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The Job Engagement Scale

Development and Validation of a Short Form in English and French

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IMPORTANT INFORMATIVE STATEMENTS

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Abstract

The original 18-item Job Engagement Scale (JES^{18}) operationalizes a multidimensional hierarchical conceptualization by Kahn (1990) of the investment and expression of an individual's preferred self in-role performance. Encompassing three dimensions (i.e., physical, cognitive, and emotional), job engagement is a known predictor of organizational performance and personal outcomes. Using a sample (N = 7185) of military and civilian personnel nested within 60 work units in the Canadian Armed Forces (CAF) and Canadian Department of National Defence (DND), we developed and cross-validated a 9-item short-form (the JES^{9}) of the original JES^{18} in English and French. Results demonstrated that both linguistic versions the JES^{9} and JES^{18} yielded comparable psychometric properties. The scales also displayed measurement invariance as a function of participants' sex (male/female), employee type (civilian/regular force/primary reserve), and role (supervisor/employee). Finally, the associations between scores on the JES^{9} and the JES^{18} and a series of covariates (i.e., employees' psychological needs for competence, autonomy, and relatedness, burnout, and turnover intentions) were assessed. Collectively, results highlight the strong psychometric soundness of the English and French versions of the JES^{9} and the JES^{18} for organizational practitioners and academics.

Keywords. Job Engagement; Job Engagement Scale; Short-form; English; French; Bifactor; Reliability; Validity; Measurement invariance.

The term "engagement" was first introduced to the academic literature by Kahn (1990), who conceptualized it as the "harnessing of organizational members' selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances" (p. 694). Since Kahn's seminal work, decades of research have highlighted the importance of engagement in relation to various indicators of employee well-being and organizational functioning (Shuck & Reio, 2014; Albrecht et al., 2015; Macey et al., 2009). Engaged employees experience higher levels of job satisfaction (Park et al., 2017), better psychological and physical health (Bakker et al., 2008), more positive emotions (Bakker et al., 2014), and lower levels of burnout (Crawford et al., 2010), and turnover (Bakker et al., 2005; Zhang et al., 2016; Saks, 2006). Organizations benefit from an engaged workforce through increases in organizational commitment (Thanacoody et al., 2014), performance at the individual and unit levels (Bakker & Bal, 2010; Halbesleben & Wheeler, 2008; Rich et al., 2010), team effectiveness (Costa et al., 2014), and organizational performance (Barrick et al., 2015; Schneider et al., 2017), productivity (Harter et al., 2010; Kumar & Pansari, 2015), and success (Harter et al., 2002; Xanthopoulou et al., 2009).

However, despite the benefits associated with engagement, in 2020, only 20% of employees were actively engaged in their work, a decrease of two percentage points (from 22%) since 2019 (Gallup, 2021). The Gallup organization estimates this lack of engagement cost the U.S. $483 billion to $605 billion and the global economy US$8.1 trillion, nearly 10% of the global GDP, in lost productivity each year (Gallup, 2021). These low engagement rates, paired with the importance of engagement for the health and productivity of the workforce, have led organizations to increasingly focus on the engagement of their employees to improve productivity and gain a competitive advantage (Albrecht et al., 2015; Macey & Schneider, 2008).

Measuring Job Engagement

Acknowledging the importance of an engaged workforce, academic research has recently coalesced around two popular measures of engagement, each anchored in their own theoretical foundations. The first of those representations of engagement, conceptualized as the antipode of burnout (Maslach & Jackson, 1981), is operationalized using the Utrecht Work Engagement Scale (UWES; Schaufeli & Bakker, 2003). From this perspective, the construct of *work engagement* is defined as "*a positive, fulfilling, work related state of mind that is characterized by vigor, dedication, and absorption*" (Schaufeli et al. 2002b; p.74). Based on this definition, the UWES assesses three components of work engagement: (a) Vigor, reflecting the presence of high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties (e.g., *At my job, I feel strong and vigorous*); (b) Dedication, referring to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge (e.g., *I am enthusiastic about my job*); (c) Absorption, referring to being fully concentrated and happily engrossed in one's work, whereby time passes quickly, and having difficulties detaching oneself from work (e.g., *Time flies when I am working*). The original 17-item UWES has been translated into more than 20 languages (Schaufeli & Bakker, 2010), and is also available in a shorter, 9-item, version (UWES-9; Schaufeli et al., 2006).

Despite its popularity, the UWES has been criticized for not fully reflecting Kahn's (1990) seminal conceptualization of engagement, and for focusing on components that might be more accurately seen as representing antecedents to the active investment of personal resources into role performance that characterizes engagement (Rich et al., 2010). Other researchers (i.e., Christian et al., 2011; Cole et al., 2012; Viljevac et al., 2012) have also noted that the scores obtained on the UWES are hard to empirically differentiate from scores obtained on the Maslach Burnout Inventory (Maslach & Jackson, 1981) or on measures of job satisfaction or commitment. These methodological issues limit the UWES's construct validity and practical utility for the measurement of engagement.

To address these limitations, Rich et al. (2010) developed an alternative measure of *job engagement* designed to reflect Kahn's (1990) conceptualization of engagement as reflecting the investment of employees' personal energies into the performance of their work role. The resulting 18-item Job Engagement Scale (JES^{18}) is aligned with Kahn's (1990) operationalization of engagement, encompassing subscales focusing on the investment of employees' physical, emotional, and cognitive energies into their role performance. The physical dimension reflects the effort and energy employees invest in the performance of their job (e.g., *I try my hardest to perform well on my job*). The cognitive dimension reflects the investment of one's cognitive resources through attentiveness, concentration, and absorption during role performance (e.g., *At work, I focus a great deal of attention on my job*). The emotional engagement dimension reflects the expression of excitement, interest, and enthusiasm in one's job role (e.g., *I am enthusiastic about my job*). Furthermore, the JES^{18} was also specifically designed to measure these three dimensions while allowing their commonality to reflect a global level of job engagement accounting for their synergistic combination (Rich et al., 2010). While Kahn's (1990) ethnographic work guided Rich et al. (2010) development of the JES^{18}, their conceptualization is also rooted in Goffman's (1961) role theory, suggesting that people's attachment to and detachment from their various roles varies from one role to another, as well as in various theories of motivation (Alderfer, 1972; Deci & Ryan, 1985) and work design (Hackman & Oldham, 1980). As such, whereas the UWES was initially developed based on a theoretical perspective seeking to understand a lack of engagement (i.e., burnout), the JES development was anchored in a rich theoretical tradition seeking to understand, and operationalize, employees' investment into their work role.

Research comparing these two representations, and measures, of engagement has shown that, while the UWES has sound psychometric properties and is broadly used in engagement research, it is not free from limitations. For instance, Saks and Gruman (2014) noted that relative to Schaufeli et al.'s (2002) conceptualization of engagement, Kahn's (1990) definition was more precise and better grounded in theory. A comprehensive comparison of the JES^{18} and UWES was also conducted by Byrne et al. (2016) using five distinct samples of employees. Their results showed that scores on both measures were strongly correlated with one another, but not enough to be considered interchangeable. Byrne et al. (2016) conclusions also reinforced the substantial conceptual overlap between the UWES and other measures of job attitudes, including commitment, psychological availability, and burnout. Conversely, their results supported the unique construct validity of the JES^{18} as a state focused on the job role. Byrne et al. (2016) thus concluded that the JES^{18} and UWES measure different aspects of engagement, proposing that because of its overlap with other relevant job attitudes the UWES might be more suitable in applied settings (to capture more global perceptions), whereas the JES^{18} should be the preferred measure in academic research setting due to its clearer focus on role performance. Currently, the JES^{18} is the only published measure of job engagement specifically designed to measure Kahn's (1990) tripartite conceptualization of engagement and for which research has provided evidence of reliability and validity. Indeed, an alternative effort by May et al. (2004) to validate a scale based on Kahn's conceptualization has failed to provide construct validity evidence for their measure. Presently, the JES is available only in its original 18-item scale length. Unlike the UWES, which is available in both a long (17-item) and short (9-item) version (Schaufeli et al., 2006). The absence of a shorter measure for the JES^{18} has limited its use in research and practice and compelled researchers to rely on non-validated ad hoc short forms of the JES^{18} or measures not based on Kahn's (1990) seminal conceptualization of engagement (such as the UWES-9).

Toward the Development of a Short Form of the JES

While research points to the utility and construct validity of the JES^{18}, its 18-item length has limited its applicability. Indeed, organizational research often relies on comprehensive studies in which multiple psychological constructs are assessed at one time, or on longitudinal studies where it is important to achieve a balance between the length of each testing session (to maintain interest and reduce fatigue), while maintaining comprehensiveness. Simultaneously, organizational researchers often have to comply with organizationally imposed time-constraints (15-20 minutes, corresponding roughly to 100 to 150 questions; Perreira et al., 2018; O'Reilly-Shah, 2017). Therefore, the length of each instrument can become a limitation to its widespread utilization in these contexts. Obviously, the length of the JES^{18} is not enough to interfere with the ability of researchers to include it as part of their assessment battery if their main research question is about engagement. However, it does hamper the ability of these researchers to simultaneously include a variety of other measures that might be relevant to their purposes, as well as with the ability of other researchers with a secondary interest in engagement to incorporate the JES^{18}. For instance, a difference of 9 items (i.e., reducing the JES from 18 to 9 items) would make it possible for researchers to incorporate three additional validated 3-item measures of alternative constructs (e.g., turnover intentions, emotional exhaustion, social support perceptions, etc.) or even nine additional validated single-item measures (e.g., Fisher et al., 2016).

The present study addresses this limitation by developing and validating a psychometrically sound short version (the JES[9])[1], of the JES[18], while also proposing equivalent French versions of the JES[18] and JES[9].[2] Although short instruments have clear, practical advantages in terms of time saving, respondent fatigue, and lower attrition they also involve trade-offs (e.g., reduced construct coverage, reduced reliability) when compared to original, more extensive, instruments. Nonetheless, to be truly useful, a short form still must meet the same psychometric standards required for longer scales (Marsh et al., 2005a; Smith et al., 2000). Fortunately, guidelines have been proposed to guide the development of psychometrically sound short instruments (Maïano et al., 2008; Marsh et al., 2005a; Myers et al., 2003; Smith et al. 2000). These guidelines reinforce the need to start from a valid and reliable long form of the instrument and to demonstrate that the short form can maintain: (1) the content coverage of each factor, (2) the factor structure of the full instrument (as indicated by adequate goodness of fit); (3) satisfactory reliability and validity (in relation to the same set of convergent measures used to validate the long form). In addition to maintaining the content validity of the original measure, items included in the short form should have (when compared to other items), relatively high factor loadings, low uniqueness and correlated uniqueness, and low cross-loadings.

In the process of developing and validating these new measures, we will also consider how best to capture the inherent psychometric multidimensionality of these measures, their measurement invariance across distinct sub-populations of participants (i.e., sex, employee type, and work role) and linguistic versions, as well as their criterion-related validity in relation to a series of covariates (i.e., psychological needs for competence, autonomy, and relatedness, burnout and turnover intentions).

