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The search for meaningful work: A network analysis of personality and the job characteristics model

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ABSTRACT

Meaningful work has increasingly been identified as a source of personal fulfillment, a protective factor against daily stress and adversity, and a key mediator linking job characteristics to important organizational outcomes. However, to date, positive organizational scholarship has neglected the role of individual differences in understanding how organizational work becomes more fulfilling. More broadly, there is limited consensus with respect to which traits, actions, or job features sustain meaning, and whether specific pathways may account for these associations. To address such limitations, we applied a regularized partial correlation network and directed acyclic graph to estimate the functional relations among multidimensional measures of these phenomena in a national dataset of workers ($n = 570$). Results highlight numerous situational and personality effects on work meaning and possible causal pathways linking various traits to experienced meaningfulness at work. Cumulatively, our findings suggest that interventions to encourage long-term changes in work meaning (e.g., job redesign, career coaching, job crafting) may require individuals to undergo changes in how their personality is structured (e.g., adjustment to the work environment and integrations with other aspects of the personality system). However, future experimental and longitudinal research is needed to test our propositions.

1. Introduction

Since the birth of modern psychology, understanding what makes life meaningful has been explored through perspectives on optimal human functioning and transcendent experience (James, 1902), maturity (Allport, 1961), and human potential (Maslow, 1943). In this time, the field has come to view individuals as motivated to understand the nature of their existence and find self-organizing aims that allow one to transcend trivialities and tribulations (Frankl, 1959).

In the context of organizational life, work similarly feels meaningful when (a) it is seen as a worthwhile pursuit of a broader purpose, and (b) it affords opportunity for self-realization (Martela & Pessi, 2018; Pratt & Ashforth, 2003). Experienced meaningfulness at work (EMW) has been cast as a protective resource, making undesirable circumstances more bearable (see Lips-Wiersma & Wright, 2012; May, Gilson, & Harter, 2004), and as a pivotal mediator linking work characteristics to work outcomes (Humphrey, Nahrgang, & Morgeson, 2007; Johns, Xie, & Fang, 1992). Indeed, it correlates with a variety of desirable outcomes, such as commitment, engagement, citizenship behaviors, life satisfaction, turnover intentions, burnout, and stress (Hu & Hirsh, 2017a; Steger, Littman-Ovadia, Miller, Menger, & Rothmann, 2013). This

heightened scholarly focus coincides with a broader societal yearning for meaningful work. Surveys of Americans have since the 90s ranked *important* and *meaningful* work above promotions, income, job security, and work hour requirements (Cascio, 2003). A recent study suggests workers would even accept lower starting salaries for work they find meaningful (Hu & Hirsh, 2017b).

Though scholars have focused much attention on identifying the causes and consequences of EMW (e.g., Hackman & Oldham, 1980; Humphrey et al., 2007; Wrzesniewski & Dutton, 2001), researchers have paid notably less attention to the role of personality traits. This special issue on healthy organizations is thus an excellent opportunity to do just that. The heritability and stability of personality traits (Jang, Livesley, & Vernon, 1996; Vernon, Villani, Vickers, & Harris, 2008; Wille, De Fruyt, & De Clercq, 2013) suggests that examining the role of individual differences in relation to the constellation of constructs linked with EMW has great explanatory value (Ilies, Arvey, & Bouchard, 2006). Personality traits, particularly those described the five factor model, share many correlates with experienced meaningfulness (e.g., engagement, burnout; see Swider & Zimmerman, 2010; Young, Glerum, Wang, & Joseph, 2018), suggesting common causal pathways that trace back to how individual personalities are structured. Though scholars

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have made theoretical advances in this area (see [Barrick et al., 2013](#)), incorporating personality into research on the antecedents and consequences of EMW will clarify the deeper changes individuals might need to undergo in themselves, their jobs, or both before finding a position that is seen as valuable. Given coherence (i.e., the degree to which things fit together) partly defines EMW ([Martela & Steger, 2016](#)), understanding how personality aspects can be integrated can be helpful for understanding how work is experienced as meaningful. It may even lead us to question whether the proposed consequences of EMW reflect direct effects or are common byproducts of basic dispositional differences (e.g., positive work attitudes, motivation, and performance).

Furthermore, while there has been some elaboration on the role of heritable individual differences in the organizational literature ([Ilies et al., 2006](#)), few have considered the implications for the study of positive organizational scholarship. Rather, positive organizational scholars assume situational assessments are solely the product of objective working conditions (i.e., work context causes perceptions of the work context). While multi-level theory and evidence provide credence for this view ([Kozlowski & Klein, 2000](#); [Ostroff, 1993](#)), it has long been recognized work roles and situations do not occur randomly in real life – individual differences inform how people select, evoke, or manipulate their situations ([Buss, 1987](#)). Developmental research suggests individuals' personalities develop by transacting with their environment ([Caspi & Roberts, 2001](#)), with people tending to select themselves into, or create for themselves, work experiences matching their pre-existing personality, with self-selected experiences then reinforcing these characteristics. For instance, prospective findings suggest baseline levels of extraversion, openness, conscientiousness, and neuroticism predict employee's decision-making latitude 10 years later ([Sutin & Costa Jr, 2010](#)). At minimum, an individual differences perspective suggests environmental perceptions are at least partially explained (perhaps one might view as contaminated) by personal factors.¹ Indeed, the larger positive psychology movement – from which positive organizational scholarship has sprung – has long been criticized for ignoring the effects of such individual differences (see [Ehrenreich, 2009](#); [Held, 2004](#); [Lazarus, 2003](#)).²

