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## Development and Validation of the Behavioural Index of Occupational Strengths (BIOS)

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### ABSTRACT

When employees develop their personal strengths at work, they thrive. Unfortunately, many people are unaware of what their strengths are. This encouraged the construction of strengths assessment tools such as the Values in Action Inventory of Strengths and the Clifton StrengthsFinder 2.0. However, these inventories may be unsatisfactory in describing all types of work-related strengths employees can identify with. Therefore, we test the comprehensiveness of these indices in the context of work. Based on our findings, we design an iterative procedure guided by the Critical Incident Technique to develop a novel index of occupational strengths. First, we inductively generate the index from 954 strengths reported by 231 Dutch employees and 87 of their colleagues and test its internal reliability (Study 1). Then, we translate the index and assess its applicability with 1056 strengths reported by 176 employees from English-speaking countries (Study 2). Finally, we examine the robustness and generalizability of both versions with an additional Dutch ( $N = 218$ ) and English ( $N = 216$ ) sample (Study 3). By building an index through the language of the employee, we generate a specialized tool for human resource development professionals and managers to help employees focus on and apply their best selves.


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A strengths-based human resource philosophy assumes that employee performance and development can be maximized by leveraging individual strengths. Research has shown that when the personal strengths of employees are prioritized, organizations will see improvements in employee work engagement (Bakker et al. 2019), their self-efficacy (Van Woerkom and Meyers 2019), and (supervisor-rated) performance (Harzer and Ruch 2014). And when employees perceive their management to actively support their personal strengths, they are able to cope with higher demands, thereby also reducing absenteeism (Van Woerkom, Bakker, and Nishii 2016). Accordingly, human resource development scholars are increasingly interested in taking strengths-based approaches in areas such as performance appraisal, training and development, and talent acquisition and retention (Bouskila-Yam and Kluger 2011; van Woerkom and Meyers 2015). Strengths are personal characteristics that mean for each individual, certain ways of thinking, feeling, and behaving are inherently energizing and enjoyable (Linley 2008).

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Unfortunately, it is difficult for many people to pinpoint what their strengths are and when they use them (Biswas-Diener, Kashdan, and Minhas 2011). One way to help individuals identify their unique sets of strengths is to use strengths classifications. However, the literature to date lacks an empirically validated, work-specific classification of the types of strengths employees can capitalize on at work. As such, human resource development professionals are in need of a validated strengths-based language. In the present study, we examined the strengths employees report to be characteristic of themselves and develop a novel index for identifying work-related strengths.

There are four main objectives that drove this investigation. First, we aimed to empirically examine whether the most frequently used classifications are adequate in describing all types of strengths employees from a wide range of job sectors report. Because the development of a strength depends as much on the environment as on the individual (Biswas-Diener, Kashdan, and Minhas 2011; Harzer and Ruch 2012), certain work-related strengths may not be specified in the more general strengths classifications. Therefore, applying these classifications in work settings could lead to a loss of relevant information. As previous studies that criticize these classifications (e.g. McGrath 2014; Noffle, Schnitker, and Robins 2011; Wadlington 2010) – reviewed in the next section – would predict, our findings showed they did not cover all types of strengths employees identify with at work. Therefore, we aimed to develop a novel strengths index more specialized in occupational strength identification. Second, most formal strengths classifications were developed using deductive procedures, which means the categories were formed based on pre-existing theory and literature (e.g. Peterson and Seligman 2004; Wright et al. 2017). Because people value different things (Kasser, Koestner, and Lekes 2002; Rokeach 1973), using top-down methods when developing classifications as measurement tools may cause their outcomes to impose preconceived values on people or miss features they would otherwise report. By following an inductive, bottom-up approach, we examined strengths as they were presented by the employee without a-priori conception of what they should entail. We repeatedly analyzed and deliberated over their content to obtain closer approximation to the best possible solution of how they relate to and differ from one another. As is common when using iterative methods, findings in each study of this research led to subsequent refinements of the index.

Third, scientists in the field of social and personality psychology emphasize that how we interpret character in ourselves may differ from how we see it in others, known as the self-other knowledge asymmetry model (Vazire 2010). To date, no strengths classifications have taken other-ratings into account in their development. By integrating strengths reported about a colleague in each study, strengths that are often overlooked regarding oneself were not excluded. Moreover, this procedure ensures the index is suitable for both personal and interpersonal strengths identification. Finally, by rigorously testing our index in three separate studies – all with diverse populations from various job sectors, gender, ages, and experience levels – we sought to provide scientists and human resource development professionals with an appropriate language to encourage efficient strengths dialogue with and among a wide range of employees and situations.

By pursuing these four aims, we make the following contributions to the human resource (HR) development literature. Firstly, we answer the call to investigate the effectiveness of the existing instruments for enhancing strengths use in HR practices

(Bakker and van Woerkom 2018). Several HR scholars have emphasized the benefits of integrating a strengths-based philosophy into HR practice (van Woerkom and Meyers 2015; Bouskila-Yam and Kluger 2011) and have pointed out the importance of specificity when it comes to its execution (Aguinis, Gottfredson, and Joo 2012). However, the field is still missing the necessary tools to make this leap from theory to practice. Therefore, our second contribution is to fill this gap by facilitating strengths-based dialogue among employees and management staff with a new work-specific occupational strengths index. This index is intended for use in strengths-based performance appraisals, training and (career) development policy, and talent acquisition and retention procedures. According to the well-accepted inventory by Evers and Rush (1996), one of the base competencies necessary for lifelong learning is personal strengths. In this study, our central question is: what are the types of strengths that employees in different job sectors identify with? By gathering our data from the employees themselves, we develop an index from the language of employees, to be used as a language by employees, their HR professionals, and managers.

### **Strengths in human resource development**

HR practices can be implemented with different foci, and the specific implementation will influence how employees perceive that practice and perform (Wright and Nishii 2007). Traditional HR practices tend to focus on fixing employee weaknesses by aiming to correct flaws through deficiency-based appraisal, training and development (Luthans 2002). However, several studies have concluded that feedback that emphasizes weaknesses can have unintended negative consequences such as employee dissatisfaction and decreased (desire to improve) performance (Burke, Weitzel, and Weir 1978; Jawahar 2010). A strengths-based HR philosophy, on the other hand, puts forward that the greatest performance can be achieved when there is a particular focus on employee strengths (Meyers and van Woerkom 2014). By collaboratively evaluating employees' strengths and planning how to apply these strengths more at work, HR practice can foster growth mindsets in employees and enhance their motivation and performance (Bouskila-Yam and Kluger 2011). When aiming to apply a strengths-based HR philosophy in performance appraisals, training procedures, and talent management, one must first identify the personal strengths of the employee, and then discuss ways in which these strengths can be applied and developed at work. This ensures that employees are aware of their strengths and motivates them to use their strengths, which can have positive outcomes, such as increased work engagement, job satisfaction, and motivation to improve performance (Ghielen, van Woerkom, and Christina Meyers 2018).

Scholars have pointed out that when it comes to these strengths-based practices, however, 'execution is key' (Aguinis, Gottfredson, and Joo 2012, 107). For instance, human resource professionals run the risk of being too vague, thereby limiting the potential performance and job satisfaction-related benefits that strengths feedback can have on employees. Aguinis and colleagues therefore recommend that when delivering effective performance feedback, human resource professionals should adopt a strengths-based approach as the primary means of giving feedback and should provide feedback that is specific and accurate. Implementing these recommendations requires the availability of techniques or instruments that allow detailed identification of employees'

occupational strengths. Therefore, a validated occupational strengths index has the potential to equip managers and supervisors to better understand their team, train their leaders, and help employees find new ways of applying their strengths at work. As we review in the following section, researchers have pointed out several issues with the existing strengths classifications and measures, relating both to their applicability in human resource development contexts as well as validity problems in their methodologies of development.

## Strengths classifications and measurements

There have been several lines of strengths research that have classified categories of strengths, the most popular being the Values in Action classification (VIA; Peterson and Seligman 2004) and Gallup's Signature Themes of Talent (Hodges and Clifton 2004). From these classifications emerged methods of helping people identify their strengths, namely the Values in Action Inventory of Strengths (VIA-IS) and the Clifton StrengthsFinder 2.0 (CSF; Rath 2007), respectively. As can be seen from the titles, these two classifications uphold slightly different foci when it comes to the definition of strengths. The Gallup organization defines strengths as 'maximized talent', meaning when talents are productively applied and combined with skills and knowledge, they become strengths (Asplund et al. 2007). According to the VIA approach, strengths are positive traits expressed in thoughts, feelings, and behaviours, that are morally valued (unlike personality traits) and contribute to individual fulfilment (Park, Peterson, and Seligman 2006). The VIA definition covers how strengths are expressed and the personal benefits of using strengths, but it lacks the notion that using strengths is energizing and engaging. Therefore, in this study we follow a definition that is close to the VIA definition but also includes the energizing aspect of using strengths, namely: Strengths are patterns of thoughts, feelings, and actions that are energizing and lead to maximal effectiveness (Linley 2008).