Psychometric Multidimensionality

Job Engagement as a Hierarchical Construct. Job engagement is explicitly defined as a multidimensional hierarchical construct encompassing physical, emotional, and cognitive facets that all serve to define employees' global levels of job engagement (Rich et al., 2010). Indeed, results from previous research conducted on the JES[18] support the idea that these components of job engagement, albeit well-differentiated from one another, might also be experienced more holistically as a single overarching construct (Gillet et al., 2020; Rich et al., 2010). Psychometrically, two approaches have been used to capture this hierarchical nature of the multidimensional job engagement construct.

Higher-order factor models define first-order factors from ratings obtained on indicators reflecting each engagement dimension (i.e., physical, emotional, cognitive). These first-order factors then act as indicators of a higher-order factor reflecting global levels of job engagement (e.g., Rich et al., 2010). Higher-order models rely on a proportionality constraint that is often too restrictive, assuming that the ratio of variance explained by the higher-order factor to that explained by the first-order factor must be the same for all items associated with the same first-order factor (Gignac, 2016; Morin et al., 2016). In higher-order models, the first-order factors are also conceptually redundant with the higher-order factor when used in prediction, as both global and specific sources of variance are captured by the first-order factors (i.e., their unique part is absorbed into their disturbance; Morin et al., 2016).

The second approach relies on bifactor models (e.g., Gillet et al., 2020) to directly estimate a global (G-) factor (global levels of job engagement) using participants' ratings from all job engagement indicators, and a series of orthogonal specific (S-) factors estimated from participants' ratings on the indicators representing each dimension of engagement (i.e., physical, emotional, cognitive) (Chen et al., 2006). As such, bifactor models are untainted by the proportionality constraint that characterizes higher-order models and provide a way to estimate S-factors that directly reflect the extent to which specific levels of physical, emotional, and cognitive job engagement diverge from global levels of job engagement. Bifactor models thus make it possible to consider job engagement holistically (global job

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[1] We used a target length of 9-items for this short version to match the length of the short version of the UWES (UWES-9; Schaufeli et al., 2006), and to be able to achieve the local identification of all factors without having to implement arbitrary constraints. As a result, this length was conceptualized as a rigid lower bound in terms of length, but as a flexible upper bound conditional on our ability to maintain the construct coverage of all JES subscales.

[2] According to Wikipedia, French is the 15th most common native language, the 7th most spoken language, and the 2nd most frequent official language in terms of number of countries where it is spoken. French is also one of the official languages of the United Nations, the Olympics, the World Trade Organization, and the Red Cross, as well as in 29 countries located on many continents.

engagement) and specifically (physical, emotional, and cognitive), and to incorporate all four facets simultaneously in subsequent analyses (Tóth-Király et al., 2018).

Job Engagement Dimensions as Conceptually Related Constructs. The choice of which model to use in order to best represent the psychometric multidimensionality present in a psychological measure is not only a theoretical issue; it is also a statistical one. As noted by Morin et al. (2016), whenever multidimensional constructs (such as job engagement) are assessed using conceptually related subscales (such as physical, cognitive, and emotional job engagement), construct relevant associations (i.e., cross-loadings) can also be expected between items theoretically associated with one subscale (e.g., physical engagement) and the factors reflecting the other subscales (e.g., cognitive, and emotional engagement). For example, in the JES^{18}, item 3: *I devote a lot of energy on my job,* is an indicator of the physical engagement dimension, while item 8: *I feel energetic at my job,* is an indicator of the emotional engagement dimension. In such context, statistical research has shown that without allowing for the estimation of cross-loadings (as small as .100) between these conceptually similar items, the model runs the risk of converging on a solution with inflated factor correlations in confirmatory factor analytic (CFA) models (Asparouhov et al., 2015) or inflated G-factor loadings in bifactor CFA models (Morin et al., 2016; Murray& Johnson, 2013).

Exploratory structural equation modeling (ESEM) provides a way to address this limitation, making it possible to freely estimate all cross-loadings while still relying on an a priori specification of the factors that can be extended to bifactor models (Morin et al., 2020). Importantly, statistical research has shown that relying on an ESEM specification when no cross-loadings are present in the population models should result in unbiased parameter estimates comparable to CFA estimates (Asparouhov et al., 2015). For this reason, current recommendations are to systematically contrast ESEM and CFA representations of multidimensional constructs before incorporating a bifactor structure. In this comparison, the factor definition (i.e., the strength of the main factor loadings), the model fit, the factor correlations, and the size of cross-loadings should all be considered to guide the selection of the optimal solution (Morin et al., 2020).

A Bifactor Representation of the JES. Supporting the previous rationale, a recent study conducted by Gillet et al. (2020) demonstrated the superiority of a bifactor-ESEM representation of participants' responses to a French version of the JES^{18} (although this was only a secondary objective of their study, relying on a French version that has yet to be formally validated). The current study first seeks to extend the validation of the original JES^{18} (Rich et al., 2010) to verify whether the French and English versions of this questionnaire will also follow a bifactor-ESEM solution comparable to that identified by Gillet et al. (2020). This study thus seeks to demonstrate that specificity exists in the individual dimensions of physical, emotional, and cognitive job engagement once global levels of job engagement are considered, leading to the following hypothesis:

Hypothesis 1: A bifactor-ESEM representation will best capture the multidimensional structure of the JES^{18}.

In addition, this study also seeks to develop, and validate, a short version of this questionnaire (JES^{9}) to increase its ease of use in both research and practical settings. To maximize the utility of the short scale across a broad range of settings, one should aim for a simplified measurement model that is more broadly accessible for researchers and practitioners. To achieve this objective, the JES^{9} items will be selected by first considering the theoretical underpinning of all items to preserve content validity, as well as following a detailed examination of the alternative solutions estimated for the JES^{18} in the current study and in Gillet et al.'s (2020) study using the aforementioned guidelines for short form development. As part of this selection, items possessing minimal conceptual overlap with non-target engagement dimensions (low cross-loadings and correlated uniquenesses) while maximally representing their target dimension (high factor loadings and low uniquenesses) across solutions will be favored. For this reason, we expect the JES^{9} to preserve the bifactor structure of the JES^{18}, but to be adequately represented by a more parsimonious bifactor-CFA (relative to bifactor-ESEM) solution:

Hypothesis 2: A bifactor-CFA representation will best capture the multidimensional structure of the JES^{9}.

Measurement Invariance as a Test of Generalizability

So far, no verification of the extent to which results regarding the factor structure (i.e., the factor loadings, intercepts, and uniqueness) of the JES^{18} across sub-populations of participants (i.e., tests of measurement invariance; Millsap, 2011) has been conducted. Tests of measurement invariance are critical to psychometric measurement as they inform users of whether instruments can be used to conduct unbiased group comparisons as a function of participant characteristics (e.g., civilian versus military). These tests, seeking to identify differential item functioning (i.e., measurement biases or non-invariance) as a function of participant characteristics can then be extended to investigations of unbiased group differences on the variance and mean of the JES[18] factors (Millsap, 2011). In the current study, we seek to ascertain the generalizability of the psychometric validity of JES[18] and JES[9] as a function of (i) language (French/English); (ii) sex (male/female); (iii) employee type (civilian/regular force/primary reserve). We also extend these tests of measurement invariance further within the civilian sample to verify that the job engagement dimensions are estimated similarly for employees occupying different (iv) work roles (supervisor/employee). As these tests are designed to assess whether and how our results can be expected to generalize to different subgroups of participants, our expectation is that the psychometric properties of both the JES[18] and JES[9] will fully generalize across all groups, and thus both measures will be appropriate to use in the context of group comparisons. Lacking clear empirical evidence in this regard, we leave as an open research question whether the means and variances of the job engagement factors will differ across these groups.

Hypothesis 3: Tests of measurement invariance will provide support for the generalizability of the JES[18] and JES[9] psychometric properties across language, sex, employee type, and roles.

Criterion-Related Validity

To verify the criterion-related validity of the English and French versions of the JES[18] and JES[9], we consider their associations with a series of covariates (i.e., employees' psychological needs for competence, autonomy, and relatedness; burnout and turnover intentions).

Basic Psychological Need Satisfaction. Kahn's (1990) seminal conceptualization positions job engagement as resulting from an integration process leading individuals to the decision to invest themselves in their work role. Likewise, Self-Determination Theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2017) is primarily concerned with independent choice and the degree to which behavior is self-regulated, self-determined, and self-motivated. SDT proposes that behaviors which are initially seen as externally driven progressively come to be internally driven as a result of a process of internalization whereby individuals progressively integrate these activities as an important part of their own value and belief system (Ryan & Deci, 2017; Ryan, 1995). As such, SDT appears well suited to clarify the underlying process that leads individuals to choose to invest their physical, emotional, and cognitive resources toward their work role (Rich et al., 2010).

According to SDT, this internalization process is driven by the degree to which the activity itself, and the environment in which it takes place, are able to satisfy individuals' basic psychological needs for competence, autonomy, and relatedness (Ryan & Deci, 2000, 2017; Ryan, 1995). The satisfaction of need for competence is defined as the degree to which individuals feel that they possess the knowledge, skills, and resources required to meet environmental challenges and requirements. The satisfaction of need for autonomy is defined as the degree to which individuals believe they have control over their environment and are able to choose how and when to apply different skills and capabilities. Finally, the satisfaction of need for relatedness is defined as the degree to which individuals feel appreciated, valued, and connected in their social environment. According to SDT, when these three basic psychological needs are met, individuals engage in behaviors with a sense of interest, enjoyment, and value that ultimately promotes engagement (Ryan & Deci, 2017; Ryan, 1995). Previous research has empirically validated this assumption, showing that basic needs satisfaction does indeed predict employees' levels of engagement (Goodboy et al., 2017; Schuck & Reio, 2014). Based on these considerations, and assuming that the JES[9] will preserve the psychometric properties of the JES[18], including its criterion-related validity, we posit that:

Hypothesis 4: The satisfaction of the needs for autonomy, competence, and relatedness will be positively correlated with job engagement measured by the JES[18] and the JES[9].

Burnout. Research on engagement has primarily investigated the construct as a positive psychological relationship that individuals' share with their work role. However, in-role experiences can be placed along a continuum between the positive experience of engagement and the negative experience of burnout (Maslach & Leiter, 2008). As such, engagement and burnout have often been positioned as opposite, but complementary, components of employees' well-being at work (Schaufeli et al., 2008; Schaufeli & Bakker, 2010). In this context, burnout is typically defined as a negative psychological state encompassing feelings of emotional exhaustion, cynicism (or psychological detachment from work), and professional inefficacy (Maslach, 1982; Maslach et al., 1986). Employees suffering from burnout are seen as having lost their connection with their work and distanced themselves emotionally and mentally from their work activities (Maslach & Leiter, 2016). Generally, previous meta-analytic findings have supported the existence of moderate negative correlations between burnout and engagement (Crawford et al., 2010; González-Romá et al., 2006; Høigaard et al., 2012). Following from these considerations, we propose the following hypothesis:

Hypothesis 5: Burnout will be negatively correlated with engagement measured by the JES[18] and the JES[9].