In this manuscript, we examine the role of personality in relation to proposed antecedents and consequences of EMW. Here, we focus on aspects of personality with distinct biological sources (i.e., Big Five aspects; see [DeYoung, Quilty, & Peterson, 2007](#)). Cybernetic Big 5 Theory (CB5T) proposes that personality aspects arise from universally evolved self-regulatory systems which serve relatively distinct functions for maintaining the personality system (see [DeYoung, 2015](#)), suggesting that examining aspects will shed light on the multiple pathways through which personality might relate to EMW. CB5T suggests individuals will experience the highest and most enduring levels of EMW when they are both well adapted to their work environment and their characteristic adaptations are aligned with local demands and personal proclivities (i.e., the personality system is, itself, highly integrated). By examining all aspects of personality in relation to the proposed antecedents and consequences of EMW, we shed light on how these personality aspects relate to one another and different work characteristics in regard to the EMW.

¹ The first law of behavioral genetics is that all psychological traits show significant and substantial genetic influence, which implies that failing to account for relatively stable individual differences can produce misleading causal claims (i.e., the nature of nurture, see [Plomin & Bergeman, 1991](#); [Plomin, DeFries, Knopik, & Neiderhiser, 2016](#); see also [Antonakis, Bendahan, Jacquart, & Lalive, 2010](#)). Here, we might consider a similar view; namely, that perceptions of organizational phenomena (e.g., climate) will reflect relatively stable (note: not immutable) individual differences. We aim to describe what is while offering a glimpse into what could be (c.f. [Plomin et al., 2016](#)).

² While some critiques of the movement have been addressed ([Cameron, 2016](#)), the bias against examining fairly stable individual differences has received less attention (for a more thorough explanation, see [Lazarus, 2003](#)).

Crucial to our contribution is the use of network analysis, which allows us to map the interplay between multiple constructs and identify plausible causal processes that explain conditional independencies embedded in the data. Rather than theorize on the causal connections (which has done previously; see [Barrick et al., 2013](#)), network analysis provides a methodological and conceptual grounding to explore such systems ([Borsboom & Cramer, 2013](#); [Fried, 2017](#)), such as those described by CB5T (i.e., personality), job characteristics theory, as well as the mutual interplay between traits and job characteristics ([Woods, Wille, Wu, Lievens, & De Fruyt, 2018](#)). Theoretically, networks suggest broad patterns of individual differences, job properties, and their interplay can be conceptualized as phenomena which covary because they are functionally linked (i.e., scale indicators essentially cause each other). Factors are argued to emerge from densely connected actions, motives, cognitions, and experiences which are mutually reinforcing. For example, individual differences in extraversion can arise from, and be maintained by, a cheery temperament which draws friends which brings further rewards (positive affect → sociability → positive affect). [Cramer et al. \(2012, p. 416\)](#) position their network model of personality around the fact that “human systems tend to settle in relatively fixed areas of the enormous behavioral space at their disposal, where they are in relative ‘equilibrium’ with themselves and their environments” so that “organism-environment feedback loops [become] important sources of stability because they can serve to sustain behavioral patterns.” Imagine a conscientious worker aspiring to become a high-powered lawyer. To do so, they might select situations demanding high achievement over social ones (e.g., prefer working Saturday night rather than go out with friends). By investing in their long-term work success, industrious workers might also engage in more planning and adherence to self-imposed schedules (e.g., orderly) to efficiently execute a larger number of tasks which, in turn, could lead to gradual accumulation of more important assignments (e.g., expanding task variety). Hence, larger jobs, working hard, and attempts to order the environment correlate or coincide due to their compatibility. This also produces negative dependencies whereby choosing one set of actions or environments comes at the expense of others. Working hard, for instance, may move one into a leadership role demanding toughness, hence shaping people to show less compassion and consideration. Collectively, this creates ‘behavioral equilibria’ whereby certain properties of people and environments naturally attract and repel one another because, “...the organization of the human system and its environment requires it” ([Cramer et al., 2012, p. 417](#)). In this way, networks provide an explanation of individual differences and situational experiences that connect their structure to potential underlying processes and dynamics ([Baumert et al., 2017](#)) which serve an overall focus of adaptation, or sense of “fit” ([Woods et al., 2018](#)).

Adopting a network perspective can enrich positive organizational scholarship. In our study, meaning can be similarly conceptualized as emergent phenomena from a system of reciprocal interactions with various correlates (situational or personal). The overall structural organization, or topology, of the phenomenon and the roles played by specific variables in the network can be analyzed in a manner that is not allowed for by techniques positive organizational scholars typically rely upon (e.g., regression models, factor analysis, structural equation models). Although such research provides important insights, these approaches are not suited for examining the complex systems of interconnected variables that defines our subject matter and so are less helpful as easily pieced together separate research findings on sub-pathways into more complex systems. Additionally, network analysis better represents models of personality development and change ([Cramer et al., 2012](#); [Woods et al., 2018](#)). For our purposes, it can be used in cross-sectional research to identify possible causal pathways, which experimental ([Baumert et al., 2017](#)) and longitudinal research can verify ([Cramer et al., 2012](#)). This approach allows us to move beyond static representations of traits and jobs as primarily predicting meaning (e.g., [Barrick et al., 2013](#)) to represent the interdependency of traits and work characteristics that affect one another

(Woods et al., 2018), and – in our case – help us better understand the emergence of EMW.