The Values in Action classification was developed by Peterson and Seligman in the pursuit of specifying the strengths and virtues that make up individual differences of character (2004). They define 24 strengths (e.g. Perspective, Kindness, and Fairness) that reflect six core cross-culturally valued virtues, such as Wisdom, Humanity, and Justice, respectively. Included was a method for people to identify their strengths consisting of 240 Likert-type questions, called the Values in Action Inventory of Strengths (VIA-IS), resulting in a ranked list of the participants' 24 character strengths, the top five representing their 'signature' strengths. However, several issues have been raised concerning the validity of this measure. For instance, McGrath (2014) found that the item contents do not always reflect the associated strength, which indicates a suboptimal construct validity. For example, the category Curiosity includes items that have to do with the ability to keep oneself occupied, which is not necessarily a facet of curiosity. Moreover, researchers have pointed out that due to the deductive way in which the VIA categories were developed, there is little evidence that they cover the full content of what that strength encompasses and may only cover certain aspects of that strength (Noftle, Schnitker, and Robins 2011). For example, the Self-Regulation items refer mostly to healthy physical habits such as exercise, but not other (e.g. work-related) aspects of regulation (McGrath 2014). Ruch and Proyer (2015) tested the

VIA categories by pairwise comparing each category's name, definition, description, theoretical elaboration, and item contents in the VIA-IS. Their results showed that while some strengths categories converged well (e.g. Zest, Humour), others (e.g. Modesty, Perspective) showed room for improvement in their definitions in the classification and in the items used to measure them. Given the length of the questionnaire, the non-specificity of the categories, and the psychometric issues identified in previous research, the VIA classification may not be ideal for work-related strengths identification practices.

The Clifton StrengthsFinder 2.0 (CSF), consisting of 34 'talents', was developed using a combination of pre-existing notions and interviews with the highest achievers across a number of careers, suggesting it should be more suitable for strengths identification at work. However, because the CSF is commercial property, it has not been empirically validated externally and its development report (Asplund et al. 2007) lacks transparency. Moreover, the validation results provided by Gallup associates are not publicly available other than the above-mentioned report, in which it seems that the CSF dimensions show considerable overlap and many of the item internal consistency estimates score below what is deemed acceptable. In addition, the CSF is not consistently worded (i.e. the category 'activator' is a noun, whereas the category 'futuristic' is an adjective), and several scales are internally inconsistent (Lopez, Hodges, and Harter 2005). Weak test-retest reliability (Schreiner 2006) and low construct validity (Wadlington 2010) have also been reported. Because of these issues, the claim that the CSF is a representative index of work-related strengths cannot be verified.

The idea that personal strengths are resources that can be used for the promotion of occupational health is not new; it has been a topic of discussion in social work (Reynolds 1934) and action research in organizations (Cooperrider and Srivastva 1987) for many years. However, the concerns with the existing classifications and measures demonstrate the need for a strengths index that is work-specific and complete in describing the types of strengths employees may identify with. In the current studies, we first examine whether the existing classifications are representative of the occupational strengths employees report. Then, we set out to develop a comprehensive and work-specific index that can be used to encourage strengths awareness and development in work contexts.

## **The present studies**

To develop and validate a novel index of occupational strengths and evaluate the existing classifications, we used an exploratory sequential design (QUAL→quan; Hamlin 2015), following the methodology of the Critical Incident Technique (CIT; Flanagan 1954). This pragmatic mixed-methods approach consists firstly of a qualitative core component, which allowed us to investigate employee strengths without imposing some previous notion of what these might entail. This inductive approach was key because the types of occupational strengths that are out there are not yet fully known or understood. The second, quantitative component of the CIT then allowed us to test whether the theories that emerged from our interpretation of employees' experiences are mutually understandable by independent raters and have therefore reached a sufficient level of trustworthiness (Butterfield et al. 2009; Viergever 2019).

However, our transfer from qualitative to quantitative investigation – or from induction to deduction – is not unidirectional, as the interpretation of the results from the quantitative component is enhanced by subsequent post-hoc qualitative analysis in order to adjust and refine our theories. In other words, we analyze the data in several phases in an iterative sequential mixed analysis design (Tashakkori and Teddlie 2009). We take a pragmatic approach that relies on abductive reasoning – moving back and forth between induction and deduction – and intersubjectivity, which transcends the dichotomy of basing our research on a purely constructivist or purely positivist ontology and allows us to switch between multiple frames of reference (Morgan 2007; Hamlin 2015).

The general aim of Study 1 was to investigate which strengths people identify with at work. To this end, we used an adjusted version of the CIT among employees in the Netherlands because it provided a way of creating a strengths index directly from employees in their own terminology, while at the same time ‘sacrificing as little as possible of their comprehensiveness, specificity, and validity’ (Flanagan 1954, 344). We then tested the reliability and validity of our initial index by (a) calculating agreement among independent judges, and (b) assigning a second round of incidents to the index to test its exhaustiveness (‘saturation’) in describing all reported work-related strengths. In addition, we explored whether there are systematic differences in the types of strengths people report about themselves and those they report about one another.

With the objective of developing a widely applicable strengths index, we put our preliminary results from Study 1 to the test by recruiting English-speaking employees (mainly from the United States) in Study 2. Our goal was to investigate whether the strengths people identify with in English coincide with the index that resulted from Study 1. Additionally, we retested the index’s internal reliability and made refinements based on these results. In Study 3, we examine the construct validity of both language versions of the index to ensure they describe strengths people actually identify in themselves and others at work. Furthermore, by testing whether multiple independent groups of Dutch and English employees substantially identified with the strengths categories, we confirm the robustness and generalizability of the index.

### **Study 1: Testing current indices and developing a novel index**

The research questions driving this study are: (a) Which strengths do employees from diverse occupational sectors describe about themselves and others at work? (b) Which qualified categories emerge from these descriptions? And (c), do people report different types of strengths about themselves than they report about their colleagues? We collected responses from two groups of Dutch employees and their colleagues from a broad range of work sectors. Data from the first group were qualitatively analyzed and coded for the initial development of the index. Then, agreement between independent raters was calculated for the categories that emerged, and based on these results, the initial index was refined. The second group of employee reports was used to test whether the index is exhaustive in describing all kinds of strengths reported by employees. Finally, we aggregated the two data sets to examine whether the types of strengths people report about themselves differ from those people tend to report about others.

## Method

### Participants

We recruited 231 employees (58% female) and 87 of their colleagues (60% female) using convenience sampling through social networks and online announcements. To obtain data from a varied sample of the general working population in the Netherlands, anyone who worked at least 12 hours per week (the minimum for a part-time job) and was over 16 years of age was able to participate. Each participant was asked to solicit one close colleague to participate as well, who was then prompted to openly report what they considered the original participant's strengths. The total colleague response rate was 38%, which was partly due to participants not providing their colleague's email address (37%) and partly due to the colleague not responding to the survey (the remaining 25%).

On average, participants reported working 35.51 hours per week ( $SD = 10.10$ , Min. = 12, Max. = 70), an average that is customary for a fulltime contract in the Netherlands (36 hours). They were drawn from all working-age groups ( $M = 40.09$ ,  $SD = 12.86$ , Min. = 21, Max. = 70 for participants;  $M = 40.15$ ,  $SD = 11.86$ , Min. = 21, Max. = 68 for their colleagues) and levels of tenure (ranging from one month to 46 years;  $M_{years} = 7.33$ ,  $SD = 9.48$ ). Most participants completed a professional education (43%) or held a university degree (34%), followed by technical school (9%); high school or lower (9%); or a postgraduate degree (5%). With the objective of developing a widely applicable strengths index, it was important that employees from a broad range of work sectors were included. The following thirteen industries were represented in the current sample: health care (22%); government (13%); education (13%); public services (10%); finance (9%); technology (9%); industry (6%); trade and retail (5%); science (3%); food and beverage (3%); sports (3%); arts, culture, and tourism (2%); and transportation (2%). With the exception of military and farming (only one participant indicated to work in agriculture), all industries in the Netherlands were represented in the sample.