Turnover Intentions. Turnover intentions are defined as "a conscious and deliberate willfulness to leave the organization" (Tett & Meyer, 1993, p. 262) and thus represent the antithesis of an individual's psychological presence (Kahn, 1992) and the allocation of personal resources toward role performance (Rich et al., 2010). As such, turnover intentions have long been considered as theoretically incompatible with job engagement. Conversely, employees who are psychologically captivated by their work generally desire to remain with the organization (Schaufeli & Bakker, 2004). Indeed, studies have supported the presence of a negative correlation between job engagement and turnover intentions (Harter et al., 2002; Maslach et al., 2001; Saks, 2006; Schaufeli & Bakker, 2004; Schaufeli, Bakker, & Salanova, 2006). With this in mind, we hypothesize the following:

Hypothesis 6: Turnover intentions will be negatively correlated with engagement measured by the JES[18] and the JES[9].

Method

Study Design

Sampling Frame. This study relies on an archival dataset collected from a stratified random sample from the Canadian Department of National Defence personnel. This sampling frame of 62,210 employees was stratified into 60 organizations covering the army (i.e., land army) personnel of the Canadian Armed Forces and all personnel from the Department of National Defence. Random samples were drawn from each stratum with proportional allocation for military component (i.e., Regular Force, Primary Reserve, and civilian), sex, rank (i.e., non-commissioned members–NCMs–and officers), and years of service for civilian personnel. This proportional allocation increased the probability of a good representation of survey respondents along these variables. This random sampling procedure yielded a total potential sample of 24,200 individuals (11,849 military and 12,251 civilian) with a small, expected margin of error (< 1%).

Procedure. Members of the randomly selected sample were invited to participate in the Defence Workplace Well-Being Survey (DWWS) via email or postcards between May and August 2018. Participants Respondents all provided informed consent, and were ensured of the confidentiality of their responses and that only aggregate data would be reported. The DWWS was approved by the CAF/DND Social Science Research Review Board. For additional information see Blais et al. (2020).

Sampling Weights. Respondents within each organization were post-stratified by component and rank (i.e., junior NCM, senior NCM, junior officers, and senior officers) for military personnel and age (i.e., up to 34, 35 to 54, and 55+ years of age) for civilians. Sampling weights were calculated so that respondents would represent the target population with respect to the original stratification variable (i.e., organization) and post-stratification variables (i.e., component and rank for military personnel and age for civilians). Discrepancies between the population estimates for other key demographics obtained from applying the sampling weights and the true population totals from the sampling frame were examined and found to be very close to the correct population totals (i.e., ≤ 5%), suggesting that the weights also produced reasonably accurate estimates along other demographics.

Respondent Characteristics. A total of 1,855 Regular Force and 624 Primary Reserve members of the Canadian Army and 4,706 civilian personnel employed within the Canadian Armed Forces and the Department of National Defence completed the DWWS. The final sample thus included 7,185 respondents occupying a wide range of occupations and nested within 60 organizations (including 11 to 442 employees, M = 119.80; SD = 102.30) for a response rate of 29.69%. The population characteristics are described with weighted percentages. Thirty-eight percent were younger than 35 years of age, 45% were between 35 and 54 years of age, and 17% were older than 54 years of age. Seventy-two percent were male. Forty-two percent had been with the organization for less than 11 years, 30% between 11 and 20 years, and 28% for 20 years or more. Sixty-seven percent were junior NCMs, 20% were senior NCMs, 9% were junior officers, and 4% were senior officers. Twenty-six percent of the civilian employees occupied a managerial or supervisory position. Seventy-two percent indicated their first language as English, and 79% completed the survey in English. The remaining 21% completed the survey in French.

Measures

Job Engagement. Participant's levels of job engagement were assessed using the JES (Rich et al., 2010; French version by Gillet et al., 2020), which incorporates three 6-item subscales measuring physical (α = .92; e.g., *I exert my full effort to my job*), emotional (α = .94; e.g., *I am excited about my job*), and cognitive (α = .93; e.g., *at work, I concentrate on my job*) engagement. All 18 items were rated using a response scale with a range of 1 (strongly disagree) to 5 (strongly agree). The French and English versions of the items are provided in Appendix A.

Psychological Need Satisfaction. The satisfaction of participant's need for relatedness (6 items; α = .87; e.g., *at work, I feel part of a group*), autonomy (6 items; α = .80; e.g., *I feel free to do my job the way I think it could best be done*) and competence (4 items; α = .89; e.g., *I am good at the things I do in my job*) were assessed with the relevant subscales from the Work-related Basic Need Satisfaction Scale (WRBNS; Van den Broeck et al., 2010; French version by Gillet et al., 2019b). All items were rated using a response scale ranging from 1 (totally disagree) to 5 (totally agree).

Burnout. Burnout was measured with a short form (8 items; α = .89; *After my work, I usually feel worn out and weary.*) of the Oldenburg's Burnout Inventory (Demerouti et al., 2003; French version by Chevrier (2009). Participants reported burnout levels on a response scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Turnover Intentions. Turnover intentions (α = .86; e.g., *I frequently think of quitting my job*) were assessed using a 4-item measure (Colarelli, 1984). Each item was rated on a response scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Analyses

Measurement Model Estimation and Selection

All analyses were conducted in *Mplus* 8.4 (Muthén & Muthén, 2019) using the robust maximum likelihood estimator (MLR) and incorporating stratified sampling weights to account for participants nesting into work units, using Mplus complex survey design functionalities (Asparouhov, 2005). Missing data at the item level was low, ranging from .0003 to .0035 for all scales used in this study, and handled using Full Information Maximum Likelihood (FIML). For all models, we report multiple statistical indices, including the chi-square test of exact fit (χ^2), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA) and its confidence intervals (Hu & Bentler, 1999; Marsh et al., 2005b) to assess their fit to the data. However, due to the well-documented sample size dependency and oversensitivity to minor misspecifications of the chi-square test of exact fit, we relied on the sample-size independent goodness-of-fit indices (CFI, TLI, RMSEA) to assess model fit (Hu & Bentler, 1999; Marsh et al., 2005b). We follow typical interpretational guidelines (Hu & Bentler, 1999; Marsh et al., 2005b) whereby CFI and TLI values greater than .90 and .95 support adequate and excellent model fit, respectively. For RMSEA, we rely on values smaller than .08 to indicate adequate and .06 to indicate excellent model fit. In addition to these statistical fit indices, we investigate the size of factor correlations (CFA and ESEM models), G-factor and S-factor loadings (bifactor-CFA and bifactor-ESEM), and cross-loadings (ESEM and bifactor-ESEM) to determine the model with the best fit to both data and theory. For each solution, we also report model-based coefficients of composite reliability (ω; McDonald, 1970) as recommended by Morin et al. (2020).

Following recommendations for a sequential analytical strategy to evaluate the relevant sources of psychometric multidimensionality (Morin et al., 2020), we first specified four models (CFA, ESEM, bifactor-CFA, bifactor -ESEM) for both the JES^{18} and the JES^{9}. For the CFA solutions, three correlated engagement factors (i.e., physical, emotional, cognitive) were specified with six items loading solely on their target factor for the JES^{18} and three items for the JES^{9}. For the ESEM solutions, an oblique target rotation was used, allowing the three engagement factors to be correlated, with all items allowed to load on all factors (i.e., 18 items for JES^{18} and 9 items for JES^{9}), but cross-loadings loadings were "targeted" to approach zero via the rotational procedure, thus providing a confirmatory approach to ESEM specifications (Morin et al., 2016). For the bifactor-CFA, all items were allowed to load on a global engagement factor (G-factor), and additional shared variance between items from the same engagement dimensions (i.e., physical, emotional, and cognitive) was explained through three specific factors (S-factors) defined as in the CFA solution. In line with bifactor assumptions (Morin et al., 2016), all factors were specified as orthogonal (i.e., correlations were fixed to be 0). For the bifactor-ESEM, an orthogonal target rotation was specified, with all items allowed to load on a global engagement factor (G-factor) and the specific factors defined as in the ESEM solution. For comparison purposes, a one-factor solution was also assessed.

Measurement Invariance

Tests of measurement invariance (Millsap, 2011) were conducted to ascertain the generalizability of the psychometric properties of the measurement model previously retained for JES[18] and the JES[9] across sex (males *N*= 4426; females *N*= 2660), language (English *N*= 5686; French *N*= 1499), employment type (civilian *N*= 4706; regular force *N*= 1855; primary reserve *N*= 624), and employment role among civilians (managers *N*= 1251; employees *N*= 3437). Tests were conducted in sequence: (i) configural invariance (same model, including the same number of factors and no additional constraint), (ii) weak invariance (same factor loadings), (iii) strong invariance (same factor loadings and items intercepts), (iv) strict invariance (same factor loadings, items intercepts, and items uniquenesses), (v) invariance of the latent variances and covariances; (vi) latent mean invariance. We rely on Chen's (2007, also see Cheung & Rensvold, 2002) guidelines indicating that invariance is supported when a model does not result in a decrease in CFI and TLI greater than .01, and in an increase in RMSEA greater than .015 when compared to the previous model.

Criterion-Related Validity

We first saved the factor scores representing each engagement dimensions from the final model retained for the JES[9] and JES[18] to obtain the correlations between each dimension across the two versions of scale. To test for the criterion-related validity of the JES[9] and JES[18], two fully latent models were estimated using the final measurement model retained for the JES[9] and JES[18] as the starting point, and to which additional latent factors (defined using CFA) were added to reflect the covariates (i.e., relatedness, autonomy, and competence, burnout, and turnover intentions). An orthogonal method factor was incorporated to account for the methodological artifact created by the negative wording of items 2, 3, and 6 of the autonomy scale, and items 1, 3, and 5 of the relatedness scale (Zhang et al., 2016). This approach made it possible to estimate latent correlations (i.e., corrected for measurement errors) between the job engagement factors and the covariates.

