20 to 18 - Final Scale Definitions of the Bifactor Engagement Scale

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Abstract

We finalize the scale definitions for a bifactor engagement measure that is comprised of intentionally complex items. This complexity crosses attitudinal and substantive components. The final scale definition exhibited moderately good bifactor fit.

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The origins of research on employee engagement began with theoretical expansions on forms of employee participation (see, for example, Ferris & Hellier, 1984) and job involvement (e.g., Elloy et al., 1991). Over a period of time, research and theory expanded into broader considerations of attitudes and emotions (Staw et al., 1994) and were further informed by discoveries regarding the dimensionality of nomologically adjacent constructs such as organizational commitment (Meyer & Allen, 1991). The 1990's was a time of expanding interest and exploration. For example, Leone (1995) conducted a dissertation and Kahn (1990a) popularized the explicit semantic use of the construct label, "engagement".

The surging interest inevitably resulted in multiple differing perspectives regarding engagement. Some viewed engagement from a globally evaluative perspective (Kahn, 1990a; Staw et al., 1994), while others approached its study by deconstructing the construct's content domain specification (Schaufeli et al., 2002). Schaufeli (2013) stated a preference for the label "work engagement" rather than referring to the construct as "employee engagement", arguing that the "employee" referrent perhaps invites a blurring of definitions with other constructs such as commitment or organizational citizenship. Maslach and Leiter (2008) proposed that engagement and burnout[1] (Maslach & Leiter, 1997) are direct opposites of each other, though most contemporary researchers consider these constructs to be conceptually distinct (Goering et al., 2017; Kim et al., 2009; Schaufeli et al., 2008; Timms et al., 2012; Trógolo et al., 2020). Goering et al. (2017), for example, explored nomological networks, concluding that the two constructs have a moderate (negative) association, but also distinct nomological networks. Schaufeli et al. (2008) investigated both internal and external association indicators, concluding that engagement and burnout

[1] Burnout is a psychological syndrome consisting of exhaustion, cynicism, and inefficacy (see, for example, Leiter & Maslach, 2004).

(as well as *workaholism*) should be considered three distinct constructs.

Engagement as an attitude

Staw et al. (1994) investigated the relationships between *positive emotions* and favorable work outcomes, and, although they do not explicitly mention the word "engagement", their distinction between felt and expressed emotion likely held influence upon the burgeoning interest in the engagement construct. Clear in this history is the specification of engagement as a work *attitude*. Staw et al. (1994) isn't the only reference to engagement as an attitude; Kahn (1990a) defines engagement as "the harnessing of organization members' selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances". These theories of engagement as an attitude were heavily inspired by Rosenberg (1960) 's tripartite model of attitudes. According to Rosenberg (1960), attitudes are a molar construct with cognitive, affective, and behavioral dimensions as its molecular parts. While this model is not specifically geared towards engagement, many researchers have drawn inspiration from it and have used it to help better understand individuals' reactions to certain attitude objects (Kaiser & Wilson, 2019). These attiudinal definitions of engagement were quickly bypassed by subsequent papers (see, for example, (Baumruk, 2004) and (Shaw, 2005), who framed it in terms of one's cognitive and affective *commitment* to one's organization). Although falling out of favor in the decades following its construction, interest in the tripartite model was revived by Kaiser and Wilson (2019).

Engagement as substantive

Schaufeli and Bakker (2003) further specify a "positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (p. 74). Via their conceptualization, vigor is described as high levels of energy and mental resilience while working. Dedication refers to being strongly involved in one's work and experiencing a

sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work (Schaufeli et al., 2002). The dimension of absorption has been noted as being influenced in conceptual specification by (Csikszentmihalyi, 1990)'s concept of "flow".

Existing Measures of Engagement

Our review of existing instruments non-exhaustively presents measures that are commonly viewed as *either* predominantly academic or applied, although please note that this is an imposed subjective distinction.