As mentioned above, we recruited a second round of participants. These 198 additional participants (61% female) and 62 of their colleagues (60% female) were similar in age ( $M = 39$ ,  $SD = 13.40$ ), hours worked per week ( $M = 35.35$ ,  $SD = 11.69$ , Min. = 12, Max. = 80), tenure ( $M_{years} = 6.75$ ,  $SD = 8.93$ ), and education (44% professional education, 28% university, 28% other) to participants in the initial round of data collection. Again, all industries in the Netherlands other than military and agriculture were represented.

### Procedure

Using an online survey supported by Qualtrics software (version 2017), all participants were asked to type what they believed their top three strengths were in three open textboxes. Specifically, after the heading 'Research on the Use of Strengths at Work', they received the following instruction: 'We are very curious about what your strengths are. Strengths are the things you are very good at. These do not have to be strengths you use on a daily basis. Please enter your top three strengths'. The survey went on to include additional questions on the frequency of strengths use at work, job demands and resources, and work engagement, analyzed in an independent research project and not part of the current paper. At the end of the survey, respondents were asked to provide the email address of a colleague with whom they worked closely. This prompted an automatic email trigger with a link to a second survey to be sent to the colleague, who was



given the same open strengths questions, now referring to the target participant's strengths instead of their own. In both cases, there were no restrictions as to what these strengths could entail. This initial collection of responses took place from March to July 2017 and produced a data set of 693 self-identified and 261 other-identified work-related strengths.

### ***Qualitative categorization and assessment of reliability***

The procedure of the original critical incident technique consists of having employees describe incidents of effective job performance, which are then sorted into job 'categories with operational definitions and self-descriptive titles' (e.g. motivation, job knowledge; Butterfield et al. 2009, 267). Then, independent judges individually allocate each incident to the category they find most fitting. Those incidents not assigned to the same dimension by more than a certain percentage of the judges are eliminated due to ambiguity. In the current study, we used this technique to determine to what extent the existing strengths classifications (VIA and CSF) captured the strengths employees reported. Next, we used an iterative method to develop and validate a novel index of work-related strengths and tested it in the same way as the existing inventories. The following stages describe the total procedure. Stage 1: Organization of raw data; Stage 2: Testing current strengths indices; Stage 3: Development of novel strengths index; Stage 4: Interrater reliability analysis of novel strengths index; Stage 5: Exhaustiveness test with second data set. For all stages, ATLAS.ti (version 8.0) was used to store and organize the quotations and categories.

#### ***Stage 1: Organization of raw data***

The first stage of the investigation consisted of organizing all employee reports of strengths ( $N = 954$ ) by grouping identical quotations together, resulting in 452 unique quotations. The software kept track of the amount of times each quotation was reported. The only manual adjustments made were that spelling errors and typos were combined with the correctly spelled quotation (e.g. 'persistant' to 'persistent') in order to reduce the amount of redundant work for the raters. The first author was assigned primary responsibility for creating, updating, and maintaining the master list of quotations and kept up with all memos and the code book.

#### ***Stage 2: Testing current strengths classifications***

The purpose of the second stage was to investigate whether the existing strengths classifications – the VIA (Peterson and Seligman 2004) and the CSF (Rath 2007) – suffice in encompassing all types of occupational strengths employees report. The first two authors operated as raters and each received the complete set of strengths reported by participants. In two separate files, the raters received the VIA and the CSF lists of strengths categories and their descriptions. Both lists included all original category wordings and definitions, which the raters were familiar with and instructed to pay close attention to while performing the task. They kept these definitions close at hand constantly while coding. The task was to independently sort all quotations into the existing strengths categories twice, first for the VIA and then again for the CSF. We also included two extra categories, namely Uncategorizable and Specific Job Skills. The former served the purpose of allowing the raters to exclude responses that are not related

to strengths, (e.g. ‘grumpiness’, ‘competencies’). The latter served the purpose of allowing the raters to exclude reports of strengths that are too specific and therefore not generalizable to wider strengths categories (e.g. Excel, Sales). The results of this sorting process were then compared by calculating Krippendorff’s alpha ( $\alpha_k$ ), which determines to what extent the raters’ interpretations of the categories were congruent. Acceptable agreement is suggested at  $\alpha_k \geq .66$  (Hayes and Krippendorff 2007). This reliability coefficient was chosen for all interrater comparisons in the present study because it was developed specifically for content analysis and calculates agreement beyond what chance would predict (Krippendorff 2004).

Eleven out of the 24 VIA categories (46%) showed acceptable reliability (e.g. Creativity,  $\alpha_k = .95$ ; Honesty,  $\alpha_k = .84$ ; Judgement,  $\alpha_k = .84$ ). In contrast, ten categories (42%) did not reach acceptable agreement (e.g. Leadership,  $\alpha_k = .24$ ; Self-regulation,  $\alpha_k = .30$ ; Perspective,  $\alpha_k = .30$ ). The three remaining categories (Prudence; Gratitude; Spirituality) were found by both raters to be undescriptive of any of the answers given by the employees, indicating they are rarely reported. In addition, a large portion of the reported strengths did not fit into any of the VIA categories according to the first ( $N = 163$ , 36%) and second ( $N = 108$ , 24%) rater.

Ten out of 34 talents comprising the CSF (29%) showed acceptable reliability (e.g. Ideation,  $\alpha_k = .92$ ; Restorative,  $\alpha_k = .88$ ; Developer,  $.76$ ). On the other hand, 23 categories (65%) had below acceptable reliability coefficients (e.g. Futuristic,  $\alpha_k = .10$ ; Focus,  $\alpha_k = .20$ ; Responsibility,  $\alpha = -.02$ ). Again, three categories were not assigned any quotations by either rater (Belief; Individualization; Significance). Raters 1 and 2 found that 66 (15%) and 97 (21%) quotations did not fit into any CSF category, respectively.

There were two reasons that the interrater reliabilities were so low for some of the categories. Firstly, a large portion of the strengths reported by employees were not coherently pronounced by the existing classifications, which caused them to often be allocated to different categories by the raters. Secondly, there were structural misunderstandings between the raters on what many of the categories in both existing classifications entailed, even though the raters were working with identical, official descriptions. This means that the categories of the VIA and CSF could be susceptible to multiple interpretations, as the two raters had a different understanding of the meaning of some of the same strengths descriptions. Because of these discrepancies in how the work-related strengths were allocated to the VIA and the CSF, we concluded that strengths identification practices in the workplace would benefit from an index geared specifically towards occupational strengths.

### ***Stage 3: Development of novel strengths index***

The third stage of coding began by the first and second author – both familiar with CIT procedures – independently grouping all quotations into new categories based on their similarities and differences, independent of pre-existing theory or structures. This is common practice in research applying the critical incident technique (e.g. Ford et al. 2018; McDowall and Lindsay 2014). Both raters followed the same inductive procedure of purposeful comparison in which each code is compared to each other code until qualified groups emerge from the data. No restrictions were specified as to the number or type of categories. Following these individual categorizations, the two raters held regular meetings to discuss discrepancies in their lists of groups and descriptions. Based on these

discussions, quotations were rearranged and the categories were refined and redefined in the codebook. This procedure was repeated until mutual exclusivity of the groups and their descriptions had been achieved, initially resulting in 27 categories of occupational strengths.

#### ***Stage 4: Interrater reliability analysis of novel strengths index***

An essential step in the external validation of coding schemes, one that is often omitted in CIT research, is calculating the interrater reliability (Neuendorf 2017). If agreement between independent raters is found within a tolerable margin of error, one can be comfortable claiming that the categories did not result from irreproducible human idiosyncrasies but reflect actual types of strengths that are comprehensible to people outside of the project (Hayes and Krippendorff 2007). Therefore, stage four consisted of recruiting three independent raters – all organizational psychologists unfamiliar with the aims of this study – to classify all 452 unique quotations into the 27 categories that emerged from stage three (Butterfield et al. 2009) or into the two extra categories Uncategorizable or Specific Job Skills (described in Stage 1).