Results

Measurement models: JES[18]

Model fit indices for the JES[18] measurement models are reported in the top section of Table 1. Parameter estimates from the CFA, bifactor-CFA, and ESEM solutions are reported in Tables S1 (factor loadings and uniquenesses) and S2 (factor correlations) of the online supplements, while parameter estimates from the bifactor-ESEM solution are reported in Table 2. Succinctly, neither the one-factor model, nor the three-factor CFA solutions were able to achieve a satisfactory level of fit to the data. In contrast, both the bifactor-CFA, ESEM, and bifactor-ESEM solutions appeared to fit the data well, although the fit of the bifactor-ESEM solution was substantially higher than that of the other two solutions (ΔCFI/TLI > .01). Following Morin et al. (2016, 2020) recommendations, we first compare the CFA and ESEM solutions to assess the need to incorporate cross-loadings to the solution. Both solutions resulted in generally well-defined factors by their main factor loadings, although these main loadings were slightly stronger in the ESEM (λ = .525 to 981; M_λ = .811) relative to CFA (λ = .495 to .919; M_λ = .789), solution. Although factor correlations were generally similar across solutions, albeit slightly smaller in the ESEM (*r* = .585 to .749) relative to CFA (*r* = .589 to .765) solution, the ESEM solution also resulted in the estimation of 21 (out of 36) statistically significant cross-loadings, seven of which were higher than .100 and one of which was higher than .200. These considerations, coupled with the fact that the free estimation of cross-loadings provides valuable information to guide the development of the JES[9] (Morin & Maïano, 2011), led us to retain the ESEM solution, which was contrasted with its bifactor counterpart.

This bifactor-ESEM solution resulted in acceptable factor loadings and composite reliability for all factors, although the physical engagement S-factor was more weakly defined than the cognitive and emotional engagement S-factors. More precisely: (a) global engagement (λ =.563 to .814; M_λ = .657; ω = .970); (b) physical engagement (λ =.203 to .548; M_λ = .346; ω = .707); (c) emotional engagement (λ =.486 to .708; M_λ = .600; ω = .897); and (d) cognitive engagement (λ =.261 to .563; M_λ = .427; ω = .811). As noted by Morin et al. (2020), observing more weakly defined S-factors is common in bifactor modeling and mainly suggests that the items (or most items) associated with these S-factors mainly serve to define the G-factor and retain little specificity once the variance explained by the G-factor is accounted for. Likewise, it is frequent to observe items that contribute more to the definition of the G-factor than of their S-factors (e.g., items 1, 3, 5, 13, 16), or to the definition of their S-factors than of the G-factor (e.g., items 10, 11), which is not problematic as long as these items are found to contribute clearly to the definition of at least one factor (Morin et al., 2020). Finally, in this bifactor-ESEM solution, 22 out of the 36 cross-loadings were statistically significant, and nine were higher than .100, further supporting the need to incorporate an ESEM component to the bifactor measurement structure of the JES[18]. These results thus support Hypothesis 1 in relation to the JES[18].

Interestingly, the bifactor-CFA also resulted in well-defined factors comparable to their bifactor-ESEM counterparts, with the exception of the physical engagement S-factor which was weaker than in B-ESEM: (a) global engagement (λ =.484 to .852; M_{λ} = .677; ω = .968); (b) physical engagement (λ = -.327 to .191; $M_{|\lambda|}$ = .196; ω = .447); (c) emotional engagement (λ =.563 to 770; M_{λ} = .661; ω = .911); and (d) cognitive engagement (λ =.389 to .608; M_{λ} = .519; ω = .853). Given that the ESEM and bifactor-ESEM solution resulted in generally small cross-loading (i.e., only one of them was higher than .200 and only in the ESEM solution), one could argue that the bifactor-CFA solutions might be more suitable from a parsimony perspective. However, given our objective to use this solution to guide the development of a short form, it was important to retain a solution including cross-loadings, as these can be used to inform item selection (particularly when multiple-group solutions are considered; Morin & Maïano, 2011). For this reason, and in accordance with the higher level of fit of this solution, we retained the bifactor-ESEM solution for further analyses.

Measurement invariance: JES[18]

Model fit indices associated with the tests of measurement invariance conducted on the bifactor-ESEM solution of the JES[18] are reported in the middle and bottom sections Table 1. Across all of these tests, no drop in CFI and TLI exceeded .01, and no increase in RMSEA exceeded .015. These results thus supported the complete measurement invariance of the JES[18] across (i) language (English/French); (ii) sex (males/females); and (iii) employee type (civilian/regular force/primary reserve). Further tests on the civilian sample also supported the full invariance of the JES[18] as a function of work roles (managers/employees). These results indicate that the psychometric properties of the JES[18] are fully generalizable to these subpopulations of employees and across linguistic versions. These results support Hypothesis 3 in relation to the JES[18].

Measurement models: JES[9]

The complete procedure used to select the optimal set of nine items to be included in the JES[9] (see the items in bold in Appendix A) is reported in the first section of the online supplements. Model fit indices for the JES[9] measurement models are reported in the top section of Table 3. Parameter estimates from the CFA, ESEM, and bifactor-ESEM solutions are reported in Tables S3 (factor loadings and uniquenesses) and S4 (factor correlations) of the online supplements, while parameter estimates from the bifactor-CFA solution are reported in Table 4. As for the JES[18], the one-factor model failed to achieve a satisfactory level of fit to the data. In contrast, all of the alternative solutions were able to achieve an excellent level of fit to the data, although the TLI (but not the other indicators) suggested that the fit of the ESEM and bifactor-ESEM solutions might be slightly better than that of their CFA counterparts. When we first consider the CFA and ESEM solutions, the results reveal that both solutions result in well-defined factors, although these main loadings were slightly stronger in the CFA (λ = .752 to 893; M_{λ} = .852), relative to ESEM (λ = .623 to .971; M_{λ} = .837), solution. As for the JES[18], factor correlations were very similar in the CFA (r = .614 to .752) and ESEM (r = .599 to .733) solutions. Finally, in the ESEM solution, 11 (out of 18) cross loadings proved to be statistically significant, but only three of those were higher than .100. These considerations, coupled with the benefits of retaining a more parsimonious solution (especially given that both solutions resulted in almost identical parameter estimates), led us to keep the CFA solution, which was then retained with its bifactor counterpart.

This bifactor-CFA solution resulted in acceptable factor loadings and composite reliability for all factors, although the physical engagement S-factor appeared to be more weakly defined than the cognitive and emotional engagement S-factors, thus matching the results obtained with the JES[18]. More precisely: The bifactor-CFA displayed acceptable factor loadings and strong composite reliability coefficients for: (a) global engagement (λ =.602 to .776; $M_{|\lambda|}$ = .699; ω = .943); (b) physical engagement

(λ =.242 to .500; $M_{|\lambda|}$ = .397; ω = .624); (c) emotional engagement (λ =.546 to .691; $M_{|\lambda|}$ = .604; ω = .824) and; (d) cognitive engagement (λ =.362 to .538; $M_{|\lambda|}$ = .436; ω = .675). This model was retained for further analyses. These results thus support Hypothesis 2 in relation to the JES[9].

Measurement invariance: JES[9]

Model fit indices associated with the tests of measurement invariance conducted on the bifactor-CFA solution of the JES[9] are reported in the middle and bottom sections of Table 3. Matching the results obtained for the JES[18], these results supported the full invariance of the JES[9] measurement model across: (i) language (English/French); (ii) sex (males/females); (iii) employee type (civilian/regular force/primary reserve); and (iv) civilian work roles (managers/employees). These results indicate that the psychometric properties of the JES[9] generalize to these sub-populations of employees and across linguistic versions, thus supporting Hypothesis 3 in relation to the JES[9].

Criterion-Related Validity

The correlations between factor scores reflecting the same dimensions taken from the bifactor-ESEM solution of the JES[18] and the bifactor-CFA solution of the JES[9], were all statistically significant ($\leq$ .01), high, and positive (global: r = .934; physical: r = .915; emotional: r = .889; and cognitive: r = .805), supporting the comparability of results across the two versions of the scales.

The latent correlations obtained from the models in which latent factors representing scores on the covariates and scores on the job engagement factors (corresponding to the retained bifactor-ESEM solution for the JES[18] and bifactor-CFA solution for the JES[9] are reported in Table 5)[3]. The results suggest that, across versions of the JES, global levels of job engagement as well as specific levels of emotional engagement share positive and moderate associations with the satisfaction of all three basic psychological needs (with the sole exception of the need for competence for the JES[9]), and moderate negative associations with burnout and turnover intentions. The physical engagement S-factor, which was also the more weakly defined (consistent with the idea that physical engagement items mainly serve to define the G-factor), did not share any significant association with the covariates (with the sole exception of the weak positive correlation with the satisfaction of the need for competence found for the JES[18]). Finally, specific levels of cognitive engagement shared weak positive associations with the satisfaction of the need for autonomy and weak negative associations with turnover intentions and burnout across versions of the JES, as well as a weak positive association with competence need satisfaction limited to the JES[18].

Out of 20 latent correlations, 17 were similar in magnitude and statistical significance for the JES[9] and JES[18], thus demonstrating consistency between the two scales. The observed discrepancies were related to the statistical significance, but not to the magnitude (very small, corresponding to less than 2% of shared variance), of the correlations involving the three job engagement S-factors and the satisfaction of the need for competence measure. These correlations were weak and statistically significant when using the JES[18] and similarly weak but not statistically significant when using the JES[9]. However, the correlation between the job engagement G-factor and the satisfaction of the need for competence measure was also slightly stronger for the JES[9] than for the JES[18], suggesting that associations between satisfaction of the need for competence and job engagement seems to be more clearly connected with the job engagement G-factor in the short version than in the long version. These results thus confirm the criterion-related validity, and equivalence, of the JES[9] and JES[18], in addition to supporting Hypotheses 4, 5, and 6 for both measures.

Discussion

In addition to providing incremental evidence supporting the psychometric properties of the original English version of the JES[18] (Rich et al., 2010) and of a newly proposed French version of this instrument (Gillet et al., 2020), the present study was more specifically designed to develop (in

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[3] Both solutions resulted in an acceptable level of model fit: JES[18] (χ^2= 5571.477; df = 903; CFI = .940; TLI = .932; RMSEA = .027); JES[9] (χ^2= 3715.264; df = 582; CFI = .942; TLI = .934; RMSEA = .027). In these solutions, the factors representing the covariates were all defined by strong loadings and satisfactory estimates of composite reliability: (a) relatedness need satisfaction (JES[18 & 9]: solutions: M_λ = .732; ω = .879), (b) autonomy need satisfaction (JES[18] M_λ = .594; ω = .797; JES[9] M_λ = .593; ω = .796), (c) competence need satisfaction (JES[18 & 9] M_λ = .826; ω = .897), (d) burnout (JES[18] M_λ = .728; ω = .901; JES[9] M_λ = .728; ω = .902), and (e) turnover intentions (JES[18] M_λ = .779; ω = .862; JES[9] M_λ = .780; ω = .862).

consultation with a panel of engagement experts) and validate a short version of this instrument (JES[9]) in both languages. To achieve this objective, the present study first addressed the question of how to best model the psychometric multidimensionality present in job engagement ratings via a comparison of CFA, ESEM, bifactor-CFA, and bifactor-ESEM representation of participants' responses to the JES[18] and JES[9] (Morin et al., 2016, 2020). Supporting our first hypothesis and Gillet et al.'s (2020) results, the JES[18] was found to be best represented using a bifactor-ESEM solution, although it must be reinforced that the bifactor-CFA solution also seemed to provide a viable alternative and might have been retained had our objective not been to use this solution to guide the development of a shorter version form. Either of those solutions provide a way to capture the theoretical hierarchical nature of the job engagement construct (Rich et al., 2010) via the estimation of a G-factor reflecting participants global levels of job engagement, together with non-redundant S-factors reflecting the unique quality associated with the physical, emotional, and cognitive components of job engagement expressed as deviations from participants global levels of job engagements across components.