2. Methods

2.1. Participants

The data that were analyzed for this study come from a sample ($n = 570$) of working employees from Amazon's Mechanical Turk (MTurk). We used small monetary incentives (\$1.30) to encourage participation. Worker reputation was used to pre-screen individuals prior to granting them study access (e.g., approval ratings $> 90\%$; Peer, Vosgerau, & Acquisti, 2014). Data analysis was restricted to employed individuals in the United States. These individuals worked in a variety of occupations, which mirrored the larger labor force (see Mahmoud, Castille, & Williamson, 2017).³

2.2. Measures

2.2.1. 10 aspects of the Big Five

The ten aspects of the big five (see DeYoung, 2015) were assessed via a suite of ideal point personality assessments designed to measure tendencies described by the full five factor model (see Castille, 2015, which were recently adapted to assess aspects of the big five Castille, 2017). Ideal point personality assessments differ from conventional dominance-based measures of personality in that they more reliably assess mid-range and extreme trait standings (Cao, Drasgow, & Cho, 2015; Chernyshenko, Stark, Drasgow, & Roberts, 2007; Dalal & Carter, 2015).⁴ The marginal reliabilities of these assessments were all acceptable ($\rho > 0.83$) and can be found in Table 1.

2.2.2. Job characteristics

Job characteristics were assessed using scales (3–6 items each) designed by Morgeson and Humphrey (2006) (all $\alpha \geq 0.77$). In addition to the five well-established core job characteristics, we also measured characteristics recently posited as relevant for traits described by the big five (Barrick et al., 2013). Individuals were asked to describe how they personally felt about their job using a series of statements (e.g., “I have the opportunity to develop close friendships in my job”, for *social support*; “My job depends on the work of many different people for its completion”, for *received interdependence*).

2.2.3. Experienced meaningfulness at work

Experienced meaningfulness was assessed using Hackman and Oldham's (1980) 4-item measure ($\alpha = 0.88$). Sample items are “The work I do on this job is very meaningful to me” and (reverse-keyed) “Most of the people on this job feel that the work is useless or trivial.”

2.2.4. Workplace behavior (OCB and task performance behavior)

Workplace behavior measures were assessed using separate measure of OCB and task performance ($\alpha \geq 0.86$). OCB was assessed using a 20-item measure developed by Fox, Spector, Goh, Bruursema, and Kessler (2012). Participants described how frequently (1 = *Never*; 7 = *Everyday*) they engaged in OCB. Sample items are “Picked up meals for others” and “Said good things about your employer in front of others.” Task performance was assessed using a 5-item measure of in-role

performance behavior (see Castille, 2015), which was adapted to describe an individual's performance behavior. Participants described their agreement to a series of statements (e.g., “(I) Complete tasks as they are specified in my job description” and “I take the time to learn the skills that are needed to do my work”).

2.3. Analytical approach

All analyses were conducted at the scale level. We used the R package *qgraph* to analyze and visualize the networks (Epskamp, Cramer, Waldorp, Schmittmann, & Borsboom, 2012). Nodes are positioned using the Fruchterman and Reingold (1991) spring algorithm, which visually represents the relative strength of their connections. Nodes placed closer together are more strongly connected, and nodes nearer the center of the graph have the strongest connections to other nodes. Green lines represent positive correlations and red lines represent negative correlations. Thicker edges correspond to larger correlations.

First, we estimate a graphical Gaussian model (GGM) with edges representing conditionally independent relationships between nodes after controlling for the effects of all other nodes (partial correlation network; Epskamp & Fried, 2018). We regularized the GGM via the graphical LASSO which shrinks trivially small partial correlations to zero. The LASSO was used in combination with the extended Bayesian information criterion (EBIC) for final model selection (Foygel & Drton, 2011). In this approach, 100 networks are estimated with varying degrees of sparsity. Then, the model with the lowest EBIC is selected given a certain value of the hyperparameter gamma (γ), which we set to the default value of 0.5. As the value of γ nears zero, the EBIC will favor a model with a greater number of edges making the default a particularly conservative adjustment.

Next, a network illustrating the shortest paths from each personality aspect to work meaning was computed. In comparison to the first network, this analysis allows clear identification of possible mediating pathways. The shortest pathway between 2 nodes represents the minimum number of steps needed to go from one node to the other, and is computed using Dijkstra's algorithm (see Dijkstra, 1959). This is like a map including all possible routes from destination A to destination B with only one of these pathways being the shortest, which would be the highlighted route in the shortest path network. Given that the partial correlations in the network are directly related to beta weights in a multiple regression models, they can be interpreted as predictive effects: two connected nodes predict each other, and any node that connects the 2 nodes (e.g., node B in the pathway A-B-C) can be seen to mediate the predictive quality between 2 nodes.

Finally, following a procedure by McNally and colleagues (McNally, 2016), we computed a directed acyclical graph (DAG) to estimate a directed, potentially causal structure of the system (see Pearl, 2009). While cause can never be proven from observational data alone, the use of DAG's and other causal discovery algorithms can provide insights about admissible causal relationships given a certain set of conditional probabilities. A central concept in DAG's is d-separation, a set of rules for specifying how control variables block the flow of all information between a focal pair of variables due to indirect causal effects or common causes (see Hayduk et al., 2003 for an accessible introduction). When two variables are d-separated, their covariance terms will be zero for every type of distribution and choice of model parameters. Hence, d-separation provides a formal basis for diagnosing correct versus incorrect causal claims in larger multivariate systems and stronger footing for directional inferences.