#### ***Stage 5: Exhaustiveness test with second data set***

As recommended by CIT scholars (e.g. Hamlin, Nassar, and Wahba 2010), it is important to test whether new categories emerge with the allocation of new data, or whether all newly reported work-related strengths fit into the existing framework. To do so, a second round of data collection was conducted to examine whether the framework had achieved exhaustiveness. This second round of data collection produced 486 self-reported and 201 other-reported strengths quotations. After conglomerating the identical responses and correcting for typos in the same manner as in Stage 1, the total of distinct strengths mentioned in this second round of data collection was 317. Of these 317 strengths, 171 (54%) were unique as they had not been mentioned by participants in the previous round of data collection. The first two authors independently sorted all 317 strengths reported in round two into the present framework, and their interrater reliability coefficients were calculated.

### ***Results and brief discussion***

The initial 27-category index of occupational strengths was put through rigorous tests of reliability and validity in stages four and five of this investigation. The results from each of these stages led to additional refinements of the index, some examples of which we will presently discuss. Because the index is further advanced in Studies 2 and 3 of this report, we provide an overview of the index's final categories and definitions in the results section of Study 3.

#### ***Reliability (stage 4)***

A comparison of the categorizations made by the three independent raters in how they sorted the quotations into the index in stage four revealed that 17 of the 27 categories (63%) reached acceptable agreement at the initial stage of analysis ( $\alpha_k = 0.68\text{--}0.91$ ). Two examples of designated categories that showed a high level of agreement, yet are not distinguished by the VIA or CSF, are Coordination ('being able to organize, plan,

structure, and/or arrange things well’) and Meticulousness (‘being conscientious and systematic; being able to act with care and precision’). These two categories are similar in that they both refer to organization and structure, yet they are notably distinct in that Coordination has an external focus while Meticulousness is focused internally and refers to self-organization. Given the difficulties people have in recognizing their strengths, it is beneficial to embrace these subtle differences as long as they are conceptually distinct enough to be understood by non-experts.

All incidents of disagreement in the remaining ten categories ( $\alpha_k = 0.36\text{--}0.66$ ) were thoroughly investigated and removed, combined, or redefined depending on the specific discrepancies that were found. For instance, the categories Drive and Perseverance were too conceptually similar and often confused, so we combined them. Similarly, we combined Pragmatism and Problem Solving because there were too many quotations that applied to both categories (e.g. being level-headed or solution-oriented). Other categories were too distinct to remove or combine, in which case we sharpened their definitions. An example is Independence, where the definition ‘being able to function autonomously, without external control or support’ was changed into ‘being able to work and think autonomously, independent of external control or influences’. These adjustments resulted in an index of 23 categories of work-related strengths.

### ***Exhaustiveness (stage 5)***

When allocating the second group of participant and colleague reports to the 23-version strengths index in stage five, it became evident that the index was sufficient in describing employee strengths, as no new categories emerged at this stage. Moreover, most categories reached highly acceptable interrater agreement ( $\alpha_k = .73\text{--}1.00$ ), meaning that the first and second rater allocated the same strengths to the same categories. The two exceptions were Natural Authority ( $\alpha_k = .57$ ) and Strategy ( $\alpha_k = .66$ ). After considerable examination and discussion from which it became clear that Natural Authority (leadership) and Persuasion (convincing others) were being confounded, it was decided that they were to be combined under a new name, namely Influence (‘being able to influence, persuade, and inspire others and prompt them into action.’). The category Strategy was renamed Vision (‘being able to think strategically, and to see the bigger picture and envision the future’), to highlight the future-oriented nature of the category. This resulted in an index comprised of 23 categories.

### ***Differences between self-identified and other-identified strengths***

To investigate whether employees tend to report other types of strengths about themselves than colleagues report about each other, we investigated whether there were different proportions of self-identified versus other-identified strengths within each category. We conducted independent sample t-tests between the following percentages: The percentage of participants who reported the strengths in a category about themselves was put in a fraction with the total number of self-reporting participants as the denominator. The percentage of colleagues who reported a strength in that category was calculated using the total number of colleagues as the denominator. Since the denominators for the two fractions represent different people, we could conduct independent sample t-tests between percentages without risking capitalization on chance. The first and second round of data were combined for these analyses, resulting in 1179 self-

identified and 462 other-identified strengths (total  $N = 1641$ ). When Levene's test indicated unequal variances, we corrected for this violation by adjusting the degrees of freedom using the Welch-Satterthwaite method. In two categories, we found significantly more self-identified than other-identified strengths. These were Adaptability, which was identified 55 times about the self and only five times by a colleague ( $t(1562) = 4.59$ ,  $p < .001$ ), and Coordination, which was identified 75 times about the self and 14 times by a colleague ( $t(1190) = 3.12$ ,  $p = .002$ ). In addition, Analytical Thinking was identified 101 times about the self and 28 times by a colleague, which revealed a difference significant at the 10% confidence interval,  $t(980) = 1.818$ ,  $p = .069$ ). On the other hand, the categories Drive and Charm contained significantly more other-identified than self-identified strengths,  $t(717) = -3.03$ ,  $p = .003$ ,  $t(629) = -2.18$ ,  $p = .03$ , respectively. For a complete overview of all  $t$ -tests including the percentages of self- and other identification per category, please refer to [Appendix A](#). While we can only speculate about why these differences occur, they highlight the importance of incorporating both self- and other-reports in the construction of a strengths index.

### **Brief discussion**

The goal of the first study was to gain insight into the kinds of strengths employees mention in the workplace and assess whether the existing strengths inventories are sufficient in describing them. Our findings suggest that the already existing inventories are not ideal for occupational strengths identification practices, which is consistent with the doubts expressed about the VIA and CSF by previous scholars (e.g. Nofle, Schnitker, and Robins 2011; Wadlington 2010). By collecting answers from a wide range of Dutch employees, we developed a novel index consisting of 23 categories of occupational strengths. Moreover, we compared the self-identified strengths to those reported by a colleague and detected that there are differences for some types of strengths in how commonly they are reported about the self or about the other. This finding suggests that it can be beneficial to include an interpersonal aspect to strengths identification exercises, as certain types of strengths may be recognized easier by others.

Because this study was conducted in Dutch, the question arose whether a similar outcome would be obtained in an international, English-speaking context, especially given that the procedure we used strongly relies on linguistics. As our aim was to create a widely applicable index of occupational strengths, we collected strengths reports from employees in English speaking countries in Study 2. Additionally, we tested our initial index by having English independent raters allocate the responses to the translated index, simultaneously testing its applicability and interrater reliability.

### **Study 2: Generalizability, reliability, and further refinement of the initial index**

The aim of this study was to investigate whether the index developed in Study 1 is generalizable to English speaking countries. In addition, we examined the applicability of the index by checking whether the strengths reported by English speaking employees were represented by the initial categories that had been developed in Dutch. We then tested the reliability of the index again by enlisting three English independent raters and

calculating the agreement between their allocations of the strengths per category developed in Study 1.

## **Method**

### **Participants**

We recruited 176 native English speakers (48% female) to reflect on their own occupational strengths and those of a close colleague. In total, 73% of the respondents were from the United States, 12% from India, 11% from the United Kingdom, 2% from Australia, and 2% from other English-speaking countries. Sixty-six of these participants (38%) were recruited through convenience sampling in November 2017, and 110 (62%) through the online platform Amazon Mechanical Turk in June 2018. Anyone who was over 16 years of age and worked at least 12 hours per week was invited to participate. On average, participants worked 40.24 hours per week ( $SD = 10.35$ , Min. = 14, Max. = 80). They were drawn from all working-age groups ( $M = 38.32$ ,  $SD = 10.82$ , Min. = 22, Max. = 66) and levels of tenure (ranging from two months to 32 years;  $M_{years} = 5.52$ ,  $SD = 5.57$ ). Most held a bachelor's (39%) or master's degree (24%), some went to college but received no degree (18%) or an associate's degree (7%), some were high school graduates (7%), and the rest had a (post)doctoral (3%) or professional (2%) degree. As in Study 1, it was imperative that the study included employees from a broad range of work sectors. The following fourteen industries were represented in the current sample: technology (18%), science (15%), finance (15%), education (10%), industry (10%), health care (9%), culture (5%), government and legal services (5%), other services (4%), food and beverage (3%), trade and retail (3%), transport (2%), sports (1%), and military (1%).

### **Procedure**

As in Study 1, an online survey supported by Qualtrics software (version 2017) was used to ask the participants to type in open textboxes what they believe their top three strengths are. Then, participants were asked to think of a colleague with whom they work closely and type in three open textboxes what they think their top strengths are. In the current study, these function as the other-identified strengths. We chose this method of collecting the other-identified strengths because of the problems experienced with low colleague response in the first study. This collection of responses produced a data set of 528 self-identified and 528 other-identified work-related strengths. Again, identical strengths were combined after correcting for typos, resulting in 458 unique quotations of self- and other-identified strengths.