The shorter JES[9], created while following best practice recommendations for the development of short forms (e.g., Maïano et al., 2008; Marsh et al., 2005a; Myers et al., 2003; Smith et al. 2000), was developed in collaboration with a panel of experts to ensure adequate content coverage, while seeking to limit cross-loadings to achieve a more parsimonious solution. As a result, the JES[9] was best represented via a bifactor-CFA solution. This more parsimonious solution resulted in factors defined as in the JES[18] bifactor-ESEM solution and showing strong correlations across versions, but without requiring the estimation of cross-loadings, thus supporting our second hypothesis.

Beyond this demonstration that the factor structure of the JES[18] was replicated in the JES[9], albeit more parsimoniously, tests of measurement invariance conducted on both versions supported the generalizability of this factor structure across samples of men and women, civilian employees versus military personnel, and civilian employees versus civilian managers/supervisors. Our results also provided evidence for the complete measurement invariance of both instruments across the English and French versions, thus supporting their linguistic equivalence. In addition to supporting our third hypothesis, these results indicate that researchers interested in measuring or investigating job engagement should have growing confidence that both the JES[18] and JES[9] can equivalently be used to achieve these goals across different types of employees, as well as in the context of cross-cultural, or cross-linguistic, studies involving English- and French-speaking participants.

Our final objective was to assess the criterion-related validity of the JES[18] and JES[9] in relation to measures of psychological need satisfaction, burnout, and turnover intentions. These results generally supported Hypotheses 4 to 6 in relation to most JES factors from both versions. In fact, most correlations were found to be statistically significant and in the expected direction, with three types of exceptions. First, the physical engagement S-factor did not share any statistically significant relation with any of the covariates when using the JES[9], and only one statistically significant relation with the need for competence when using the JES[18]. It should be noted that the results are based on a bifactor modeling framework. As such, one must always interpret the relations between S-factors and correlates as occurring above and beyond the variance already explained by the G-factor. In the current study, this means that specific deviations in participants' levels of physical engagement beyond their global levels of job engagement did not share any meaningful additional associations with the covariates. This result is not surprising as this S-factor was also found to be the most weakly defined in the bifactor-ESEM and bifactor-CFA solutions, suggesting that, at least in this study, physical engagement items mainly served to define the global job engagement factor and retained only a limited amount of specificity. In other words, this means that participants' levels of physical engagement were generally aligned with their global levels of job engagement. The second exception was related to the lack of correlations between the specific engagement dimensions of the JES[9] and the need for competence. Indeed, although these relations were present in the JES[18], in the JES[9] they rather seemed to be occurring more strongly at the level of the global job engagement factor. The third exception was related to the cognitive engagement dimension. Although this facet of job engagement shared many of the expected relations with the covariates, these relations were generally weaker than those involving global or emotional engagement.

Once again, these results can generally be understood by the bifactor nature of these specific factors and can be interpreted as the statistical manifestation of the empirically distinct but related subdimensions of a latent construct once their common core (i.e., the global factor) is taken into account.

Furthermore, these results can also be theoretically explained by Kahn's (1990) conceptualization of engagement according to which "people can use varying degrees of their selves, physically, cognitively, and emotionally, in the roles they perform, even as they maintain the integrity of the boundaries between who they are and the roles they occupy" (Kahn, 1990, p. 692). This approach is also connected to Kelman's (1958) work, which posited three levels of investment of personal energies into role performance: physical, cognitive, and emotional. Kelman suggested that the lowest investment of personal energies into role performance was solely physical, automatic, or robotic and devoid of cognitive or emotional involvement. The next level of personal investment for Kelman was that which included cognitive energies. Kelman's highest level of personal investment involved physical and cognitive investment of resources and an investment of emotions. At this level, individuals are engaged in their work role through an emotional connection between themselves and their role. At this level, individuals are "fully present" in their task through an emotional connection between themselves and their work. This view is consistent with Kahn's (1990) who noted that role engagement was the highest when people were emotionally connected to their work activity. As such, these theoretical perspectives are well-aligned with the strongest covariate associations that we observed in relation to employees' global and emotional levels of job engagement, followed by their cognitive levels of job engagement, and finally by their physical levels of job engagement.

Practical Implications and Recommendations

The recognition of engagement as a psychological construct with meaningful implications is growing among researchers and practitioners alike. Perhaps the most significant contribution of this study is the validation of a short measure designed to capture Kahn’s (1990) original conceptualization of engagement in a way that preserves the theoretical global and specific (i.e., a bifactor) representation of this construct. When inconsistencies arise across studies relying on different types of measurement structure, it becomes particularly difficult to clearly determine whether the source of these differences is theoretically or practically relevant, or whether it simply reflects differences in measurement. Thus, whereas research on engagement has alternatively relied on global scores, or on subscale-specific scores, the current bifactor approaches makes it possible to achieve both: Considering the role played by the global construct, together with the unique role played by the specific nature of each engagement dimension. In this sense, we hope that engagement researchers, especially those interested in relying on the JES^{18} or JES^{9}, will follow our suggestion to adopt a bifactor representation of the job engagement construct.

Beyond showcasing the value of this bifactor representation of the job engagement construct, the validation of a short version of the JES in English and of a short and long version of the JES in French represent another key contribution of this study. More precisely, the reduced length of the JES^{9} will make it possible to incorporate a measure of job engagement into many academic and practitioner-based data collection procedures in which job engagement might not be a focal construct and within which the integration of the JES^{18} might have met some resistance. Likewise, the availability of a validated French version of the JES^{18} and JES^{9}, with demonstrated equivalence to the English version of these instruments, will also make it possible to incorporate measures of job engagement into studies conducted among French-speaking populations and, perhaps even more importantly, to large scale cross-cultural studies. The fact that the psychometric properties of our measurement models were also demonstrated to be invariant across military personnel and civilians, across civilian managers and subordinates, and across male and female employees also increases confidence that the JES^{18} and JES^{9}, and its underlying measurement structure, can adequately capture the different facets of engagement for a broad range of individuals.

Having demonstrated the equivalence of the JES^{9} to the JES^{18}, how should researchers and practitioners choose between the two scales? Because of its length, the JES^{18} is likely to provide a broader construct coverage of all facets of job engagement. For this reason, we recommend that researchers interested in assessing narrow distinctions among the role played by each specific facet of job engagement, and for whom job engagement represent a key focal construct, should adopt the JES^{18}. However, for researchers or practitioners interested in obtaining a global measure of job engagement or seeking to add job engagement as a secondary construct to their data collection, then the JES^{9} would be a more practical alternative than the JES^{18}. Beyond these generic recommendations, however, we reinforce that based solely on our results both versions seem able to achieve an identical representation of the globality and specificity of the job engagement construct. Pending the replication of our findings and their extensions to a broader range of criterion variables, the JES[9] could eventually come to represent a viable alternative to the JES[18] across most situations.

Another key consideration for engagement researchers relates to the decision to rely on the JES (Rich et al. 2010) or on the UWES (Schaufeli et al. 2002). Although both engagement measures share similar conceptual structures and seem to match a similar bifactor representation (e.g., Gillet et al., 2019a, 2020; Salamon et al., 2021), both instruments were developed from different theoretical foundations and have different emphases and focus. The JES (Rich et al. 2010) was created to reflect Kahn's (1990) conceptualization of engagement as the "harnessing of the organizational members' selves in their work roles" (p. 694) and to emphasize the investment of their physical, cognitive and emotional resources into their role performance. In contrast, the UWES (Schaufeli et al. 2002) was developed from a conceptualization of work engagement as the opposite of burnout, as a "persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual, or behavior" (p. 74), and to measure "a general, positive, job attitude [that] leads individuals to contribute rather than withhold desirable inputs from their work" (Harrison et al., 2006, p. 320, brackets added for clarity). Thus, while the JES focuses on the physical, cognitive, and emotional investment of one's resources into the performance of their work role seen as a part of their identity, the UWES focuses on a more generic attitude towards work. In this regard, Byrne et al. (2016) concluded that the UWES and JES were not interchangeable, but rather focused on different aspects of the engagement construct. On the one hand, Byrne et al. (2016) demonstrated that the UWES was able to assess a broader portion of the nomological network of the engagement construct (i.e., the UWES demonstrated significantly higher correlations and overlap with peripheral attitudes related to engagement, such as stress, performance, strain, commitment, psychological availability, and burnout). On the other hand, they also concluded that the JES had less conceptual overlap with these other attitudes, making it a potentially more useful instrument for identifying the edges of the nomological network of the engagement construct (Klein et al., 2014).

Based on these considerations, we recommend using the JES[9] or JES[18] when the focus is placed on employees' personal engagement in their work role as a core component of their identity and as a core driver of performance or seeking to better differentiate the role played by engagement relative to that of other attitudinal constructs. In contrast, we recommend using the UWES when the focus is placed on engagement as a broader attitudinal construct intimately related to employees' well-being at work. These recommendations are in line with those from Byrne et al. (2016).

Limitations

Despite its strengths (i.e., rigorous analytic approach, large representative sample, etc.), the current study is not without limitations. For one, the criterion-related validity of the JES[18] and JES[9] was only assessed in relation to a small subset of variables that are part of the job engagement nomological network. Likewise, all variables were assessed using self-reports, which are subject to a variety of biases (e.g., social desirability, self-consistency, etc.). Fortunately, statistical research has shown that multivariate analyses, such as those reported in the present study, are unlikely to result in inflated estimates of relations as these analyses are naturally controlled for shared method variance. Yet, it would be highly interesting for future studies to consider a broader range of covariates (e.g., work motivation, job performance, psychological health and well-being, medical leaves, absenteeism) obtained via a variety of sources (e.g., self-reports, informant reports, company records, etc.). In addition, all measures were taken at a single point in time, which precludes the verification of the directionality of the associations between the job engagement factors and the covariates. Longitudinal data would have made it possible to consider whether covariates are predictors or outcomes of the job engagement factors, and to verify this directionality assumption empirically. It would also have made it possible to consider stability and change occurring over time in job engagement components, as well to obtain estimates of test-retest reliability, which should be investigated in future studies. Likewise, longitudinal studies would also make it possible to more clearly assess the psychological mechanisms underlying the emergence and evolution of job engagement, as well as its repercussions for employees and organizations. Finally, despite evidence that our results were fully replicated across linguistic versions (French vs. English), sex (male vs. females), employment type (military vs. civilians), and employment role among civilians (supervisor vs. employee), and JES version (JES[18] vs. JES[9]), and despite having no reason to assume that job engagement would be expressed or would differentially relate to covariates among other samples of employees, the fact that this study was conducted within a

Canadian military organization still limits the generalizability of our findings. As a result, it would be important for future research to more systematically verify the replicability of our results among more diversified samples of workers from different types of organizations and cultures.

