 0.04$ to 0.25, with a mean of 0.13 ($SD = 0.06$). Fig. 1 shows a prominent peak relation for the military occupational group. Otherwise, relations are small-to-moderate in groups marked by lower-to-moderate complexity, but nil/negligible in higher complexity groups (see Table 1). All 80% CRs exclude zero.

### 3.5. Extraversion

Performance relations range from $\bar{\rho} = 0.02$ to 0.14, with a mean of 0.11 ($SD = 0.05$). Fig. 1 illustrates that trait relations resemble a mesa of small magnitudes, which are bookended by nil/negligible relations for skilled/semiskilled and professional occupational groups, the only two coefficients with 80% CRs that overlap zero (see Table 1).

### 3.6. Openness

Performance relations range from $\bar{\rho} = 0.02$ to 0.20, with a mean of 0.10 ($SD = 0.07$). Fig. 1 shows that Openness has an undulating pattern of negligible and small relations before peaking at the highest complexity occupational group—professional (cf. Gnambs, 2015). With the exception of healthcare, the remaining 80% CRs all exclude zero (see Table 1).

Overall, relations of the Big Five traits to occupational performance differ considerably across occupational groups. Grand mean correlations resemble findings of cross-sectional meta-analyses of heterogenous occupations (Judge et al., 2013; Judge & Zapata, 2015; Schmidt et al., 2008), but these similarities belie the meaningful differences between groups. A major source of these differences appears to be occupational complexity. Complexity influences the relations of conscientiousness and extraversion. The former displays potent relations in lower and moderate complexity occupations, whereas the latter shows small, consistent relations across occupations, except for lower (i.e., skilled/semiskilled) and higher (i.e., professional) complexity groups, in which relations are nil. For the other Big Five traits, complexity shows less systematic influence.

### 3.7. Comparing expert ratings of big five trait relevance with empirical relations

Having answered research question 1, we now compare expert ratings of trait relevance with empirical relations. Table 2 presents a summary of expert ratings and empirical relations of the Big Five traits and occupational performance by major occupational group; Fig. 2 presents this information visually. Specifically, Fig. 2 depicts the empirical relations on the left *y*-axis and the expert ratings of trained job analysts (standardized within occupational group for ease of interpretation) on the right *y*-axis, with the Big Five traits on the *x*-axis. In comparing expert and empirical profiles, we primarily focus on traits with *z*-score ratings >0.00 and $\bar{\rho} \geq 0.10$. In our reporting, we also describe selected results of our multiple regression analyses. Specifically, total accountable variance ($R^2$) and relative importance weights (%)—especially importance weights ≥10% (for details of multiple regression input and output for all groups, see Tables S5 to S8).

Fig. 2 compares expert ratings of trait relevance to requirements of each occupational group with its corresponding empirical relations. Across major occupational groups, correlations between expert and empirical profiles range from 0.37 to 0.80, with a mean of 0.63 ($SD = 0.14$; for details of the convergence among expert and empirical profiles across groups, see Table S9).

### 3.8. Skilled/semiskilled

Fig. 2 displays strong convergence between expert and empirical profiles ($r = 0.80$). Expert ratings of conscientiousness ($z = 0.81$) and emotional stability ($z = 0.84$) are consistent with empirical relations ($\bar{\rho} = 0.24$ and 0.14, respectively). These two traits are also the most relatively important for performance (76% and 18%, respectively; $R^2 = 0.063$).

### 3.9. Clerical

Fig. 2 shows comparatively strong convergence among expert and empirical profiles ($r = 0.69$). Expert ratings for conscientiousness ($z = 0.81$), agreeableness ($z = 0.81$), and emotional stability ($z = 0.52$) resemble the rank-order of traits' empirical correlations ($\overline{\rho} =$ 0.25, 0.18, and 0.17) and relative importance weights (44%, 16%, and 14%). Openness ($z = -0.80$, $\overline{\rho} = 0.19$) is also an underrated, yet relatively important, performance contributor (19%; $R^2 = 0.091$).