### **Qualitative categorization and assessment of reliability**

The index of occupational strengths that resulted from Study 1 was translated from Dutch into English by the first author who is bilingual. The category translations were thoroughly discussed among authors and a wide range of thesauruses and dictionaries were consulted, by which we intended to stay as close as possible to the original category descriptions. Then, we recruited three English native speakers – all academic social scientists with no knowledge of the exact aims of this study and no active involvement in previous parts of the project – to be independent raters. They were instructed to carefully read through each category and description and allocate each reported strength

to one of the 23 translated categories or to the two extra categories: Uncategorizable and Specific Job Skills (described in Stage 2 of Study 1). The level of agreement for each category was calculated with Krippendorff's alpha ( $\alpha_k$ ).

### Results and brief discussion

A comparison of how the three independent raters sorted the quotations into the index revealed that 15 of the 23 categories (65%) reached acceptable agreement at the initial stage of analysis ( $\alpha_k = .68 - .97$ ). All incidents of disagreement in the remaining seven categories ( $\alpha_k = .09 - .63$ ) were thoroughly investigated and removed, combined, or redefined. For example, Initiative and Assertiveness were combined to the broader category Courage, because the low level of agreement was due to the result that several codes (e.g. confidence, bravery) were often relevant to both categories. In another example, Attentiveness was renamed Helpfulness, because raters confused the distinction between paying attention to any stimuli in the environment in contrast to specifically paying attention to other people. Therefore, the category was renamed and redefined to avoid future misinterpretations. Table 1 presents a complete overview of the 22 categories of the Behavioural Index of Occupational Strengths (BIOS) that resulted from refinement based on this English validation in Study 2. Please refer to Appendix B for a complete overview of all versions of the BIOS and the changes made at each stage.

The results from Study 2 showed that a large majority of the categories that emerged from Study 1 in Dutch were also identified by English-speaking people. However, there were still several adjustments that needed to be made. Because some of these adjustments resulted in new categories and descriptions, it was necessary to empirically assess whether each of the final 22 categories of the index represent strengths that are valid for both English and Dutch-speaking employees. Therefore, we conducted a third study in which

**Table 1.** Final categories of the Behavioural Index of Occupational Strengths (BIOS).

Category	Description
Adaptability	Being able to adjust easily, learn quickly, and be flexible and versatile
Affiliation	Being able to connect (with) others, work together, and maintain relationships
Analytical thinking	Being able to think critically and thoroughly about complex issues
Charm	Being nice, friendly, and fun to be around
Communication	Being able to share knowledge and clearly transfer verbal or written information
Coordination	Being able to organize, plan, structure, and/or arrange things well (e.g. activities, meetings)
Courage	Being proactive and entrepreneurial; unafraid to take initiative and voice one's opinions
Dedication	Being loyal and dedicated to a person, job, or organization
Drive	Being active, energetic and motivated to work hard to accomplish goals
Eagerness to learn	Being curious, open, interested, and eager to learn new things
Empathy	Being able to understand and appreciate others' feelings and experiences
Helpfulness	Paying close attention to others and offering support, care, and/or help
Independence	Being able to self-regulate, work and think autonomously, without external control or influences
Influence	Being able to persuade and inspire others and prompt them into action
Inventiveness	Creative thinking; being able to use imagination to develop things and ideas
Meticulousness	Being conscientious and systematic; being able to act with care and precision
Positivity	Being optimistic and having a positive attitude
Pragmatism	Being practical, down to earth, and able to efficiently recognize and solve problems
Reliability	Being dependable, punctual, responsible, and eliciting trust
Serenity	Having tranquillity, patience, and calmness
Sincerity	Being honest, genuine, and authentic
Vision	Being able to think strategically, see the bigger picture, and envision the future

we addressed this concern and tested the credibility and strength of the final categories of the BIOS.

### **Study 3: Robustness and generalizability of the BIOS**

This study was designed to confirm that the Dutch and English indices resulting from Studies 1 and 2 are indeed seen by a substantial number of employees from the Netherlands and the United States as strengths they identify with at work. In the occurrence that one or several categories are characteristic of (almost) no employees in the Netherlands and/or the United States, these may be irrelevant upon further inspection and need to be omitted from the final index. We confronted this remaining query by collecting new independent samples of self and other-identified strengths from Dutch and American employees.

#### **Method**

##### **Participants**

The English language group consisted of 216 employees (63% female) from the United States from all working age groups ( $M = 33.94$ ,  $SD = 9.30$ , Min. = 19, Max. = 62), who worked 37.95 hours per week on average ( $SD = 8.21$ , Min. = 15, Max. = 80). Only people who worked at least 12 hours per week were able to participate. They had tenure levels ranging from several months to 32 years ( $M_{years} = 5.52$ ,  $SD = 5.48$ ). Most had a bachelor's degree (40%); went to college but obtained no degree or an associate's degree (38%); or had a master's degree (12%). The remaining participants completed high school (5%) or a doctoral or professional degree (5%). In the English sample, employees from the following job sectors participated: health care (18%); trade or retail (11%); education (10%); finance (9%); government and legal services (9%); IT and data processing (8%); food and beverage (8%); other services (7%); culture (6%); industry (5%); science (5%); military (1%); sports (1%); and agriculture (1%).

The Dutch language group consisted of 218 participants from the Netherlands (51% female) from all working age groups ( $M = 29.72$ ,  $SD = 10.20$ , Min. = 15, Max. = 62), who worked between 16 and 44 hours per week ( $M = 29.11$ ,  $SD = 8.96$ ) and had tenure levels ranging from several months to 33 years ( $M_{years} = 3.89$ ,  $SD = 5.39$ ). Most participants had professional college (35%) or university degrees (31%); followed by high school (23%); technical school (10%); or postdoctoral degrees (1%). The job sectors they worked in were distributed as follows: IT and data processing (12%); finance and insurance (11%); healthcare (10%); trade and retail (10%); food and beverage (9%); education (9%); culture (9%); other services (7%); science and technology (6%); government and legal services (6%); transport and logistics (5%); industry (5%); sports (1%); agriculture (1%); and military (1%).

##### **Procedure**

Respondents were recruited in August and September 2018 through two online crowdsourcing platforms: Amazon Mechanical Turk for the English survey and Clickworker for the Dutch survey. Both surveys were prepared using Qualtrics software (version 2017). All participants were asked to carefully read the 22 occupational strengths



categories and their descriptions and use a slider to indicate on a 0 (I do not have this strength at all) to 100 (I completely master this strength) scale to what extent they feel each strength category is characteristic of them at work. We chose to use a slider instead of radio buttons in order to enhance the possible within-person variance among the categories and obtain a more fine-grained within-person strengths hierarchy. The 50-point mark was defined as 'I have this strength to some extent'. To uphold the integration of other-identified strengths in developing the index, we subsequently asked them to perform the task a second time, now indicating to what extent they feel the categories describe a close colleague.

### Results and brief discussion

As is shown in Table 2, on average, the extent to which people personally identified with the categories of the English index ranged from  $M = 64.74$  ( $SD = 22.08$ ) to  $M = 86.71$  ( $SD = 13.49$ ). Similarly, average responses to the Dutch categories ranged from  $M = 64.86$  ( $SD = 19.63$ ) to  $M = 82.80$  ( $SD = 15.75$ ). At first glance, it seems none of the categories were severely underrepresented in how much participants felt the categories were descriptive of themselves. Upon further inspection, we found that in both the Dutch and English versions, the categories that had the highest self-identification ratings compared to the rest of the categories were Eagerness to Learn, Reliability, and Sincerity. The categories that were personally identified with the least in both languages were Influence and Courage.