Future Directions

The current study offers organizational researchers and practitioners, reliable, valid, and equivalent long (JES^{18}) and short (JES^{9}), English and French, measures of job engagement aligned with Kahn's (1990) conceptualization of physical, emotional, and cognitive engagement. Based on a holistic view of the current study's results, it is safe to say that researchers and practitioners interested in using the JES^{9} in a broader multivariate context should feel confident in its psychometric properties. The current results add to recent evidence (Gillet et al., 2020) supporting the value of a bifactor operationalization of the job engagement construct. From a research perspective, this suggests that researchers interested in the job engagement construct should also consider adopting a similar representation of job engagement. Although it is true that relying on a bifactor-ESEM representation of job engagement can substantially add to the analytic complexity of a study, and generally benefits from larger samples (Morin et al., 2013), the current results also showed that a simpler bifactor-CFA approach works well with both versions of the JES, and is even the method of choice for the JES^{9}. However, by supporting a bifactor representation of job engagement, our results also suggest that research relying on non-latent methodologies (i.e., based on the manual calculation of scale score on the job engagement component) may no longer be appropriate for job engagement measures. Indeed, manual scoring procedures are unable to replicate a bifactor structure and would thus result in inflated estimates of correlations among job engagement components (and possibly multicollinearity) due to the presence of the unmodeled G-factor. As such, they may result in inaccurate estimates of associations between job engagement components and other constructs. Fortunately, for situations in which the reliance on fully latent models is not possible (due to the overall complexity of the theoretical analytic models), it remains possible to rely on factor scores saved from preliminary bifactor models (Morin et al., 2017). Unfortunately, as noted by Perreira et al. (2018), none of these solutions apply to the scoring of measurement instruments administered by organizations or consultants. So far, bifactor scoring remains possible when using a sample of participants (i.e., *Mplus* can be used to generate scores using the estimates reported here as start values; Perreira et al., 2018). However, individual scoring currently remains impossible pending the development of computerized scoring algorithms similar to those used in many broadband personality or intelligence tests.

Finally, a promising avenue for future research on the multidimensional job engagement construct would be to rely on bifactor measurement as a starting point for the estimation of job engagement profiles (e.g., Gillet et al., 2020). Capturing stable profiles reflecting qualitatively different psychological states reflected by various combinations of global, physical, emotional, and cognitive engagement is indeed likely to provide insightful information on whether and how contextual and psychological factors influence the harnessing of employees' selves within their work role. Moreover, investigating whether engagement profiles differ in their relations with important work outcomes will inextricably lead to more targeted recommendations for interventions aimed at improving job engagement among distinct profiles of employees.

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Table 1

Model Fit Results from the Alternative JES^{18} Measurement Models.

	df	χ^2	CFI	TLI	RMSEA	90% CI	$\Delta\chi^2$	Δdf	ΔCFI	ΔTLI	ΔRMSEA
One-Factor CFA	135	9895.595*	.665	.620	.100	.099;.102					
Three-Factor CFA	132	5426.407*	.818	.789	.075	.073;.076					
Bifactor CFA	117	1734.879*	.944	.927	.044	.042;.046					
ESEM	102	1524.061*	.951	.927	.044	.042;.046					
Bifactor ESEM	87	1069.792*	.966	.941	.040	.038;.042					
Measurement Invariance: Language											
Configural	174	1367.636*	.963	.935	.044	.042;.046					
Weak	230	1534.426*	.960	.946	.040	.038;.042	211.331*	56	-.003	+.011	-.004
Strong	244	1737.963*	.954	.942	.041	.039;.043	236.031*	14	-.006	-.004	+.001
Strict	262	1876.927*	.95	.942	.041	.040;.043	135.056*	18	-.004	.000	.000
Latent variance	272	2102.068*	.943	.936	.043	.042;.045	200.119*	10	-.007	-.006	+.002
Latent means	276	2300.880*	.937	.931	.045	.043;.047	302.278*	4	-.006	-.005	+.002
Measurement Invariance: Sex											
Configural	174	1176.571*	.967	.942	.040	.038;.043					
Weak	230	1221.015*	.967	.957	.035	.033;.037	89.646*	56	.000	+.015	-.005
Strong	244	1255.051*	.967	.958	.034	.032;.036	26.140	14	.000	+.001	-.001
Strict	262	1298.861*	.966	.960	.033	.032;.035	61.259*	18	-.001	+.002	-.001
Latent variance	272	1341.613*	.965	.960	.033	.032;.035	43.931*	10	-.001	.000	.000
Latent means	276	1419.426*	.962	.958	.034	.032;.036	179.990*	4	-.003	-.002	+.001
Measurement Invariance: Army vs. civilian members											
Configural	261	1964.700*	.963	.934	.052	.050;.054					
Weak	373	1877.725*	.967	.959	.041	.039;.043	139.989	112	+.004	+.025	-.011
Strong	401	1970.753*	.966	.961	.040	.039;.042	77.886*	28	-.001	+.002	-.001
Strict	437	2142.327*	.963	.961	.040	.039;.042	173.180*	36	-.003	.000	.000
Latent variance	457	2202.662*	.962	.962	.040	.038;.042	70.899*	20	-.001	+.001	.000
Latent means	465	2345.881*	.959	.959	.041	.039;.043	191.869*	8	-.003	-.003	+.001
Measurement Invariance: Manager vs. Employee											
Configural	174	1368.886*	.964	.936	.054	.051;.057					
Weak	230	1369.645*	.965	.954	.046	.044;.048	90.988*	56	+.001	+.018	-.008
Strong	244	1453.036*	.963	.954	.046	.044;.048	83.375*	14	-.002	.000	.000
Strict	262	1398.067*	.966	.960	.043	.041;.045	18.230	18	+.003	+.006	-.003
Latent variance	272	1382.102*	.966	.962	.042	.040;.044	11.910	10	.000	+.002	-.001
Latent means	276	1413.851*	.966	.962	.042	.040;.044	37.559*	4	.000	.000	.000

Note. * $p \leq .01$; df: Degrees of freedom; χ^2: Chi-square; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square approximation; 90% CI: 90% confidence intervals for the RMSEA; $\Delta\chi^2$: Chi-square difference test; Δ: change in relation to the previous model.

Table 2

Parameter Estimates from the Retained Bifactor-ESEM Solution for the JES[18]

	Global λ (s.e.)	Physical λ (s.e.)	Emotional λ (s.e.)	Cognitive λ (s.e.)	δ (s.e.)
Item 1	**.774 (.033)****	**.203 (.108)**	-.032 (.021)	-.060 (.019)**	.355 (.018)**
Item 2	**.787 (.035)****	**.308 (.093)****	-.006 (.024)	-.041 (.016)**	.284 (.016)**
Item 3	**.814 (.041)****	**.271 (.122)***	-.105 (.027)**	-.072 (.018)**	.249 (.015)**
Item 4	**.645 (.035)****	**.548 (.023)****	.039 (.026)	.137 (.038)**	.264 (.038)**
Item 5	**.668 (.033)****	**.503 (.023)****	.043 (.024)	.110 (.028)**	.288 (.028)**
Item 6	**.752 (.041)****	**.241 (.123)***	-.142 (.026)**	-.128 (.018)**	.340 (.020)**
Item 7	**.670 (.017)****	.049 (.023)*	**.547 (.022)****	-.025 (.020)	.250 (.013)**
Item 8	**.653 (.021)****	-.013 (.035)	**.486 (.025)****	-.063 (.029)*	.334 (.018)**
Item 9	**.593 (.022)****	.011 (.017)	**.597 (.022)****	.090 (.016)**	.283 (.015)**
Item 10	**.563 (.022)****	.065 (.023)**	**.603 (.021)****	.119 (.016)**	.300 (.015)**
Item 11	**.567 (.027)****	-.054 (.021)**	**.708 (.022)****	.058 (.021)**	.171 (.009)**
Item 12	**.642 (.022)****	-.085 (.016)**	**.658 (.022)****	-.037 (.028)	.147 (.007)**
Item 13	**.684 (.024)****	-.030 (.021)	.187 (.026)**	**.261 (.040)****	.427 (.015)**
Item 14	**.698 (.015)****	.153 (.021)**	.103 (.012)**	**.551 (.020)****	.176 (.020)**
Item 15	**.735 (.019)****	.070 (.012)**	.036 (.014)**	**.563 (.021)****	.137 (.012)**
Item 16	**.704 (.030)****	-.070 (.022)**	-.048 (.036)	**.269 (.060)****	.424 (.020)**
Item 17	**.762 (.040)****	-.052 (.030)	-.020 (.041)	**.461 (.061)****	.203 (.016)**
Item 18	**.794 (.034)****	-.040 (.021)	-.012 (.036)	**.455 (.056)****	.160 (.012)**

Note. ** $p \leq .01$; * $p \leq .05$; s.e.: Standard error; λ: Factor loading; δ: Item uniqueness; Target loadings are in bold.

Table 3
Model Fit Results from the Alternative JES[9] Measurement Models.

	df	χ^2	CFI	TLI	RMSEA	90% CI	$\Delta\chi^2$	Δdf	ΔCFI	ΔTLI	ΔRMSEA
One-Factor CFA	27	3354.439*	.701	.602	.131	.127;.135					
Three-Factor CFA	24	237.163*	.981	.971	.035	.031;.039					
Bifactor CFA	18	107.848*	.992	.984	.026	.022;.031					
ESEM	12	35.712*	.998	.994	.017	.010;.023					
Bifactor ESEM	6	25.150*	.998	.990	.021	.013;.030					
Measurement Invariance: Language											
Configural	36	132.388*	.992	.984	.027	.022;.032					
Weak	50	186.873*	.989	.984	.028	.023;.032	54.168*	14	-.003	.000	+.001
Strong	55	283.205*	.981	.976	.034	.030;.038	113.272*	5	-.008	-.008	+.006
Strict	63	314.904*	.979	.977	.033	.030;.037	35.946*	8	-.002	+.001	-.001
Latent variance	67	327.780*	.979	.977	.033	.029;.037	15.692*	4	.000	.000	.000
Latent means	71	429.056*	.971	.970	.037	.034;.041	296.214*	4	-.008	-.007	+.004
Measurement Invariance: Sex											
Configural	36	114.626*	.993	.986	.025	.020;.030					
Weak	50	140.716*	.992	.988	.023	.018;.027	28.031	14	-.001	+.002	-.002
Strong	55	146.291*	.992	.989	.022	.017;.026	3.686	5	.000	+.001	-.001
Strict	64	170.514*	.990	.989	.022	.018;.026	24.118*	8	-.002	.000	.000
Latent variance	68	198.583*	.988	.987	.023	.020;.027	24.398*	4	-.002	-.002	+.001
Latent means	72	259.071*	.983	.983	.027	.024;.031	83.971*	4	-.005	-.004	+.004
Measurement Invariance: Army vs. civilian members											
Configural	54	176.633*	.993	.985	.031	.026;.036					
Weak	82	213.268*	.992	.990	.026	.022;.030	44.874	28	-.001	+.005	-.005
Strong	92	276.545*	.989	.987	.029	.025;.033	76.592*	10	-.003	-.003	+.003
Strict	110	342.097*	.986	.987	.030	.026;.033	62.052*	18	-.003	.000	+.001
Latent variance	118	396.738*	.984	.985	.031	.028;.035	47.671*	8	-.002	-.002	+.001
Latent means	126	475.721*	.979	.982	.034	.031;.037	89.640*	8	-.005	-.003	+.003
Measurement Invariance: Manager vs. Employee											
Configural	36	119.814*	.993	.985	.032	.025;.038					
Weak	50	146.344*	.992	.988	.029	.023;.034	28.163	14	-.001	+.003	-.003
Strong	55	168.260*	.990	.987	.030	.025;.035	25.063*	5	-.002	-.001	+.001
Strict	64	165.211*	.991	.990	.026	.021;.031	8.501	8	+.001	+.003	-.004
Latent variance	68	170.132*	.991	.991	.025	.021;.030	6.446	4	.000	+.001	-.001
Latent means	72	196.472*	.989	.989	.027	.023;.032	33.842*	4	-.002	-.002	+.002

Note. * $p \leq .01$; df: Degrees of freedom; χ^2: Chi-square; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square approximation; 90% CI: 90% confidence intervals for the RMSEA; $\Delta\chi^2$: Chi-square difference test; Δ: change in relation to the previous model.