Research measures (e.g., freely available). Multiple research scales currently exist, including the Intellectual, Social, Affective (ISA) Engagement Scale (Soane et al., 2012). This 9-item measure draws inspiration from Kahn (1990b)'s theory of engagement and can aggregate to three 3-item scales (Intellectual Engagement, Social Engagement, and Affective Engagement) or one 9-item summary aggregate ("Overall Engagement). Intellectual engagement refers to the degree of intellectual absorption one has in their work and the degree they think about improving work (Soane et al., 2012). Social engagement primarily concerns social connections in a workplace context as well as having shared values with colleagues (Soane et al., 2012). According to Soane et al. (2012), affective engagement refers to a positive emotional state relating to one's work role. This is a rare known measure of engagement to have been explicitly validated at both the subscale and overall aggregate level (Soane et al., 2012).

Another example of an engagement measure comes from Saks (2006), who splits engagement into two distinct entities: job engagement and organization engagement. This dichotomy largely results from Kahn (1990b)'s theory that an individual's role is central to engagement. Saks (2006) further posits that employees typically have more than one role, with the most important being their work role and their role as a member of an

organization. The former role is specific to the employee's job, while the latter is more broad and refers to the organization as a whole. Antecedents and consequences of employee engagement were also tested, with findings suggesting that perceived organizational support precedes both job and organizational engagement and that job satisfaction, organizational commitment, intent to quit, and organizational citizenship behaviors (OCBs) at the individual and organization level are outcomes of high and low levels of engagement. Recently the model was revisited and revised to include several new antecedents (e.g. leadership, job demands, dispositional characteristics, etc.) leading to engagement as well as consequences (e.g. burnout, stress, health and well-being, etc.) resulting from high or low levels of engagement (Saks, 2019).

Perhaps the most commonly cited research measure is the Utrecht Work Engagement Scale (UWES), wherein Schaufeli and Bakker (2003) specify a "positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (p. 74). Via their conceptualization, vigor is described as high levels of energy and mental resilience while working. Dedication refers to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work (Schaufeli et al., 2002). This absorption element has been noted as being influenced in conceptual specification by (Csikszentmihalyi, 1990)'s concept of "flow".

Commercial measures (e.g., typically fee-based). Gallup's Q12 is a popular commercial measure for engagement. The Q12 is a 12-item measure that originated from a push to use "soft" metrics as opposed to "hard" ones for future action planning (Coffman & Harter, 1999). In this interpretation "soft" metrics tend to be metrics that are more abstract and difficult to measure (e.g. engagement, brand loyalty), while "hard" metrics are easily-measured and typically deal with concrete numbers (e.g. turnover, profitability). In the original creation of the survey, each of the 12 items were found to relate to important

organizational outcomes including productivity, profitability, turnover, and customer satisfaction (Coffman & Harter, 1999). A recent meta-analysis of 456 studies revealed that the Q12 also relates to additional performance measures such as absenteeism, wellbeing, and organizational citizenship (Harter et al., 2013). While this engagement measure is one of the most popular, some scholars disagree with its conceptualization as "engagement"; some feel that this measure is better described as (or no different than) a measure of overall satisfaction, as the two concepts are highly correlated, $r = .91$ (Sirota & Klein, 2013).

Gallup is not the only organization with an engagement measure; many consulting companies have commercially available surveys, models, and processes for measuring engagement. One such example is Aon Hewitt, a consulting firm that annually measures engagement for over 1000 companies worldwide. Their measurements are centered around an engagement model that focuses on three main factors: say, stay, and strive. Essentially, the model states that employees demonstrate engagement through saying positive statements about their organization, staying at their organization for a long time, and striving to put in their best effort and help the organization succeed (Hewitt, 2017). In their most recent analysis. Hewitt (2017) found that global levels of engagement had retracted since the previous year.

BlessingWhite, another consulting firm, provides a different model for engagement. BlessingWhite's model, the X Model, measures engagement through the lens of satisfaction and contribution. Essentially, BlessingWhite believes that cooperation between the organization and individual employees is necessary, and that maximum engagement can only be reached when an employee reaches maximum levels of satisfaction while also outputting maximum contribution towards the organization (BlessingWhite, 2018). Their model holds each level in the organization accountable for employee levels of engagement. From their view, executive leaders must shape the organization's culture, and managers must be able to effectively communicate with and motivate their subordinates (BlessingWhite, 2018).