We modeled the DAG by bootstrapping the Bayesian hill-climbing function in the R package *bnlearn* (Scutari, 2010). First, an algorithm is applied for identifying the DAG most likely to encode the data's conditional independencies. The hill-climbing algorithm identifies the most likely DAG using a score-based heuristic optimizer which traverses many possible structures (e.g., reversing arcs, eliminating edges) while introducing random perturbations to prevent premature model selection.

³ It is worth pointing out that the MTurk populations appears overrepresented by white-collar workers (see Mahmoud et al., 2017).

⁴ Consider the statement “I occasionally seek out better ways of doing work.” Someone might disagree to this item because they either rarely or always seek out better ways of doing work, and such a response reflects lower and higher levels, respectively, of the personality trait than that tapped into by the item. Unfolding or ideal point models account for this item response behavior (see Roberts et al., 1998). The items for the ideal point assessments used in this study can be found in Castille (2015).

Table 1
Regularized partial correlation network ($N = 570$).

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Polite	0.06	0.95	0.83																							
2. Compass	0.06	0.94	0.37	0.85																						
3. Indust	0.14	0.91	0.00	0.00	0.87																					
4. Order	0.18	0.94	0.03	0.10	0.35	0.83																				
5. Volat	-0.15	0.99	-0.27	0.00	-0.09	-0.03	0.90																			
6. Withd	-0.03	1.04	-0.01	0.07	-0.02	0.00	0.53	0.92																		
7. Enthus	0.05	0.99	0.05	0.00	0.00	0.00	0.00	-0.25	0.92																	
8. Assert	-0.06	1.00	-0.04	-0.07	0.15	-0.00	0.00	-0.02	0.41	0.93																
9. Intell	-0.06	1.00	0.00	0.00	0.25	0.00	-0.10	0.00	0.00	0.15	0.91															
10. Create	0.11	0.92	0.00	0.33	0.05	0.02	-0.02	0.00	0.09	0.00	0.15	0.89														
11. Meaning	3.39	1.12	0.00	0.00	0.06	0.00	-0.03	0.00	0.10	0.00	0.00	0.00	0.88													
12. SocSup	3.36	0.87	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.14	0.77											
13. Interd	3.08	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.78										
14. ExtInt	2.97	1.39	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.02	0.00	0.00	-0.06	0.00	0.00	0.01	0.90									
15. TAut	3.29	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.15	0.02	0.00	0.00	0.00	0.81								
16. TVar	3.69	1.00	0.00	0.02	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.15	0.00	0.06	0.21	0.92								
17. Tide	3.48	0.97	0.00	0.00	0.00	0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.03	0.00	0.84							
18. TSig	3.28	1.21	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.32	0.02	0.00	0.14	0.02	0.08	0.01	0.90						
19. TFree	3.46	1.06	0.01	0.00	0.03	0.00	-0.05	0.00	0.01	0.00	0.00	0.02	0.09	0.00	0.00	0.02	0.00	0.00	0.13	0.11	0.91					
20. SFree	3.26	1.15	0.00	0.00	0.02	0.00	-0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.19	0.01	0.00	0.00	0.00	0.03	0.01	0.56	0.91				
21. Acco	3.10	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.06	0.25	0.07	0.10	0.10	0.00	0.08	0.00	0.13	0.93			
22. TP	4.15	0.72	0.00	0.05	0.18	0.13	-0.04	0.00	0.00	0.00	0.00	0.18	0.00	0.05	0.00	0.00	0.00	0.04	0.03	0.00	0.02	0.00	0.00	0.88		
23. OCBI	3.27	1.14	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	
24. OCBO	3.37	1.14	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.11	0.00	0.00	0.00	0.04	0.00	0.73	0.86	

Note. The least absolute shrinkage and selection operator (LASSO) does not produce traditional p-values but rather estimates all partial correlations while minimizing a penalty term based on the sum of the absolute values of the coefficients. Polite = politeness; Compass = compassion; Indust = industriousness; Order = orderliness; Volat = volatility; Withd = withdrawal; Enthus = enthusiasm; Assert = assertiveness; Create = openness to experience (aspect); Intell = intellect; SocSup = social support; Interd = task interdependence (both initiated and received); ExtInt = external social interactions; TAut = task autonomy; TVar = task variety; Tide = task identity; TSig = Task significance; TFee = task feedback; SFee = social feedback; Acco = holding others accountable; TP = task performance; OCBI = organizational citizenship behavior – interpersonal; OCBO = organizational citizenship behavior – organization.