**Table 2.** Means, standard deviations, and ranges of responses to the English and Dutch BIOS.

Category	English ( $N = 216$ )				Dutch ( $N = 218$ )			
	$M$	$SD$	Min	Max	$M$	$SD$	Min	Max
Adaptability	81.10	15.11	20	100	74.45	15.86	0	100
Affiliation	73.19	21.70	0	100	68.33	18.80	2	100
Analytical thinking	82.56	14.88	25	100	76.28	17.32	3	100
Charm	74.37	21.61	0	100	72.32	19.04	13	100
Communication	78.52	16.84	24	100	74.14	15.98	20	100
Coordination	73.61	19.24	0	100	66.85	20.27	3	100
Courage	64.85	22.27	0	100	65.25	19.86	9	100
Dedication	77.92	20.50	5	100	77.12	15.91	28	100
Drive	74.95	18.94	10	100	76.14	15.70	25	100
Eagerness to learn	86.71	13.49	20	100	81.11	15.47	27	100
Empathy	77.18	20.53	15	100	76.80	17.83	0	100
Helpfulness	77.38	18.66	19	100	77.14	15.73	16	100
Independence	82.30	16.94	10	100	78.43	16.83	18	100
Influence	64.74	22.08	6	100	64.86	19.63	5	100
Inventiveness	74.19	19.44	14	100	72.21	18.43	0	100
Meticulousness	76.53	19.57	10	100	73.18	18.96	8	100
Positivity	71.11	21.91	11	100	71.44	18.77	6	100
Pragmatism	80.33	14.08	35	100	72.76	17.57	8	100
Reliability	84.96	15.71	10	100	82.80	15.75	22	100
Serenity	66.43	22.77	6	100	71.35	21.02	0	100
Sincerity	85.56	14.94	23	100	82.42	14.96	0	100
Vision	75.48	19.37	5	100	71.06	18.17	16	100

English responses are from the United States; Dutch responses are from the Netherlands. Responses were made on a scale from 0 (*I do not have this strength at all*) to 100 (*I completely master this strength*). Internal consistency reliability for the English data was  $\alpha = .91$  for self-ratings and  $\alpha = .94$  for other-ratings; for the Dutch data  $\alpha = .90$  for self-ratings and  $\alpha = .93$  for other-ratings.

The other-identification ratings were generally scored lower than the self-identification ratings in both languages, ranging from  $M = 62.36$  ( $SD = 26.76$ ) to  $M = 78.62$  ( $SD = 22.87$ ) for the English categories and  $M = 67.89$  ( $SD = 21.53$ ) to  $M = 79.14$  ( $SD = 14.87$ ) for the Dutch categories. In the United States, the only category that was rated significantly more characteristic of participants' colleagues than of themselves was the category Courage ( $t(438) = -2.38, p = .018$ ). In the Netherlands, Courage ( $t(434) = -3.92, p < .001$ ) was also considered significantly more characteristic of other people than of the self, along with Affiliation ( $t(434) = -3.01, p = .003$ ), Charm ( $t(434) = -2.45, p = .015$ ), and Coordination ( $t(434) = -2.23, p = .027$ ). In both English and Dutch, many of the categories were rated as more characteristic of the self than of a colleague, namely 14 and 8 out of the 22 categories, respectively.

Taking a step further than a comparison of how each category was rated on average, we explored the frequencies with which each category was one of the participants' highest ranked strengths. These rankings were based on the scores participants gave each strength category in the extent to which it was characteristic of them or of their chosen colleague, the top five strengths representing the participant's five highest scores. The number five is arbitrary and does not represent a normative or prescriptive number; it was chosen because top fives are often selected in strengths identification exercises (e.g. in the VIA-IS). In the English version, all categories were among the five most identified with at least 26 (12%) and at most 118 (55%) times in the participants' self-identified strengths and at least 36 (17%) and at most 103 (48%) times in the strengths they attributed to their colleagues. Similar results were found for the Dutch version, as each category was among the highest five at least 26 (12%) and at most 118 (55%) times in participants' top self-identified strengths and at least 38 (17%) and at most 95 (44%) times in top strengths attributed to a colleague. This indicates that in the current 22-category index of occupational strengths, each category emerged as a strength strongly characteristic of a significant proportion of participants from the Netherlands as well as the United States.<sup>1</sup>

## General discussion

The purpose of this study was firstly to examine whether the existing strengths classifications sufficiently encompass the types of work-related strengths employees identify with, and therefore are sufficiently specific for use by human resource practitioners taking a strengths-based approach in their policies and procedures. When we found this was not the case, we developed and tested an index made specifically for strengths identification practices in the context of work, which we call the Behavioural Index of Occupational Strengths (BIOS). By collecting real-life strengths identified by employees in Study 1, we were able to create an initial design of the index. In Study 2, we translated the index to English and tested that version. Finally, our results from Study 3 showed that the final version of the BIOS is representative of the strengths employees identify with in the Netherlands and the United States, indicating that it is an accurate dialectic tool, and can be used to facilitate work-related strengths identification for human resource development practice and procedures.

### ***Theoretical contributions***

In the development of the BIOS, we focused only on work-related strengths. This is consistent with Biswas-Diener, Kashdan, and Minhas (2011) call for more attention to strengths that can be developed in the workplace depending on the situation and context in question, as doing so promotes individual and organizational growth. Our results show that while some categories are conceptually similar to categories from the existing inventories, such as Inventiveness (creativity) and Analytical Thinking, many BIOS categories are more narrowly specified which produces occupational nuances not captured by previous frameworks. By developing a scientifically-driven, comprehensive, and practice-based taxonomy of work-related strengths, we provide human resource development scholars researching strengths-based approaches to HR policy with a suitable strengths framework. The BIOS categories conform to the conditions of effective strengths-based practices expressed by human resource scholars (Aguinis, Gottfredson, and Joo 2012), focused on providing specific and accurate strengths-based feedback during, for instance, performance appraisals.

A further contribution of the BIOS is that it was developed using an inductive (or abductive) approach, as opposed to the deductively constructed strengths classifications. As put forward by Gephart (2004), the unique advantage of this kind of research is that it investigates meanings as they are interpreted by people in their natural environments, thereby 'rehumanizing' phenomena that are often addressed in organizational research (455). By combining a qualitative analysis of written reports of work-related strengths from hundreds of employees with quantitative tests of the applicability and relevance of the categories that emerged from this real-life content in Studies 1 and 2, we were able to construct an index of occupational strengths that closely approximates people's workplace experiences. Indeed, our results from Study 3 showed that all strengths categories present in the English and Dutch BIOS are identified frequently by employees and their colleagues from a wide range of work sectors. The authenticity of the BIOS, due to its phenomenological correspondence with real life, makes it an intuitive and practical tool for identifying work-related strengths in human resource development procedures. This is especially essential regarding the subject of strengths, because the strengths that have the most lasting effects when put to use are those 'signature' strengths that people most strongly identify with (Proyer et al. 2015). It therefore is reasonable to assume that strengths-based approaches to work are most effective if the terminology matches the experience of the employee.

A third contribution of the BIOS is that in its development, we included both self- and other-reports of strengths. As mentioned in the general introduction, the self-other knowledge asymmetry model posits that both the self and the other possess unique insight in how a person typically behaves (Vazire and Mehl 2008). Therefore, self-knowledge about strengths may be more limited than people typically assume. In this study, we found incongruities between self-identified and other-identified strengths, from which we infer that people may have a unique perspective and recognize strengths in their colleagues that they would otherwise not think of regarding themselves. Though we did not compare the strengths reported by a participant and the specific colleague they recruited, overall, we found that certain types of strengths, such as Courage and Influence, are mentioned relatively more often by people about their colleagues than

about themselves. By including these other-identified strengths, we were able to ensure that the strengths less noticeable to oneself are still included in the index.

Finally, our research advances theoretical understanding of strengths at work by highlighting the breadth of strengths that can be applied at work. In organizational psychology, there has been less emphasis on the significance of different types of strengths within employees and more focus on how certain abilities, such as leadership (Bagheri and Pihie 2011) or resilience (Ngoasong and Groves 2016), are important in specific organizational contexts. The development of the BIOS allowed us to reorganize strengths mentioned by employees in a comprehensive manner that makes them more specific to the work-related context. For example, the category Affiliation is not one that is specified by previous inventories. One aspect of Affiliation, namely Teamwork, is included in the VIA, but Affiliation as described in the BIOS also includes the ability to connect (with) others, which can be an important attribute when aspects of one's work are dependent on maintaining social relations. Specificity is essential in strengths identification, because it is the use of those personal strengths that one truly identifies with that leads to beneficial behavioural outcomes at work, such as increased performance and decreased counterproductive work behaviour (Littman-Ovadia, Lavy, and Boiman-Meshita 2016).