The last commercial example is Towers Perrin-ISR, which holds the philosophy that employee engagement can only be worked on indirectly; engagement can only be attained through effective leadership, business strategy, and organizational culture (Ballendowitsch & Perrin-ISR, 2009). Rather than focus on building an involved model for engagement, Towers Perrin-ISR instead focuses on leadership development and creating a healthy organizational culture. Through fulfilling these antecedents of engagement, Ballendowitsch and Perrin-ISR (2009) argues that employees will have a vivid understanding of organizational goals. In addition, employees will become committed to the organization and motivated to contribute.

Our Proposed Model of Engagement

The present article extends our previous exploration of two methods for constructing an engagement scale. The first method incorporates both the substantive and attitudinal models into one based on corrected item-total correlations, while the second method incorporates substantive and attitudinal models into one based on modification indices. Our conceptualization of work engagement is a mental state wherein employees: a) feel energized (*Vigor*), b) are enthusiastic about the content of their work and the things they do (*Dedication*), and c) are so immersed in their work activities that time seems compressed (*Absorption*). We further decompose each of these facets into three attitudinal components: d) feeling (e.g., affect), e) thought (e.g., cognition), and f) action (e.g., behavior). Development and construct validation of the focal 18-item measure of engagement is described in Russell et al. (2022) whereas the current study focuses on administrative response cues in the form of order of item presentation. The expectation is that either model (attitudinal or substantive) will exhibit stronger factorial validity when item administration parallels latent structure.

Bifactor structures

Typically, bifactor analyses are utilized when exploring common method variance [Biderman et al. (2011); Gäde et al. (2017); reise_rediscovery_2012]. Giordano et al. (2020) recently published an overview of exploratory bifactor analyses. In their work they cite past applications as well as potential future uses, and credit Reise (2012) as the catalyst for the revival of bifactor models. Research and application of Item response theory (IRT) and structural equation modeling (SEM) are increasingly integrating the use of bifactor models. Typically, bifactor models are used to analyze compare two phenomena: 1. The degree to which a single general factor reflects the common variance among a set of item responses and their covariance. 2. The degree to which a group of non-correlated factors reflect common variance among item clusters. The current study breaks away from this tradition, as two factor groups, as opposed to one factor group and a general factor, will be compared in order to assess two general factors from each group: attitidunal and substantive.

The current SIOP presentation describes an effort to construct a measure of engagement that may be simultaneously explores two methods for constructing a scale that incorporates both the substantive and attitudinal models into one

Methods

We solicited three different samples for purposes of winnowing from 20 to 18 final scale items. One sample was a Prolific panel, one was a Qualtrics panel, and one was a "snowball" sample whereby friends and colleagues of the paper authors were invited to participate. In the snowball sample, invited individuals were also asked to further forward the survey along to friends and colleagues of theirs, with the "forwarding along" component being requested *ad infinitum*.

Participants

Of the 743 total Qualtrics panel respondents, 366 were excluded based on conservative indices of carelessness across the larger survey (consistent non-differentiating responses across more than 20 consecutive items or greater than 50% missing responses). For Prolific panel respondents, 568 were retained of 785 total participants due to the same exclusion criteria. The smaller ($n = 232$) snowball sample retained all participants for a total combined analysis sample of 1177.

Procedure

A previous instrument administration reduced an initial list of 36 candidate items to 20 (Russell et al., 2022). Primarily for the goal of balance, we wanted to ultimately retain only 18 items (6 per attitudinal/substantive scale dimension, 2 per bifactor subscale). The items considered candidates for deletion were from bifactor subscales that yet retained 3 candidation items: the Absorption-Cognition subscale (Item 1: *I am able to concentrate on my work without getting distracted*, Item 3: *Time passes quickly while I'm working*, and Item 4: *I find it difficult to mentally disconnect from work*) and the Dedication-Cognition subscale (Item 25: *I plan to stay with this company as my career advances*, Item 26: *I believe this company cares about my career goals*, and Item 28: *This organization challenges me to work at my full potential*)[2]. Two primary considerations were given to the decision to retain or delete the 6 deletion candidates: 1) is the content of the item necessary for the definitional integrity of the content domain, and 2) does the empirical functioning of the item implicate priority regarding deletion or retention.