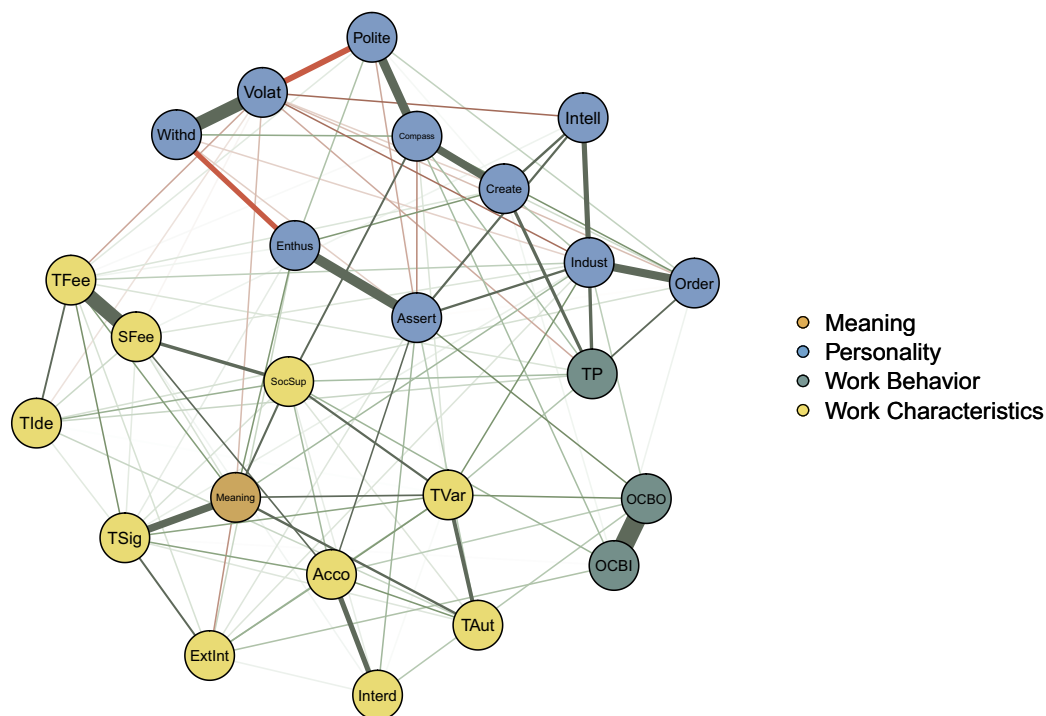


Fig. 1. Graphical LASSO network in which edge weights reflect relative strength of an association with green denoting a positive association and red a negative association. Polite = politeness; Compass = compassion; Volat = volatility; Withd = withdrawal; Create = creativity/openness to experience (aspect); Intell = intellect; Enthus = enthusiasm; Assert = assertiveness; Order = orderliness; Indust = industriousness; OCBO = organizational citizenship behavior – organization; OCBI = organizational citizenship behavior – interpersonal; Interd = task interdependence (both initiated and received); SocSup = social support; Tide = task identity; SFee = social feedback; TFee = task feedback; Acco = holding others accountable; TVar = task variety; TAut = task autonomy; TP = task performance; TSig = task significance; ExtInt = external social interactions. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

The algorithm converges on a final solution maximizing the probability of the graph given the data using the lowest BIC. Random restarts were set at 50 and perturbations at 100. Second, the network is stabilized through bootstrapped resampling; edges absent in a preset proportion of cases are removed. We applied 1000 bootstraps, averaged them to attain the final network, and only retained edges appearing in over 85% of bootstrapped networks. Finally, the direction of an edge was depicted if it pointed from node X to node Y in at least 51% of the networks. The probability of the edge direction was visualized by line thickness in the final DAG. Hence, if an edge points from node X to node Y in 999 of 1000 bootstrapped networks, it would appear very thick; however, if the same association appeared in only 550 of 1000 networks, it would be very thin.

3. Results

The regularized partial correlation network is presented in Table 1 and resulting network visualization in Fig. 1. Collectively, about half of the variance in experienced meaningfulness is explained by the network ($R^2 = 51\%$). A few features are worth nothing. Notably, all ten personality aspects are most proximate to their counterpart within the Big Five taxonomy (e.g., politeness strongly related to compassion). Additionally, job characteristics are proximate to one another within the network, as are job performance behaviors. While there are many noteworthy patterns, we focus the remainder of the results on the direct and indirect relationships with experiencing work as meaningful.

In regard to job characteristics, partial correlations indicate the core job characteristics are uniquely and directly linked to EMW: task significance ($r = 0.32$), autonomy ($r = 0.15$), task variety ($r = 0.13$), and task feedback ($r = 0.09$). Additionally, the social work characteristics social support ($r = 0.14$) and social feedback ($r = 0.02$) are directly linked to EMW. The remaining job characteristics were not associated uniquely or directly with EMW.⁵

⁵ One exception is external social characteristics related to interdependence, which was negatively related to meaning within the context of the larger network. Because the bivariate correlation is positive, this implies suppression in that once the beneficial effects of the other work characteristics are removed,

In addition to job characteristics, certain personality aspects were also uniquely and directly linked to EMW: enthusiasm ($r = 0.10$), industriousness ($r = 0.06$), and volatility ($r = -0.03$). The remaining traits and performance behaviors were not uniquely or directly associated with EMW.

For those factors not linked to experienced meaningfulness, their association (should any exist) are likely indirect via their overall effects on network connectivity, which is partially reflected in the centrality indices (Fig. 2). Experienced meaningfulness is one of the nodes with the highest strength, betweenness, and closeness, indicating numerous nodes (and corresponding pathways) shape the degree to which people find worth in their work. Additionally, we note social support is very high on betweenness. This suggests social support is a common bridge between far removed nodes. Give its strong linkage to work meaning, social support may serve as a core mediator explaining why many disparate constructs relate to meaning making, including social feedback, task identity, compassion and task performance.