### 3.10. Sales

Fig. 2 presents moderate convergence between expert and empirical profiles ($r = 0.49$). Expert ratings of conscientiousness ($z =$ 1.04) and emotional stability ($z = 0.91$) partly reflect empirical relations ($\overline{\rho}_M = 0.27$ and 0.10, respectively), but the relation of extraversion ($\overline{\rho} = 0.14$) is underrated by experts ($z = -1.08$). Even so, conscientiousness (75%) and extraversion (15%) are the two most relatively important contributors to performance ($R^2 = 0.088$).

### 3.11. Military

Fig. 2 displays moderate-to-strong convergence between expert and empirical profiles ($r = 0.60$). Expert ratings capture the relevance of emotional stability ($z = 1.41$) and conscientiousness ($z = 0.35$), if not the rank-order of their empirical relations ($\overline{\rho} = 0.25$ and 0.31, respectively). Ratings for the remaining traits are lower, yet their relations range from $\overline{\rho} = 0.10$ to 0.16. Altogether, conscientiousness (53%), emotional stability (30%), and openness (11%) are the most relatively important contributors to occupational performance ($R^2 = 0.131$).

### 3.12. Healthcare

Fig. 2 shows moderate-to-strong convergence among expert and empirical profiles ($r = 0.57$). Experts rate agreeableness, emotional stability, and conscientiousness ($z = 1.04$, 0.79, and 0.28, respectively) as most relevant, but empirical relations tell a more nuanced story: conscientiousness, agreeableness, and extraversion ($\overline{\rho} = 0.33$, 0.25, and 0.11, respectively) have the strongest relations. Further, relative importance analysis shows that conscientiousness (63%) and agreeableness (30%) are the most important performance contributors ($R^2 = 0.134$).

### 3.13. Customer service

Fig. 2 shows comparatively weak convergence among expert and empirical profiles ($r = 0.37$). Experts rate emotional stability ($z =$ 0.79), conscientiousness ($z = 0.72$), and agreeableness ($z = 0.60$) as most relevant, but conscientiousness ($\overline{\rho} = 0.23$) shows the strongest empirical relation, followed by emotional stability ($\overline{\rho} = 0.13$), and extraversion ($\overline{\rho} = 0.13$)—which is comparably underrated ($z = -1.41$). Openness and agreeableness also have small relations (both $\overline{\rho}$s $= 0.11$), but conscientiousness (62%), emotional stability (11%), and extraversion (11%) are the most relatively important contributors to performance ($R^2 = 0.062$).

### 3.14. Law enforcement

Fig. 2 shows comparatively strong convergence among expert and empirical profiles ($r = 0.68$). Experts identify the relevance of emotional stability ($z = 1.37$) and conscientiousness ($z = 0.50$), if not their empirical rank-order ($\overline{\rho} = 0.14$ and 0.23, respectively). Agreeableness and extraversion have small relations (both $\overline{\rho}$s $= 0.10$), but only conscientiousness (68%) and emotional stability (17%) display relative importance for performance ($R^2 = 0.059$).

### 3.15. Management

Fig. 2 shows relatively strong convergence among expert and empirical profiles ($r = 0.66$). Expert ratings of extraversion ($z = 1.56$) and conscientiousness ($z = 0.18$) converge with empirical relations ($\overline{\rho} = 0.14$ and 0.17, respectively), if not their rank-order. These traits are also the most relatively important predictors (32% and 55%, respectively; $R^2 = 0.042$).

### 3.16. Professional

Fig. 2 shows relatively strong convergence among expert and empirical profiles ($r = 0.78$). Expert ratings of conscientiousness ($z =$ 1.15) and openness ($z = 0.62$) match empirical relations ($\overline{\rho} = 0.14$ and 0.20, respectively), but not their rank-order. Notably, openness (66%) is a relatively more important contributor than conscientiousness is (29%; $R^2 = 0.058$).

Overall, expert ratings of trait relevance display robust convergence with the empirical relations (mean $r = 0.63$). Job analysts rate conscientiousness as highly relevant across all major occupational groups (mean $z = 0.70$), which parallels both empirical relations ($\overline{\rho}_M = 0.24$) and relative importance weights (mean = 58%). More impressively, for 77% of groups, the two most highly rated traits by experts match the two most highly predictive traits, as indicated by relative importance weights. Finally, similarities are notable between certain occupational group profiles. Skilled/semiskilled, military, and law enforcement benefit from the supplemental

prediction of emotional stability; management and sales benefit from supplemental prediction of extraversion; and clerical and customer service benefit from supplemental prediction of the other four traits.