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[2] Item numbers presented throughout this presentation are legacy numbers from the initial 36-item pool of candidate indicators.

Results

We used R (Version 4.2.1; R Core Team, 2022) and the R-packages *careless* (Version 1.2.1; Yentes & Wilhelm, 2021), *descr* (Version 1.1.5; Dirk Enzmann et al., 2021), *lavaan* (Version 0.6.12; Rosseel, 2012), *papaja* (Version 0.1.1; Aust & Barth, 2022), and *tinylabels* (Version 0.2.3; Barth, 2022) for all our analyses.

Looking first at the Absorption-Cognition candidate items (1, 3, and 4), Item 4 stood out as a candidate for exclusion based on empirical indices (corrected item-total correlations, inter-item correlations, and bifactor analysis fit; $\chi^2_{with4} = 676.51$, $\chi^2_{without4} = 499.05$). Conceptually we also agreed that Item 4 was not uniquely critical for comprehensive coverage across either the Cognition or Absorption constructs.

Regarding candidate items 25, 26, and 28, item 25 exhibited the weakest corrected item-total correlation for both Dedication ($r = .69$) and Cognition ($r = .60$), however, the relative magnitudes were moderately high, coefficients for all three items were comparable (ranging from .60 to .78) and the item 25 content was deemed critical for both the Cognition as well as Dedication content domains. Two different CFAs were performed with comparable fit indices - one retaining only item 26 ($\chi^2_{keep26} = 442.39$), and the other instead retaining item 28 ($\chi^2_{keep28} = 458.12$).

Ultimately the definitional uniqueness of item 26, focusing on percieved reciprocity and support regarding tenure/career objectives led to a decision for retention. This entire scale reduction endeavor, therefore, concluded with the deletions of Item 4, “I find it difficult to mentally disconnect from work” and Item 28, “This organization challenges me to work at my full potential”.

Figure 1 presents the visual CFA for the final scale definitions, Table 1 presents a more comprehensive table of fit indices, and Table 2 presents the final recommendation regarding the 18-item scale definitions, including the individual item stems.

Discussion

We believe that this project has theoretical, methodological, and practical implications. By specifying known sources of item covariance (through *a priori* specification of alternative factors), it is possible that we may help explain some of the high inter-scale correlations that have been reported with other measures of engagement. We do this via extension of the bifactor analsis tradition, which historically has been used in common method variance investigations where only "one" alternative factor is specified. Although not common in the literature, we hope that this type of extension of bifactor analyses may be further pursued and investigated.

Our primary aspiration for developing this measure was that it would be a public domain instrument that would draw equal appeal from both practitioners and academics. These preliminary investigations suggest that it is scalable to two aggregations which we have been referring to as: 1) research (DAC), and 2) actionable (ABC). Our (as-of-yet untested) assumption is that practitioners may be more interested in feedback regarding how their employees *think*, *feel*, and *behave* with regard to engagement. Academics, on the other hand, may be more interested in possible differentiation between levels of dedication, absorption, and vigor. Having one assessment that may aggregate to either framework not only addresses the demand of constituent users, but it also facilitates aggregation across samplings for broader purposes such as norms development, validation, and metaanalysis.

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Table 1

Fit indices five different bifactor CFAs.

Model	chisq	df	RMSEA	SRMR	CFI	TLI	AIC
20 Item	676.51	145	0.06	0.04	0.94	0.93	60686.58
Retain 1	682.6	128	0.07	0.04	0.94	0.92	57744.46
Retain 4	499.05	128	0.05	0.03	0.96	0.94	57173.78
Retain 26	442.39	112	0.05	0.03	0.96	0.94	54493.47
Retain 28	458.12	112	0.06	0.03	0.96	0.94	54425.65

Note. Items were dropped sequentially, the first CFA reflects 20 items, the next two CFAs reflect 19 items, and the last two CFAs reflect 18 items.

Table 2

Suggested final scale definitions.