The shortest path network illustrating the smallest distance between all ten personality aspects and meaning is provided in Fig. 3. To clarify what these paths imply, we describe these possible pathways in Table 2. The shortest route for neuroticism aspects, assertiveness, and intellect are all through enthusiasm which, itself, is directly connected to EMW. Both aspects of agreeableness and the creativity (i.e., openness to experience) aspect of the broader openness trait run through social support while both aspects of conscientiousness run through task variety to reach meaning. This suggests the shortest route for all traits to reach meaning is by their association with enthusiasm, social support, or task variety.

Finally, the DAG provides a plausible casual diagram between nodes. In Fig. 4, edge weights represent directional probabilities. Higher values and therefore thicker arrows indicate a greater likelihood the edge points in the depicted direction. Thus, the thick edge pointing from politeness to assertiveness appeared in a large proportion of bootstrapped networks, whereas the thin edge pointing from meaning

(footnote continued)

the only remaining external social interactions are those that may detract appear to from meaning (e.g., sales, media).

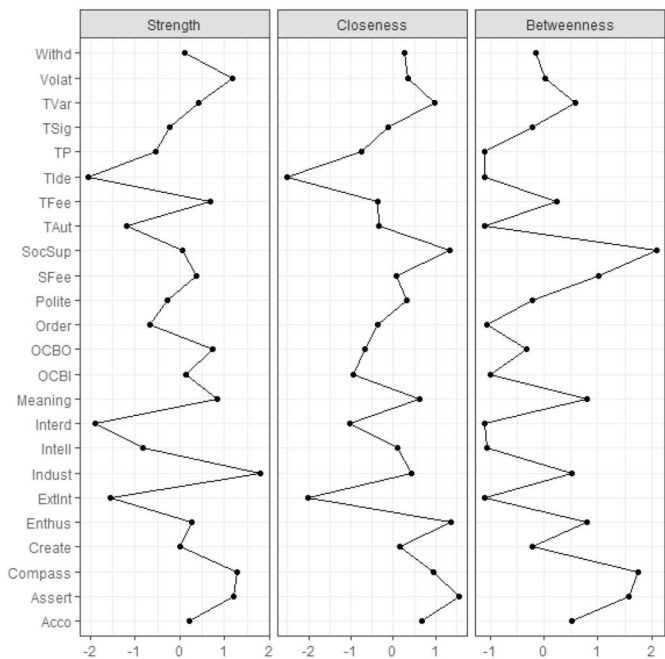


Fig. 2. Centrality plot. Betweenness = # times a given node lies on shortest path between any two other nodes; Closeness = average distance between a given node and all other nodes, calculated from the inverse of the weighted sum of shortest path from a given node to all other nodes. Strength = sum of edge weights connecting a node to all other nodes.

Table 2
Shortest pathways between the ten facets of the Personality Aspects scale and experienced meaningfulness at work (EMW).

Withdrawal → enthusiasm → EMW
Volatility → withdrawal → enthusiasm → EMW
Polite → compassion → social support → EMW
Compassion → social support → EMW
Enthusiasm → EMW
Assertiveness → enthusiasm → EMW
Creative → compassion → social support → EMW
Intellect → assertiveness → enthusiasm → EMW
Orderliness → industriousness → task variety → EMW
Industriousness → task variety → EMW

to task variety appeared in fewer. The highest value appeared for the connection between meaning and task significance (0.99), and the lowest value belongs to the connection between openness to experience aspect and enthusiasm (0.51). Of note is the directed arrow from enthusiasm to meaning, with greater meaning in work appearing to predict a variety of job characteristics, including task significance, feedback, social support, variety, and external social interactions. This suggests that personality precedes EMW and, further, experiencing one's work as meaningful *causes* one to perceive their work in ways defined by job characteristics theory (i.e., as granting autonomy, providing task significance, etc.).

4. Discussion

By examining the role of personality in relation to proposed antecedents and consequences of EMW, we extend the prior literature on what makes work meaningful. We further showcase network analyses