### ***Practical implications***

Previous research shows that when employees perceive their management to actively support employee strengths, they are able to cope with higher demands, thereby reducing absenteeism (Van Woerkom, Bakker, and Nishii 2016). The BIOS can inform human resource policy for supervisors in how to engage in positive dialogue with their employees. For example, HR professionals could use the BIOS to train supervisors in recognizing and talking about the individual strengths of employees during performance appraisals. A specific amount of time could then be allocated for the discussion of strengths during these meetings, and the BIOS would be useful in helping the supervisors discuss the strengths of the employees, particularly strengths they may not be aware of themselves. Because research has shown that employees become more productive when they perceive organizational support for the use of strengths (Lavy and Littman-Ovadia 2017), it is beneficial for organizations to have performance appraisals oriented towards the collaborative evaluation of the employee's strengths and the collaborative planning of how to apply these strengths at work (Bouskila-Yam and Kluger 2011; van Woerkom and Meyers 2015). The BIOS provides managers and human resource professionals with an appropriate shared language with which to facilitate efficient strengths dialogue between human resource professionals, managers, and employees.

Strengths identification is an important first step in strengths-based policy in organizations because there is high probability that employees are not aware of what their strengths are (Quinlan, Swain, and Vella-Brodrick 2012). Research has shown that when employees use strategies to align their daily tasks with personal identities and values, they show higher levels of creativity and performance (Unsworth and Mason 2016). Gaining knowledge into one's personal strengths could thereby facilitate the formation of such strategies. Using the BIOS for strengths identification can also help teams be more efficient, for instance in agile working contexts, as team members can work together

more effectively if they each know what every member's unique contributions are. Moreover, it was recently found that within teams, positive feedback increases creativity (Hoever, Zhou, and van Knippenberg 2018). The BIOS could assist in articulating this positive feedback by informing feedback givers on the kinds of strengths that are characteristic of the team members.

Readers from non-English or Dutch-speaking countries can also benefit from this research for two reasons. Firstly, we used a rigorous mixed-method approach based on the critical incident technique, combining qualitative with quantitative analyses. Human resource development researchers can use our study as an example how to analyze content-rich concepts in the language of the employee and still validate the results with larger employee samples. Thirdly, we carefully explain our step-by-step procedure, so that if researchers and practitioners would like to translate the BIOS into other languages, they would have a comprehensible and clear example on how to do so and how to test the translation's validity and reliability.

### ***Limitations and future directions***

The development of the BIOS paves the way for future research on identifying and optimally applying personal strengths at work. Users of the existing strengths inventories tend to arbitrarily isolate a person's top five strengths. This approach offers no room for the possibility that individuals have more than five strengths and it disregards strengths that may not be an individual's most prominent ones but that still can be highly relevant or valuable. In contrast, we put forward an index that employees can select from depending on its suitability for the situation in question. As such, this index could be incorporated in a technique that produces individualized 'constellations' – or networks – of strengths that employees can select from depending on the situation, as proposed by Biswas-Diener, Kashdan, and Minhas (2011). Future research could look into the possibility of creating individualized strengths constellations that can give employees a dynamic indication of their work-related strengths and how these are interrelated.

In the current study, there was no room to test the nomological validity of the BIOS with work-related outcomes such as absenteeism, performance, or well-being. The BIOS was developed as an aid to help people identify their work-related strengths, which has been shown to lead to positive outcomes regardless of which strengths employees indicate as characteristic of themselves (Proyer et al. 2015). In order to study the benefits of the application of the BIOS, one would need to test the use of the BIOS in an intervention study. As has been shown using other classifications in previous studies (for a recent meta-analysis, see Schutte and Malouff 2019), the aim of such a study would be to investigate whether identification with the BIOS and development of one's identified strengths at work contributes to increased work-related performance and well-being.

Because the sampling in the current studies was not stratified, a possible limitation could be that the distribution of work sectors was not completely reflective of the entire population's distribution. Specifically, participation took place online, so blue-collar workers may have been less represented. However, regarding the distribution of job sectors according to the United States Bureau of Labour Statistics, we find that in reality only 1.5% of the population is employed in agriculture (2016), which is consistent with the samples in these three studies. Moreover, health care, government, and education are

the largest service-providing industry sectors, which is also consistent with the populations in this study. Though the aim of this study was not to investigate between-sector differences, future research could focus specifically on the underrepresented branches, such as the military, to investigate whether the BIOS is sufficient in describing all strengths relevant to those employees.

Furthermore, it was recently found that the topic of employee learning and development has the most impact in bridging the gap between human resource development research and practice (Ross et al. 2020). Along with learning and development, personal strengths use has been identified in organizational research as a key ingredient for employee thriving (Mahomed and Rothmann 2019). According to Schutte (2018), a strengths-based approach to career development results in individuals having a more positive self-image and being able to imagine more options for their future. Future research should investigate these proposed benefits of aligning personal training and development opportunities at work with the individual strengths of employees, for example by comparing general development programmes with those that adhere to a strengths-based philosophy of human resource development using the BIOS.

## Conclusion

The objective of this study was to gain insight into the kinds of strengths employees identify with at work, and with this knowledge develop and validate a new index of strengths relevant in the workplace. This index provides human resource professionals with a comprehensive overview that they can use to identify specific, well-defined occupational strengths for the purpose of, for example, performance feedback and appraisal, and personalized training and development trajectories. To this aim, we collected real-life experiences, used a systematic inductive procedure, and put our inferences through several validation tests in three separate studies. When it comes to work-specific strengths identification, the Behavioural Index of Occupational Strengths provides a practical and theoretical foundation for researchers and practitioners examining work-related strengths. We discuss how the BIOS can contribute to one's positive identity at work by introducing them to the kinds of strengths they might identify with and that others might recognize in them. In sum, we present a strengths taxonomy that brings precision and practicality to research and practice in human resource development.

## Note

1. For the practical purpose of making the BIOS more easily interpretable when applied in practice, we conducted exploratory factor analyses on the data collected in Study 3 and an additional Dutch dataset to explore whether the index reveals a coherent structure where categories are sorted into several overarching groups, thus making it easier to take in. However, we did not find a consistent structure across datasets, confirming our suspicions that strengths can be present in all sorts of combinations and that people cannot be grouped into one specific 'type' of strengths beholder. All factor analysis results are available upon request.

## Contribution statement

Conceptualization: Hannah L. Moore, Heleen van Mierlo, Arnold B. Bakker; Methodology: Hannah L. Moore, Heleen van Mierlo, Arnold B. Bakker; Formal analysis and investigation: Hannah L. Moore, Heleen van Mierlo; Writing – original draft preparation: Hannah L. Moore; Writing – review and editing: Heleen van Mierlo, Arnold B. Bakker; Funding acquisition: Arnold B. Bakker; Resources: Arnold B. Bakker; Supervision: Heleen van Mierlo, Arnold B. Bakker.

## Disclosure statement

The authors declare that they have no conflict of interest. All authors have approved the manuscript before submission, including the names and order of authors.

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## Informed consent

This research involved human participants who provided informed consent prior to participation in the surveys by digitally agreeing to the following statement in each of the studies included in this manuscript:

“The purpose of this research is to investigate which strengths people identify with at work. This short questionnaire will ask about your strengths and how much you use them at work and should take no more than 8 minutes to complete. By completing this questionnaire, you authorize us to use the information for research purposes. The data is collected, processed, and stored in accordance with the ethical guidelines of Erasmus University Rotterdam, the Netherlands. All information is treated as strictly confidential and will in no way be identifiable in the report of the results. Your participation in this research is entirely anonymous and voluntary and you may quit at any time by closing this window. If you have read and understood this consent form, please click “next” to start the survey.”