Table 4

Parameter Estimates from the Retained Bifactor-CFA Solution for the JES[9]

	Global λ (s.e.)	Physical λ (s.e.)	Emotional λ (s.e.)	Cognitive λ (s.e.)	δ (s.e.)
Item 2	.761 (.017)**	.242 (.033)**			.362 (.018)**
Item 4	.721 (.019)**	.500 (.049)**			.231 (.040)**
Item 6	.735 (.019)**	.448 (.044)**			.259 (.027)**
Item 7	.670 (.016)**		.546 (.021)**		.253 (.015)**
Item 9	.619 (.019)**		.574 (.021)**		.288 (.018)**
Item 12	.602 (.017)**		.691 (.018)**		.161 (.016)**
Item 15	.776 (.016)**			.407 (.028)**	.232 (.014)**
Item 16	.656 (.018)**			.362 (.027)**	.439 (.018)**
Item 17	.747 (.018)**			.538 (.029)**	.153 (.020)**

Note. ** p ≤ .01; * p ≤ .05; s.e.: Standard error; λ: Factor loading; δ: Item uniqueness.

Table 5

Latent Correlations (with Standard Errors in Parenthesis) Between Job Engagement and the Covariates

	Global engagement		Physical engagement		Emotional engagement		Cognitive engagement	
Predictors	Long	Short	Long	Short	Long	Short	Long	Short
Relatedness	.351 (.024)**	.337 (.040)**	-.038 (.028)	-.025 (.061)	.371 (.026)**	.373 (.043)**	.003 (.026)	-.004 (.057)
Autonomy	.441 (.033)**	.405 (.033)**	-.067 (.039)	.032 (.044)	.655 (.025)**	.667 (.031)**	.073 (.026)**	.111 (.048)*
Competence	.378 (.022)**	.453 (.038)**	.131 (.033)**	-.005 (.063)	.135 (.024)**	.043 (.039)	.085 (.027)**	-.045 (.060)
Outcomes								
Burnout	-.360 (.033)**	-.321 (.042)**	.074 (.046)	-.044 (.058)	-.627 (.023)**	-.640 (.039)**	-.098 (.025)**	-.134 (.068)*
Turnover intentions	-.380 (.028)**	-.319 (.037)**	.050 (.033)	-.087 (.050)	-.552 (.022)**	-.604 (.034)**	-.062 (.026)*	-.129 (.056)*

Note. ** p ≤ .01; * p ≤ .05.

Appendix A

Items from the JES[18] and JES[9]

	English	French
	Following are a number of statements regarding how you invest your energies at work. Read each statement carefully. Then, indicate your level of agreement with each statement.	*Voici un certain nombre de déclarations concernant la façon dont vous investissez vos énergies au travail. Lisez attentivement chaque déclaration. Ensuite, veuillez indiquer dans quelle mesure vous êtes d'accord ou en désaccord avec celles-ci.*
1	*Strongly Disagree*	*Fortement en désaccord*
2	*Disagree*	*En désaccord*
3	*Neither Agree nor Disagree*	*Neutre*
4	*Agree*	*En accord*
5	*Strongly Agree*	*Fortement en accord*
Physical Engagement		
Item 1	I work with intensity on my job.	Je mets de l'intensité dans mon travail.
Item 2	**I exert my full effort to my job.**	**Je fais tous les efforts possibles pour mon travail.**
Item 3	I devote a lot of energy to do my job.	Je consacre beaucoup d'énergie à mon travail.
Item 4	**I try my hardest to perform well on my job.**	**Je fais de mon mieux pour avoir un bon rendement dans mon travail.**
Item 5	I strive as hard as I can to complete my job.	Je m'efforce autant que possible d'effectuer mon travail.
Item 6	**I exert a lot of energy on my job.**	**J'applique beaucoup d'énergie à mon travail.**
Emotional Engagement		
Item 7	**I am enthusiastic about my job.**	**Je suis enthousiaste à l'égard de mon travail.**
Item 8	I feel energetic at my job.	Je me sens énergique à mon travail.
Item 9	**I am interested in my job.**	**Je suis intéressé par mon travail.**
Item 10	I am proud of my job.	Je suis fier de mon travail.
Item 11	I feel positive about my job.	Je me sens positif au sujet de mon travail.
Item 12	**I am excited about my job.**	**Je suis motivé par mon travail.**
Cognitive Engagement		
Item 13	At work, my mind is focused on my job.	Au travail, mon esprit est concentré sur mes fonctions.
Item 14	At work, I pay a lot of attention to my job.	Au travail, je porte beaucoup d'attention à mes fonctions.
Item 15	**At work, I focus a great deal of attention on my job.**	**Au travail, je concentre une très grande partie de mon attention à mes fonctions.**
Item 16	**At work, I am absorbed by my job.**	**Au travail, je suis absorbé par mes fonctions.**
Item 17	**At work, I concentrate on my job.**	**Au travail, je me concentre sur mes fonctions.**
Item 18	At work, I devote a lot of attention to my job.	Au travail, je consacre beaucoup d'attention à mes fonctions.

Note. JES[9] items are indicated in bold. The original English items were previously published by Rich et al. (2010, p. 634) and reproduced with permission.

Online Supplements for:

The Job Engagement Scale:

Development and Validation of a Short Form in English and French

Item Selection for the JES[9]

To select the optimal set of nine (or more) items to be included in the JES[9], a panel of five engagement content experts was formed and consulted. These experts were asked to consider Kahn's underlying theory and conceptualization of engagement as the investment of personal energies into one's job (Kahn, 1990), as well as Rich et al. (2010) conceptualization of job engagement which has led to the development of the JES[18]. They were also provided with the following conceptual definition of each dimension of the JES formulated based on work by Kahn (1990) and Rich et al. (2010): (a) Physical engagement as reflecting the investment of effort and energy into the performance of one's job; (b) emotional engagement as reflecting the investment of excitement, interest, and enthusiasm into one's job; (c) cognitive engagement as reflecting the investment of one's cognitive resources through attentiveness, concentration, and absorption during role performance. Considering these elements, the experts were each asked to select three items for each subscale based on their ability to capture the underlying theoretical definition of each engagement dimension and to maintain the content domain of the original 18-item scale (i.e., content validity). We then considered the factor loadings, item uniquenesses, cross-loadings, and correlated uniquenesses (suggested by an examination of the model modification indices) obtained in the various solutions reported by Gillet et al. (2020) or estimated in the present study (in the total sample and as part of the tests of measurement invariance). This empirical information was not used as the primary driver of item selection, but rather to guide the authors in selecting the best performing items among alternative possibilities characterized by similar levels of content validity (based on expert ratings). Final item selection was achieved by a consensus between the members of the expert committee and the authors of the present study, and considered the expert initial ratings, the results, and the following discussions.

Physical Engagement. Based on the aforementioned definition, four items (i.e., 2, 3, 4, and 6) were first identified by the expert panel as best reflecting the core underlying construct of Kahn's (1990) engagement theory while also providing sufficient content coverage of the physical engagement dimension. However, from a theoretical standpoint, item number 3 (*"I devote a lot of energy to do my job"*) appeared to be suboptimal due to its conceptual redundancy with item 6 (*"I exert a lot of energy on my job"*) and was thus replaced with item 2 (*"I exert my full effort to my job"*), which was more clearly distinct from item 3 while still reflecting the core underlying construct of the physical engagement dimension. A similar rationale was used to exclude item 5 ("*I strive as hard as I can to complete my job*") due to conceptual redundancy with item 4 ("*I try my hardest to perform well on my job*"), which the expert panel found to be clearer in both languages. Finally, item 1 ("*I work with intensity on my job*") was not retained by the expert panel who felt that the selected items provided sufficient content coverage of the core of the physical engagement dimension by referencing the intense investment of energy and effort into one's job without the additional complexity associated with the term "intensity". Indeed, the Merriam-Webster dictionary defines intensity as an extreme degree of strength, force, energy, or feeling. As a result, the item could be interpreted by respondents as reflecting an *extreme level* of investment that would then interfere with the rating scale, itself used to reflect intensity. Examination of the results from this study and from Gillet et al.'s (2020) supported the selection of these items (i.e., 2, 4, and 6), which presented satisfactory factor loadings on the G-factor and on their respective S-factor, while displaying small cross-loadings, low uniquenesses, and low correlated uniquenesses across most solutions.

Emotional Engagement. Based on the aforementioned definition, three items (7, 9, 12) were first identified by the expert panel as best reflecting the emotional engagement dimension. The remaining three items were not retained for a variety of reasons. First, the expert panel expressed concerns that item 8 ("I feel energetic at my job") presented a level of conceptual redundancy with item 5 (*"I exert a lot of energy on my job"*) from the physical engagement dimension that may interfere with the ability to differentiate both dimensions in a short version of the questionnaire. Second, item 11 ("*I feel positive about my job*"), albeit seen to be relevant in a long version of the questionnaire, was seen to fall too far from the core components of emotional engagement (i.e., excitement, interest, and enthusiasm) and too close to other constructs (e.g., job satisfaction; see Byrne et al., 2016) to be retained in a short version of the questionnaire. Finally, the panel of experts determined that item 10 ("*I am proud of my job*") did not clearly represent the actual *investment* of emotional engagement into one's role as theorized by Kahn (1990) but rather it might represent an antecedent or outcome of job engagement. Furthermore, pride is a relatively complex emotion that simultaneously focuses on the self and on others. Consequently, it can be classified both as a self-conscious emotion revolving around the self (e.g., Tangney & Fischer, 1995; Tracy & Robins, 2004) and as a social emotion revolving about one's relationship with others (e.g., Van Osch et al., 2013; Williams & DeSteno, 2009). The panel of experts felt that this complexity was not required to map emotional engagement in a short scale. Examination of the results from this study and from Gillet et al.'s (2020) supported the selection of these items (i.e., 7, 9, and 12), which presented satisfactory factor loadings on the G-factor and on their respective S-factor, while displaying small cross-loadings, low uniquenesses, and low correlated uniquenesses across most solutions.