### 3.17. Moderating effect of occupational complexity on personality–occupational performance relations

Having answered research question 2, we now examine occupational complexity's effect on personality–occupational performance relations across occupational groups. Fig. 3 presents multiple correlations ($R$) of the Big Five with occupational performance across groups, which are ranked by their level of overall occupational complexity (for additional details, see Table S10).

As Fig. 3 shows, multiple correlations across occupational groups generally follow an inverse-U shaped pattern. The relation for the lower complexity, skilled/semiskilled group ($R = 0.25$) increases for clerical and sales groups (both $R$s $= 0.30$), and increases further for moderate complexity groups of military ($R = 0.36$) and healthcare ($R = 0.37$). Relations then begin to taper off as the complexity increases for customer service ($R = 0.25$), law enforcement, ($R = 0.24$), and management ($R = 0.20$) groups, before ending slightly higher for professional occupations ($R = 0.24$). Thus, results reveal a novel finding: Personality appears to show its strongest relations in occupational groups with moderate levels of complexity, which may be a "goldilocks range" for performance prediction. When interpreted in tandem with Fig. 1, this appears to be due mainly to the effect of complexity on the performance relations of conscientiousness and extraversion.

## 4. Discussion

Drawing on 15 meta-analyses reporting 47 independent effects across nine occupational groups, representing $n = 89{,}639$ workers across $k = 539$ studies, we presented the largest, most comprehensive quantitative review of personality and occupation-specific performance available in the literature. In addition, we integrated meta-analytic data with expert job analytic data from the Department of Labor's Occupational Information Network (O*NET). For each occupational group, we quantified expert ratings of Big Five trait relevance to its occupational requirements and its overall level of complexity. In so doing, we reported the most systematic examination of the moderating influences of occupational characteristics on personality–performance relations.

Our paper makes three important contributions. First, using the methodological advance of second-order meta-analysis, we cumulated the relations of the Big Five traits and occupational performance (i.e., supervisory ratings of overall job performance and/or objective performance outcomes) across nine major groups of occupations: skilled/semiskilled, clerical, sales, military, healthcare, customer service, law enforcement, management, and professional. Although traits' grand mean correlations across occupational groups resembled extant meta-analyses that pooled cross-sectional data from heterogenous occupations, these similarities obscured key differences. Relations of the Big Five traits to performance differed markedly across different occupational groups. A significant source of these differences was occupational complexity, which moderated performance relations of conscientiousness and extraversion. Second, we examined how expert ratings of trait relevance converged with empirical relations. We found that job analyst ratings displayed robust convergence (mean $r = 0.63$) with empirical relations within those occupational groups. Thus, in general, content and criterion-related validities resulted in the same traits being identified. Specifically, for 77% of groups, the top-two most highly rated traits matched the top-two most highly predictive traits. Conscientiousness was consistently rated as relevant across all occupations, although its empirical primacy was occasionally underrated (e.g., healthcare, law enforcement). However, expert ratings displayed particular utility in predicting the second-most highly relevant trait, after conscientiousness. Thus, job analyst ratings

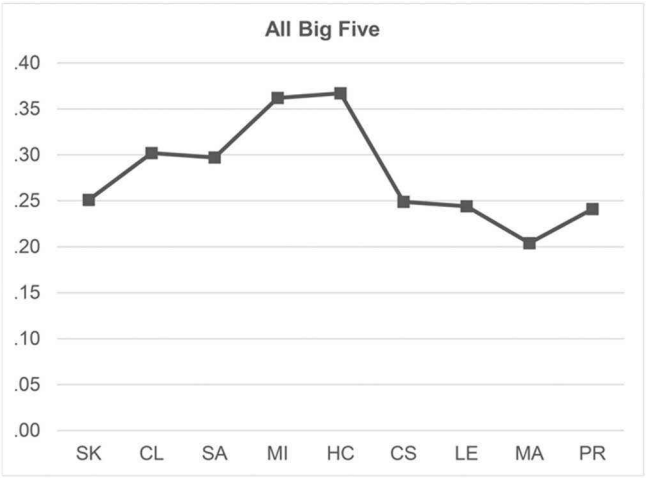



**Fig. 3.** Moderating effect of overall occupational complexity on personality–occupational performance relations across nine major occupational groups. SS = skilled/semiskilled; CL = clerical; SA = sales; MI = military; HC = healthcare; CS = customer service; LE = law enforcement; MA = management; PR = professional. Squares represent multiple correlations of the Big Five traits and occupational performance.