Substantive	Attitudinal	Item.Number	Item.Stem
Absorption	Cognitive	1	I am able to concentrate on my work without getting distracted
Absorption	Cognitive	3	Time passes quickly while I'm working
Absorption	Affective	5	I enjoy thinking about work even when I'm not at work
Absorption	Affective	8	I love starting my workday
Absorption	Behavioral	10	I have to be reminded to take breaks while I'm at work
Absorption	Behavioral	11	I never miss a work deadline
Vigor	Cognitive	14	Thinking about work saps my energy
Vigor	Cognitive	16	I'm able to maintain good levels of energy throughout the workday
Vigor	Affective	17	I enjoy spending time completing my job tasks
Vigor	Affective	19	I feek motivated to go beyond what is asked of me at work
Vigor	Behavioral	21	When work is slow I find ways to be productive
Vigor	Behavioral	22	I express enthusiasm for my job while at work
Dedication	Cognitive	25	I plan to stay with this company as my career advances
Dedication	Cognitive	26	I believe this company cares about my career goals
Dedication	Affective	31	I feel proud of my accomplishments within this organization
Dedication	Affective	32	My job makes me feel like I'm part of something meaningful

Table 2 continued

Substantive	Attitudinal	Item.Number	Item.Stem
Dedication	Behavioral	34	I embrace challenging situations at work
Dedication	Behavioral	35	I speak positively about this organization to others

Note. The recommended response scale is 'Strongly Disagree', 'Disagree', 'Somewhat Disagree', 'Somewhat Agree', 'Agree', and 'Strongly Agree'

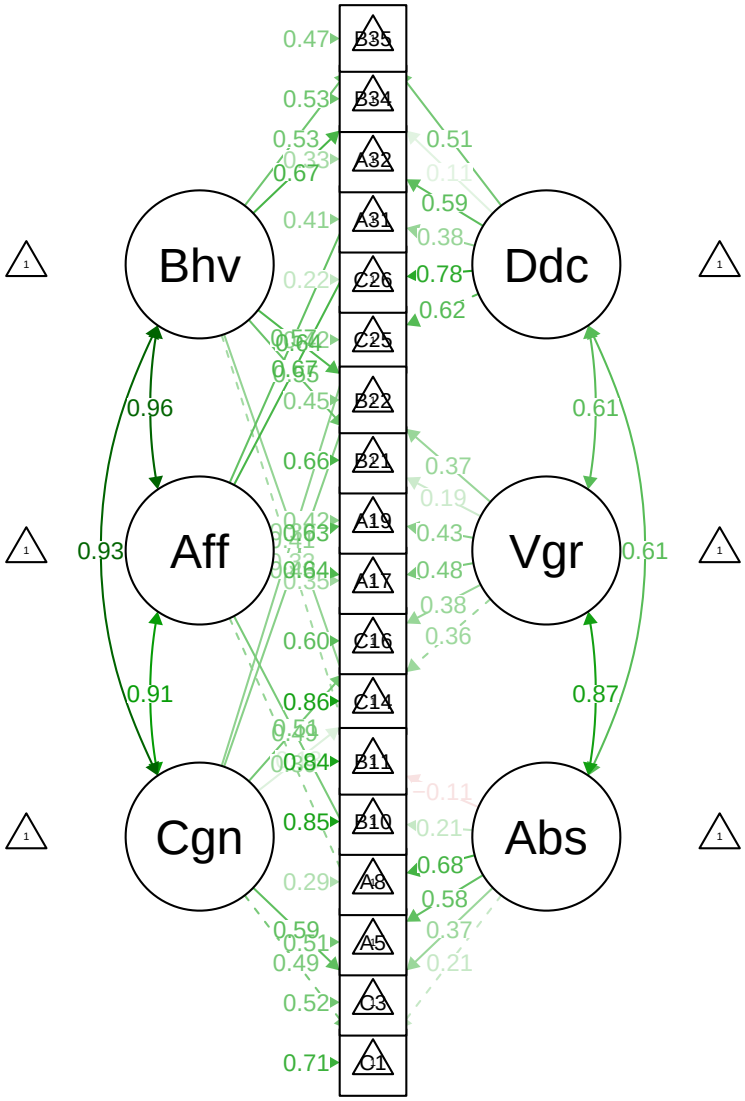

Figure 1. Bifactor analysis final 18-item scale(s) definitions.