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## Appendix A. Frequency, percentage, and t-tests for equality of means between self- and other identified strengths within each category

Category	Total <i>N</i>	Self		Other		t-Test for equality of means		
		%	<i>N</i>	%	<i>N</i>	<i>t</i>	<i>df</i>	<i>p</i>
Drive	188	61.70	116	38.30	72	-3.03	716.86	.003*
Charm	36	52.78	19	47.22	17	-2.18	629.00	.03*
Assertiveness	25	52.00	13	48.00	12	-1.87	622.70	.062
Positivity	79	62.03	49	37.97	30	-1.82	709.78	.07
Sincerity	35	57.14	20	42.86	15	-1.71	661.27	.088
Initiative	6	33.33	2	66.67	4	-1.55	533.69	.121
Dedication	32	59.38	19	40.63	13	-1.41	680.23	.159
Serenity	59	67.80	40	32.20	19	-0.70	1639.00	.481
Trustworthiness	54	68.52	37	31.48	17	-0.55	1639.00	.581
Eagerness to learn	42	69.05	29	30.95	13	-0.41	1639.00	.683
Helpfulness	90	70.00	63	30.00	27	-0.40	1639.00	.689
Affiliation	141	71.63	101	28.37	40	-0.06	1639.00	.953
Pragmatism	38	73.68	28	26.32	10	0.25	1639.00	.799
Empathy	89	74.16	66	25.84	23	0.50	1639.00	.618
Influence	42	76.19	32	23.81	10	0.63	1639.00	.526
Vision	23	78.26	18	21.74	5	0.69	1639.00	.491
Meticulousness	76	76.32	58	23.68	18	0.89	1639.00	.375
Communication	114	76.32	87	23.68	27	1.15	931.91	.249
Independence	13	84.62	11	15.38	2	1.21	1222.47	.228
Inventiveness	82	78.05	64	21.95	18	1.37	978.21	.171
Analytical thinking	129	78.29	101	21.71	28	1.82	979.88	.069
Coordination	89	84.27	75	15.73	14	3.12	1189.57	.002*
Adaptability	60	91.67	55	8.33	5	4.59	1562.37	<.001*

Order is from relatively more other-identified (Drive) to relatively more self-identified (Adaptability). \*  $p < .05$ .

**Appendix B. Names, descriptions, (change of) interrater reliability estimates, and changes made to all versions of the Behavioural Index of Occupational Strengths**

Study 1			Study 2			Study 3 (Final)		
Name: Definition. Examples	IRR (α)	Revisions	Name: Definition	IRR (α)	Change	Revisions	Name: Definition	
Adaptability: Being able to easily adjust; being flexible and versatile. Examples: malleability, quick learning	.694	None	Adaptability: Being able to easily adjust; being flexible and versatile	.604	-.090	Added 'learn quickly' to description	Adaptability: Being able to adjust easily, learn quickly, and be flexible and versatile	
Affiliation: The ability to establish contact, maintain social relationships, and connect (with) others. Examples: building bridges, social skills	.622	Merged with Collaboration; added 'work together' to description	Affiliation: Being able to connect (with) others, work together, and maintain relationships	.815	.193	None	Affiliation: Being able to connect (with) others, work together, and maintain relationships	
Analytical thinking: Being able to think critically and thoroughly about complex problems and/or situations. Examples: conceptual, smart	.769	Shortened description	Analytical thinking: being able to think critically and thoroughly about complex issues	.913	.144	None	Analytical thinking: Being able to think critically and thoroughly about complex issues	
Assertiveness: The ability to be self-assured, outspoken, and direct. Examples: voice, directness	.510	Revised name and description	Assertiveness: Being direct, confident, and unafraid to voice one's opinions	.798	.288	Merged with initiative; revised name and description	Courage: Being proactive and entrepreneurial; unafraid to voice one's opinions	
Attentiveness: Being able to pay close attention to others and offer care and/or help. Examples: helpfulness, caring	.730	None	Attentiveness: Being able to pay close attention to others and offer care and/or help	.264	-.466	Revised name and description	Helpfulness: Paying close attention to others and offering support, care, and/or help	
Collaboration: Cooperating well with others. Examples: teamwork, working together	.913	Merged with Affiliation (see Affiliation)						
Communication: The ability to transfer verbal or written information. Examples: speaking, writing	.905	Merged with Teaching; Added 'share knowledge' to description	Communication: Being able to share knowledge and clearly transfer verbal or written information	.860	-.045	None	Communication: Being able to share knowledge and clearly transfer verbal or written information	

(Continued)



(Continued).

	Study 1		Study 2		Study 3 (Final)	
Coordination: The ability to organize, structure, or arrange things (i.e. activities, meetings). Examples: planning, organizing	.825	Small description revision	Coordination: Being able to organize, plan, structure, and/or arrange things well (e.g. activities, meetings)	.741	None	Coordination: Being able to organize, plan, structure, and/or arrange things well (e.g. activities, meetings)
Dedication: Being able to be loyal to a person or organization. Examples: loyalty, dedicated	.721	Small description revision	Dedication: Being loyal and dedicated to a person or organization	.942	None	Dedication: Being loyal and dedicated to a person or organization
Drive: Being ambitious, enthusiastic, and eager to work hard in pursuit of goals and results. Examples: competitive, ambitious	.355	Merged with Perseverance; revised description	Drive: Being active, energetic, and motivated to work hard to accomplish goals	.739	None	Drive: Being active, energetic, and motivated to work hard to accomplish goals
Empathy: Understanding and appreciating others' feelings and experiences. Examples: sensitivity, understanding	.846	None	Empathy: Understanding and appreciating others' feelings and experiences	.418	Revised description	Empathy: Being able to understand and appreciate others' feelings and experiences
Independence: Being able to function autonomously, without external control or support. Examples: autonomy, independent	.464	Changed 'function' into 'work and think'	Independence: Being able to work and think autonomously, without external control or influences	.314	Added 'self-regulate' to description	Independence: Being able to self-regulate, work and think autonomously, without external control or influences
Inquisitiveness: Being curious and eager to learn new things. Examples: interest, discovering	.785	None	Inquisitiveness: Being curious and eager to learn new things	.504	Revised name and description	Eagerness to learn: Being curious, open, interested, and eager to learn new things
Inventiveness: Thinking creatively; with imagination. Examples: innovation, development	.899	Added 'develop things and ideas' to description	Inventiveness: Creative thinking; being able to use imagination to develop things and ideas	.913	None	Inventiveness: Creative thinking; being able to use imagination to develop things and ideas
Likeability: Being friendly and spontaneous; bringing about favourable regard. Examples: humour, friendliness	.413	Revised name and description	Charm: Being nice, friendly, and fun to be around	.680	None	Charm: Being nice, friendly, and fun to be around
Meticulousness: Being conscientious and systematic; acting with care and precision. Examples: organized, conscientious	.738	Small description revision	Meticulousness: Being conscientious and systematic; being able to act with care and precision	.701	None	Meticulousness: Being conscientious and systematic; being able to act with care and precision
Natural authority: Having a natural ability to lead and influence the conduct of others. Examples: directing, delegating	.466	Merged with Persuasiveness; Revised name and description	Influence: Being able to persuade and inspire others and prompt them into action	.892	None	Influence: Being able to persuade and inspire others and prompt them into action

(Continued)

(Continued).

Study 1		Study 2		Study 3 (Final)	
Perseverance: Being persistent; continuing in pursuit of an aim until it is achieved. Examples: discipline, not giving up	.617	Merged with Drive (see Drive)			
Persuasiveness: Being able to convince others to take a course of action or embrace a point of view. Examples: motivating, convincing	.535	Merged with Natural authority (see Natural authority)			
Positivity: The ability to be optimistic and positive. Examples: enthusiasm, optimism	.684	Added 'towards life' to description	Positivity: Being optimistic and having a positive attitude towards life	.647	Deleted 'towards life' from description -0.037
Pragmatism: Being down to earth and practical in one's thoughts and actions. Examples: sober, pragmatic	.481	Merged with Problem solving; Revised description	Pragmatism: Being practical, down to earth, and able to efficiently recognize and solve problems	.747	None .266
Problem Solving: The ability to recognize and solve problems. Examples: solution orientation, improvement	.660	Merged with Pragmatism (see Pragmatism)			
Reliability: Having the ability to be trusted and dependable. Examples: trust, punctuality	.698	Added 'responsive' and 'eliciting trust' to description	Reliability: Being dependable, responsible, and eliciting trust	.586	Added 'punctual' to description -1.112
Serenity: Having tranquility and calmness. Examples: patience, calmness	.700	Added 'patience' to description	Serenity: Having tranquility, patience, and calmness	.972	None
Sincerity: Being honest, genuine, and authentic. Examples: authenticity, integrity	.829	None	Sincerity: Being honest, genuine, and authentic	.855	None
Strategy: Being able to see the bigger picture and envision the future. Examples: vision, transcendence	.733	Revised name and description	Vision: Being able to think strategically; to see the bigger picture and envision the future	.763	None
Teaching: Imparting knowledge or ideas by giving instructions or lessons. Examples: explaining, training	.729	Merged with Communication (see Communication)			

(Continued)

(Continued).

Study 1	Study 2		Study 3 (Final)
New category	Initiative: Being entrepreneurial and proactive	.577	Merged with Assertiveness (see
N categories = 27	N categories = 23		N categories = 22

IRR = Inter-Rater Reliability, which was analyzed by calculating Krippendorff's  $\alpha$ . Examples in column 1 are from the dataset used in Study 1.