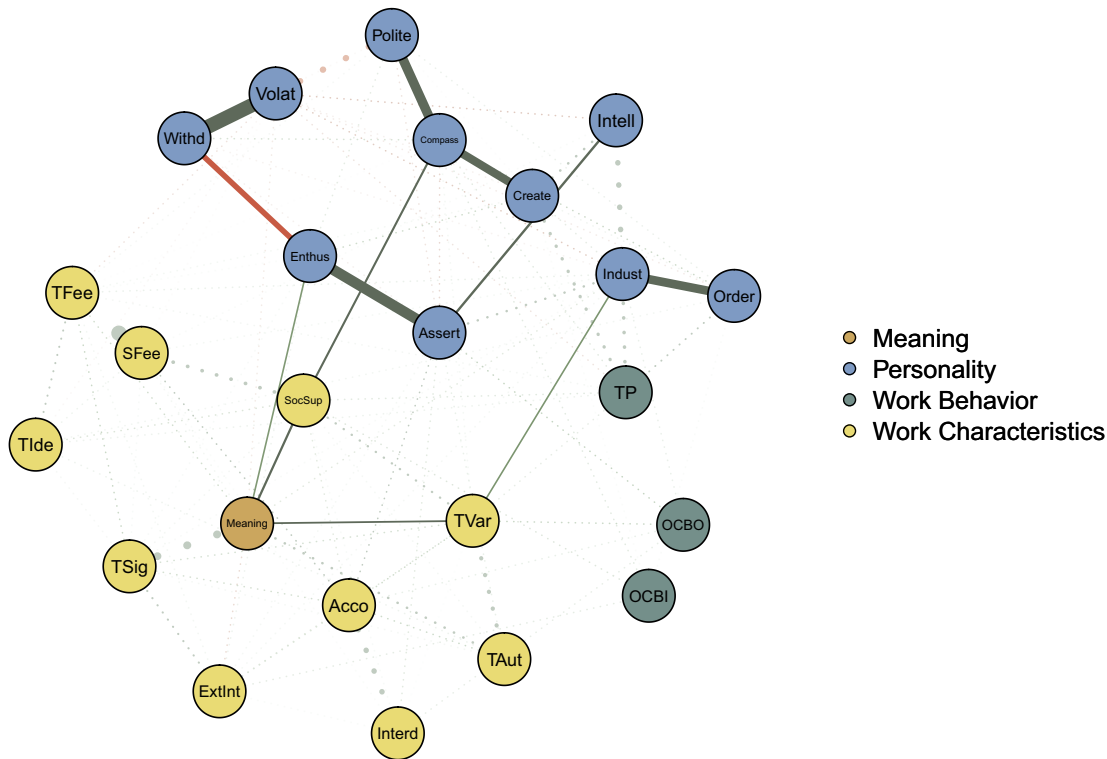


Fig. 3. Networking depicting shortest paths between the ten facets of the Personality Aspects scale and work meaning. Edges < 0.01 are minimized for clarity. Polite = politeness; Compass = compassion; Volat = volatility; Withd = withdrawal; Create = creativity/openness to experience (aspect); Intell = intellect; Enthus = enthusiasm; Assert = assertiveness; Order = orderliness; Indust = industriousness; OCBO = organizational citizenship behavior – organization; OCBI = organizational citizenship behavior – interpersonal; Interd = task interdependence (both initiated and received); SocSup = social support; Tide = task identity; SFee = social feedback; TFee = task feedback; Acco = holding others accountable; TVar = task variety; TAut = task autonomy; TP = task performance; TSig = task significance; ExtInt = external social interactions. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