corroborated the empirical profiles of highly predictive traits for each major occupational group: conscientiousness across all occupational groups; agreeableness for healthcare; emotional stability for skilled/semiskilled, law enforcement, and military; extraversion for sales and management; and openness for professional. Third, when we compared personality's cumulative performance relations across occupational groups ranked by complexity, multiple correlations generally followed an inverse-U shaped pattern. For occupational groups characterized by the lowest and highest complexity, effects correspond to medium effect sizes (mean $R = 0.23$), which "offer some explanatory and practical use"; for occupational groups characterized by moderate complexity, effects represent large effect sizes (mean $R = 0.30$) "that are potentially powerful in both the short and long run" (Funder & Ozer, 2019, p. 156). Overall, results suggest that moderate occupational complexity levels may be a "goldilocks range" for using personality to predict performance, particularly for conscientiousness and extraversion. Findings merits replication and future study of personality–performance relations in occupations, as well as investigation using other performance criteria.

### 4.1. Implications for research, practice, and policy

Confirming prior research, conscientiousness is a potent predictor of performance across occupational groups. Although their performance requirements may differ, all occupations have goals to be achieved (Barrick et al., 2013). Because goal-directed performance is fundamental to conscientiousness, it makes sense that its characteristic motivational engagement and behavioral restraint to perform and achieve non-immediate goals (Wilmot & Ones, 2019) is relevant across all occupations. Expert ratings and empirical relations alike confirm its relevance. Although the remaining four traits predicted differently across occupations, each predicted better when it had higher relevance to its occupational requirements. This relevance is further explicated by extant literature on trait links to core goals, values, and vocational interests. Agreeableness predicted best in healthcare where interpersonal helping is a major requirement. Findings reflect trait links to the core goal of communion (Barrick et al., 2013), self-transcendence values (Parks-Leduc et al., 2014), and social interests (Mount et al., 2005). Emotional stability predicted best in skilled/semiskilled, military, and law enforcement occupations, wherein safety, protection, and control of the physical environment are key. Results reflect trait links to the goal of security (Barrick et al., 2013), conservation values (Parks-Leduc et al., 2014), and realistic interests (Wiernik, 2016). Extraversion predicted best in sales and management groups, both of which require interpersonal influence. Linkages to the core goal of status, self-enhancement values, and enterprising interests (Wilmot et al., 2019) support the present results. Finally, openness predicted best in professional occupations, which require problem solving. Findings reflect trait links to the goal of autonomy (Barrick et al., 2013), self-direction values (Parks-Leduc & Feldman, 2014), and investigative interests (Mount et al., 2005). Overall, the total evidence reported here and in the extant literature converge to show that relevance to occupational requirements matters. A theoretical implication of this is that trait relevance to occupational requirements should be considered in future work. That is, occupation-specific data should be collected and reported but study designs that combine relations across heterogenous occupations should be avoided, if possible. A practical implication is that, to explain and predict occupational performance in a given occupational group, a measure of conscientiousness should be paired with the measure of a secondary trait with high relevance.