Cognitive Engagement. Based on the aforementioned definition, three items (15, 16, 17) were first identified by the expert panel as best reflecting the core components (attention, absorption, and concentration) of the cognitive engagement dimension. This selection was more straightforward than for the other dimension, as a total of 4 items from the JES[18] referred to attention (14, 15, 18) or focus (13, 15), two elements captured by item 15 (*At work, I focus a great deal of attention on my job*). As a result, only one item each remained to capture concentration (item 17: "*At work, I concentrate on my job"*) and absorption components (item 16: "*At work, I am absorbed by my job*") of cognitive engagement. As for the previous dimensions, examination of the results from this study and from Gillet et al.'s (2020) supported the selection of these three items. The final items selected to compose the JES[9] are identified in bold in Appendix A.

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Table S1

Parameter Estimates from the Alternative CFA, Bifactor-CFA, and ESEM Solution for the JES[18]

	CFA		Bifactor-CFA			ESEM			
	λ (s.e.)	δ (s.e.)	G-λ (s.e.)	S-λ (s.e.)	δ (s.e.)	λ (s.e.)	λ (s.e.)	λ (s.e.)	δ (s.e.)
Physical engagement									
Item 1	.495 (.011)**	.755 (.011)**	.799 (.016)**	.191 (.034)**	.325 (.023)**	**.742 (.029)****	.071 (.017)**	.020 (.030)	.359 (.017)**
Item 2	.524 (.010)**	.726 (.010)**	.849 (.011)**	.080 (.048)	.273 (.018)**	**.813 (.022)****	.072 (.017)**	-.008 (.021)	.276 (.016)**
Item 3	.524 (.010)**	.725 (.011)**	.852 (.010)**	.147 (.071)*	.252 (.021)**	**.874 (.022)****	-.023 (.014)	.006 (.023)	.252 (.014)**
Item 4	.853 (.009)**	.272 (.015)**	.805 (.020)**	-.273 (.054)**	.277 (.026)**	**.690 (.029)****	-.009 (.015)	.124 (.030)**	.388 (.019)**
Item 5	.854 (.011)**	.271 (.019)**	.823 (.019)**	-.327 (.071)**	.216 (.037)**	**.697 (.031)****	.019 (.017)	.105 (.032)**	.359 (.017)**
Item 6	.731 (.013)**	.466 (.019)**	.776 (.012)**	.159 (.071)*	.373 (.025)**	**.873 (.021)****	-.050 (.016)**	-.062 (.023)**	.376 (.021)**
Emotional engagement									
Item 7	.863 (.008)**	.255 (.014)**	.619 (.017)**	.605 (.019)**	.252 (.013)**	.173 (.020)**	**.794 (.018)****	-.058 (.017)**	.249 (.013)**
Item 8	.804 (.010)**	.353 (.017)**	.578 (.018)**	.563 (.019)**	.349 (.016)**	.177 (.022)**	**.743 (.018)****	-.069 (.021)**	.340 (.016)**
Item 9	.849 (.009)**	.280 (.015)**	.539 (.020)**	.650 (.019)**	.287 (.015)**	-.042 (.021)**	**.807 (.018)****	.096 (.021)**	.286 (.015)**
Item 10	.828 (.009)**	.315 (.015)	.534 (.021)**	.632 (.020)**	.316 (.015)**	-.043 (.022)**	**.783 (.017)****	.104 (.023)**	.316 (.015)**
Item 11	.895 (.006)**	.198 (.011)**	.484 (.020)**	.770 (.013)**	.172 (.010)**	-.152 (.015)**	**.968 (.009)****	.039 (.016)*	.171 (.009)**
Item 12	.912 (.004)**	.168 (.007)**	.538 (.018)**	.744 (.013)**	.158 (.007)**	-.013 (.014)	**.957 (.010)****	-.051 (.014)**	.156 (.007)**
Cognitive engagement									
Item 13	.729 (.012)**	.468 (.018)**	.613 (.017)**	.389 (.021)**	.474 (.018)**	.040 (.027)	.265 (.023)	**.525 (.030)****	.433 (.015)**
Item 14	.887 (.008)**	.213 (.014)**	.695 (.016)**	.548 (.026)**	.216 (.017)**	-.003 (.028)	.016 (.015)	**.882 (.032)****	.208 (.018)**
Item 15	.919 (.005)**	.155 (.010)**	.694 (.015)**	.608 (.020)**	.148 (.013)**	-.035 (.019)	-.048 (.011)**	**.981 (.019)****	.142 (.012)**
Item 16	.735 (.012)**	.460 (.017)**	.611 (.016)**	.410 (.021)**	.458 (.017)**	.136 (.027)**	-.013 (.020)	**.636 (.029)****	.460 (.017)**
Item 17	.887 (.008)**	.214 (.013)**	.671 (.018)**	.583 (.021)**	.210 (.015)**	-.011 (.023)	-.042 (.012)**	**.919 (.024)****	.216 (.015)**
Item 18	.910 (.006)**	.171 (.011)**	.705 (.017)**	.578 (.020)**	.169 (.012)**	.025 (.024)	-.027 (.012)*	**.907 (.025)****	.174 (.013)**

Note. ** $p \leq .01$; * $p \leq .05$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; s.e.: Standard error; λ: Factor loading; δ: Item uniqueness; G: Factor loading on the global factor in a bifactor solution; S: Factor loading on a specific factor in a bifactor solution; Main loadings are marked in bold in the ESEM solution.

Table S2

Factor Correlations from the CFA (Over the Diagonal) and ESEM (Under the Diagonal) Solutions for the JES[18]

	1. Physical engagement	2. Emotional engagement	3. Cognitive engagement
1. Physical engagement		.589(.020)**	.765 (.015)**
2. Emotional engagement	.585 (.019)**		.633 (.016)**
3. Cognitive engagement	.749 (.015)**	.632(.015)**	

Note. ** p ≤ .01; * p ≤ .05.

Table S3

Parameter Estimates from the Alternative CFA, ESEM, and Bifactor-ESEM Solution for the JES[9]

	CFA		ESEM				Bifactor-ESEM				
	λ (s.e.)	δ (s.e.)	λ (s.e.)	λ (s.e.)	λ (s.e.)	δ (s.e.)	G-λ (s.e.)	S-λ (s.e.)	S-λ (s.e.)	S-λ (s.e.)	δ (s.e.)
Physical engagement											
Item 2	.799(.011)**	.362(.018)**	**.623(.026)****	.120(.018)**	.108(.025)**	.380(.017)**	**.759(.029)****	**.255(.043)****	.023(.032)	.469(.027)**	.357(.027)**
Item 4	.854(.010)**	.270(.016)**	**.907(.034)****	-.047(.012)**	-.016(.029)	.246(.024)**	**.697(.025)****	**.541(.051)****	-.011(.017)	.318(.053)**	.220(.038)**
Item 6	.858(.010)**	.264(.017)**	**.894(.028)****	-.015(.013)	-.022(.026)	.245(.020)**	**.735(.027)****	**.448(.050)****	-.025(.026)	.486(.040)**	.259(.021)**
Emotional engagement											
Item 7	.874(.008)**	.237(.015)**	.141(.019)**	**.809(.018)****	-.051(.016)**	.247(.015)**	**.669(.025)****	.046(.032)	**.547(.028)****	-.021(.033)	.249(.016)**
Item 9	.851(.010)**	.276(.016)**	-.028(.018)	**.821(.018)****	.062(.020)**	.288(.017)**	**.583(.023)****	.034(.024)	**.621(.030)****	.039(.025)	.265(.025)**
Item 12	.891(.007)**	.207(.012)**	-.085(.014)**	**.971(.013)****	-.012(.014)	.161(.015)**	**.637(.025)****	-.088(.034)**	**.651(.025)****	-.014(.041)	.161(.019)**
Cognitive engagement											
Item 15	.893(.007)**	.203(.013)**	.071(.021)**	.009(.012)	**.818(.023)****	.230(.014)**	**.745(.016)****	.077(.017)**	.039(.012)**	**-.043(.029)**	.216(.020)**
Item 16	.752(.012)**	.434(.018)**	.006(.022)	.034(.017)*	**.724(.023)****	.437(.018)**	**.688(.035)****	-.056(.036)	-.012(.030)	.091(.028)**	.422(.025)**
Item 17	.893(.008)**	.202(.014)**	-.042(.017)*	-.035(.011)**	**.966(.020)****	.163(.017)**	**.768(.021)****	-.018(.018)	-.016(.015)	-.041(.030)	.174(.019)**

Note. ** p ≤ .01; * p ≤ .05; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; s.e.: Standard error; λ: Factor loading; δ: Item uniqueness; G: Factor loading on the global factor in a bifactor solution; S: Factor loading on a specific factor in a bifactor solution; Main loadings are marked in bold in the ESEM solutions.

Table S4

Factor Correlations from the CFA (Over the Diagonal) and ESEM (Under the Diagonal) Solutions for the JES[9]

	1. Physical engagement	2. Emotional engagement	3. Cognitive engagement
1. Physical engagement		.614(.020)**	.752(.017)**
2. Emotional engagement	.599(.018)**		.623(.016)**
3. Cognitive engagement	.733(.017)**	.623(.016)**	

Note. ** $p \leq .01$; * $p \leq .05$.

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13. ABSTRACT/RÉSUMÉ (When available in the document, the French version of the abstract must be included here.)

The original 18-item Job Engagement Scale (JES18) operationalizes a multidimensional hierarchical conceptualization by Kahn (1990) of the investment and expression of an individual's preferred self in-role performance. Encompassing three dimensions (i.e., physical, cognitive, and emotional), job engagement is a known predictor of organizational performance and personal outcomes. Using a sample (N = 7185) of military and civilian personnel nested within 60 work units in the Canadian Armed Forces (CAF) and Canadian Department of National Defence (DND), we developed and cross-validated a 9-item short-form (the JES9) of the original JES18 in English and French. Results demonstrated that both linguistic versions the JES9 and JES18 yielded comparable psychometric properties. The scales also displayed measurement invariance as a function of participants' sex (male/female), employee type (civilian/regular force/primary reserve), and role (supervisor/employee).Finally, the associations between scores on the JES9 and the JES18 and a series of covariates (i.e.,employees' psychological needs for competence, autonomy, and relatedness, burnout, and turnover intentions) were assessed. Collectively, results highlight the strong psychometric soundness of the English and French versions of the JES9 and the JES18 for organizational practitioners and academics.