For the most part, O*NET-based ratings converged with the results of second-order meta-analyses; experts generally identified the two traits with the strongest effects for an occupational group. Content and criterion-related validity mostly converged. However, a few divergences may highlight the limitations of analyst ratings. On occasion, conscientiousness and extraversion were underrated compared with other relevant traits. Regarding conscientiousness, agreeableness was rated as more relevant for healthcare, and emotional stability was rated as more relevant for law enforcement. In both cases of underrating, experts may have put greater weight on more visible requirements while under-weighting less observable ones (cf. Connelly & Ones, 2010). That is, interpersonal aspects of patient care may have been overrated versus adhering to medical rules and procedures. Similarly, the salient aspects of dealing with high-stress conflict and threatening situations may have been overrated vis-à-vis matters of diligent compliance with the law when enforcing it. Now, in neither case should this be interpreted as suggesting that agreeableness is unimportant to healthcare or that emotional stability is unimportant to law enforcement—much to the contrary, both are critical—but rather that conscientiousness is the preeminent predictor of performance. Regarding extraversion, its underrating may have been due to a content deficiency in the O*NET database. Although O*NET's 16 work styles provided sufficient content coverage for the other four traits, extraversion was poorly represented, as it was indicated by a single work style item. An implication of this is that O*NET work styles should be expanded to better cover the main facets of extraversion, such as positive emotions, energy, and sociability (Wilmot et al., 2019). Excepting these few caveats, the collective evidence suggests that occupational relevance data from job analysis can be a useful, if not fully sufficient, content-oriented means to correctly identify the top-two trait predictors of occupational performance in an occupation. Ideally ratings should be paired with empirical data—preferably meta-analytic—for organizational applications.

The moderating effect of occupational complexity also has key implications. Personality, particularly conscientiousness and extraversion, appears to better predict performance in occupations characterized by moderate complexity than it does in those characterized by lower or higher complexity levels. Accordingly, when modeling performance determinants, researchers and organizations should assess occupational complexity and personality—especially in moderate complexity jobs. However, two important caveats are in order. First, in our meta-analyses, we used the well-established Big Five trait model. Examining performance relations at the lower order trait level (cf. Judge et al., 2013) may reveal relations that are obscured at a higher level of analysis. Thus, future investigations should consider the moderating effects of occupational complexity on relations of the lower order traits. Second, we used occupational performance as our criterion. Although this criterion is commonly used in the literature, performance is better modeled as a multidimensional construct (Campbell & Wiernik, 2015). The tripartite model of task performance, organizational citizenship behavior (OCB), and counterproductive work behavior (CWB) is the most widely used model of performance. Extant meta-analyses indicate that personality confers stronger prediction to OCB and CWB compared to task performance, which is more strongly predicted by cognitive

ability (Chiaburu et al., 2011; Mackey et al., 2021; Schmidt et al., 2008). Accordingly, the present meta-analytic data primarily reflect task performance and its outcomes. Thus, future research should consider the moderating effects of occupational complexity on other dimensions of personality–performance relations. At the very least, our finding of a "goldilocks range" of optimal prediction in moderate complexity occupations merits future investigation and replication to test its robustness and generalizability.

Finally, findings have applied and policy implications. As a whole, society benefits from better performing employees (Campbell & Wiernik, 2015). Organizations can and should base employee selection systems on rigorous scientific evidence, such as the personality–occupational performance relations reported here. Job-relatedness is a central feature of legal selection (Ryan & Ployhart, 2014). In cases where selection systems are legally challenged, courts may benefit from considering findings from this research. The statistical links established by meta-analytic correlations constitute broad-based evidence for the occupational relevance of conscientiousness across occupational groups, as well as the relevance of key traits for certain occupational groups. Individuals may also benefit from our findings. Vocational choice is based on a combination of preferences, values, and vocational interests (Hansen & Wiernik, 2018; Holland, 1959; Nye et al., 2017). Hence, by providing individuals with information about occupational performance profiles alongside their own personality assessment profile, findings may improve occupational guidance and ultimately help clarify vocational choice (Sauermann, 2005; Whiston et al., 2017).

## 5. Conclusion

Personality is a valuable human capital resource and a useful predictor of occupational performance. However, occupational requirements and complexity are major considerations for applying this resource. The findings presented here should prove useful for scholars pursuing a richer understanding of personality–performance relations; for organizations honing employee talent identification and selection systems; for individuals choosing a well-fitting vocation; and for society at-large, which would reap the collective benefits of better occupational performance.

## CRediT authorship contribution statement

M.P.W. and D.S.O. conceptualized research; M.P.W. designed research; M.P.W. performed research; M.P.W. analyzed data; and M.P.W. and D.S.O. wrote the paper.

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## Declaration of competing interest

We, the authors, report no conflict of interest, financial or otherwise, in the submitted research.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jvb.2021.103655.

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