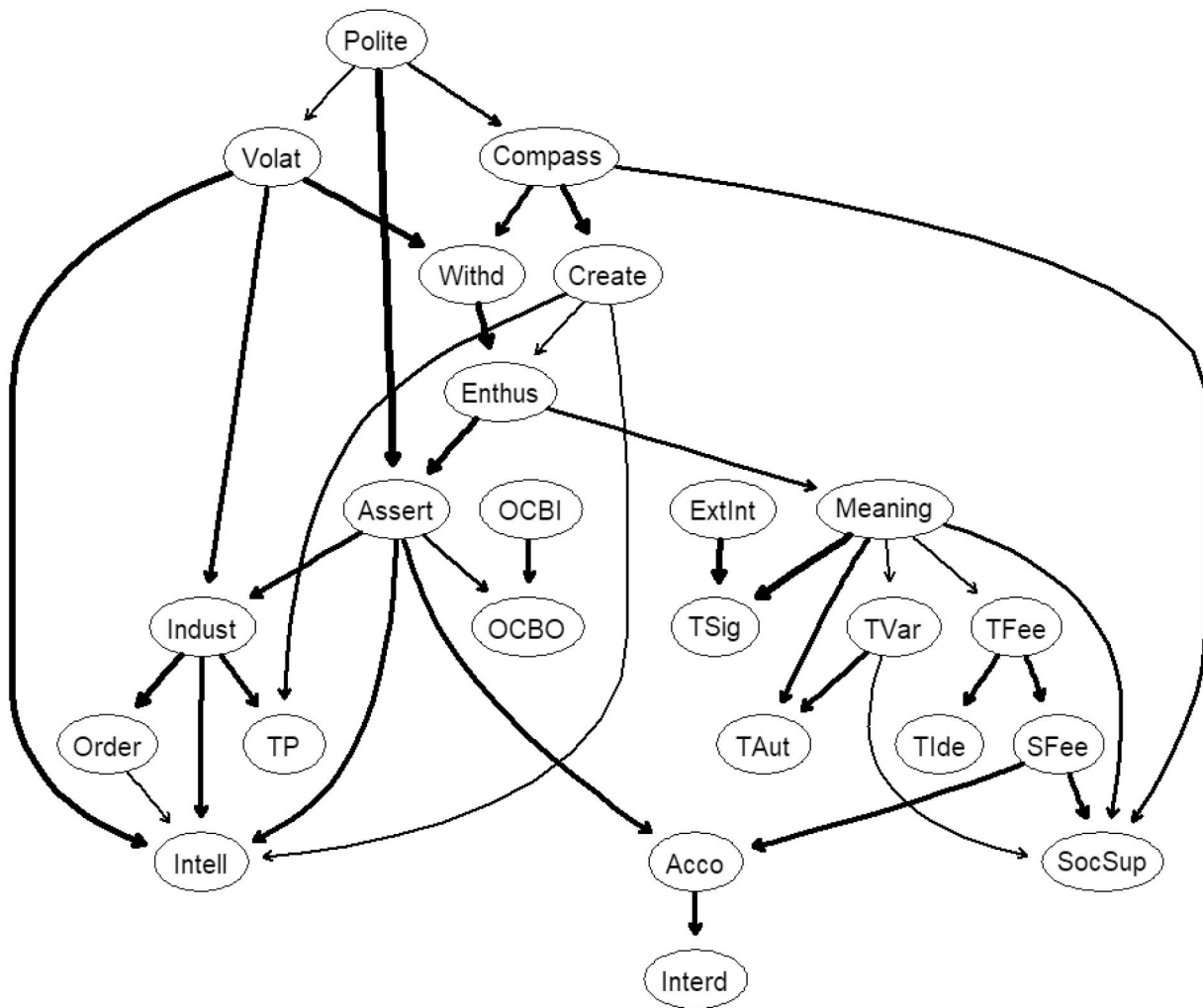


Fig. 4. Directed acyclic graph (DAG). Edge thickness signifies the probability of prediction is in the direction depicted.

to uncover unique, indirect, and proximate sources of meaning by simultaneously modeling the system of relationships between personality, job characteristics, and work behavior. The validity of this approach can be partially confirmed by its ability to replicate common effects reported across numerous meta-analyses. This includes the larger effects of the aspects of conscientiousness on task performance relative to other traits (Barrick & Mount, 1991), differential effects of aspects of agreeableness and conscientiousness on individual and organizational citizenship behaviors (Chiaburu, Oh, Berry, Li, & Gardner, 2011), and larger effects for task variety, significance, and autonomy on work meaning relative to task identity (Humphrey et al., 2007).

Uniquely, we find that each of the personality aspects appear either directly (enthusiasm) or indirectly (the remaining aspects) linked to experienced meaningfulness. The shortest paths indicate industrious people find meaning through task variety, possibly by expanding their skills and role boundaries. Compassionate people, on the other hand, find it through social support, perhaps by building or finding better social environments in which to work. While not the shortest path, low volatility is indirectly linked to meaning through task feedback, indicating a willingness to seek out diagnostic information about performance. These results align with models on how young adults develop a calling by expanding their ability, involvement, and social comfort within a chosen profession (Dobrow, 2013). The DAG graph further hints at directional effects with those higher on enthusiasm more likely to discover work purpose (e.g., calling, passion) which drives them to find roles providing freedom, variety, and support. Further, the network

can address ambiguity on whether enthusiasm is related to meaning because it broadens thinking or because it builds relationships (Steger et al., 2013). The network indicates enthusiasm is directly linked to creativity (also labeled openness to experience aspect) but not social support, suggesting broadened thinking in discerning coherent patterns across diverse life elements is a better mechanism explaining why those higher on positive affect find work meaningful (see also King, Hicks, Krull, & Del Gaiso, 2006).

It is worth noting job characteristics are more strongly associated with experienced meaningfulness than personality aspects. This is clearly visualized by meaning's proximity to task significance, autonomy, variety, feedback, and social support. This speaks to the prominent effects of work context; namely, that regardless of one's personality, it is possible for work to be structured in ways that make it more interesting and meaningful (Hackman & Oldham, 1980). Interestingly, the large effects of social support on experienced meaningfulness indicate its inclusion into work characteristics (Barrick et al., 2013; Morgeson & Humphrey, 2006) holds incremental explanatory power. By contrast, our findings suggest that personality also holds explanatory power. Once we accounted for individual differences in personality aspects - many of which were strongly and uniquely associated with EMW - neither OCB nor self-reported task performance were uniquely or directly associated with experiencing work as meaningful. This finding suggests correlations between experienced meaningfulness and performance behaviors may be spurious, explained by individual differences in personality traits, or that the two domains indirectly

relate to one another. Future research seems needed to clarify, corroborate, and explain this finding.

4.1. Theoretical implications

If we assume the primary routes to finding meaning at work are through purpose and self-realization (see Martela & Pessi, 2018), then our findings provide clues into what the discovery of work meaning looks like. For job characteristics, task significance and social support suggest work carried out in and with the service of others (purpose) whereas task variety, feedback, and autonomy likely promote meaning by expressing and cultivating the self (realization). Conversely, characteristics unrelated to work meaning (i.e., identity, accountability, interdependence) do little to facilitate purpose or growth. In terms of personality, individuals who are more enthusiastic, industrious, and less volatile are more likely to find meaning in their work, with enthusiasm possibly taking causal precedence. If employees are not elevated in the appropriate direction on these three aspects, how might we shift employee personality in a direction conducive to meaning making?

The DATA model (Woods et al., 2018) offers guidance regarding how work experience might change personality by casting both jobs and individuals as continuously interacting, dynamic entities engaged in a series of transactions. Drawing on Super's work on adjustment (Super, 1980), they point out how behavioral reactions to work demands can be managed via rewards and punishments, resulting in the cultivation of habits that might, over time, produce deep trait changes. Indeed, work redesign research both corroborates their model and informs how changes in work demands might precede changes in personality. A longitudinal study of engineers, scientists, and managers revealed that certain job characteristics (e.g., task identity and feedback) were uniquely related to increases in sociability (which is analogous to enthusiasm) over 7 years (Brousseau & Prince, 1981). A variety of changes were also observed that appear aligned with our own findings. Unfortunately, due to differences in measurement, such interpretations are questionable at best. Additionally, they did not examine changes in social characteristics of work, such as social support. A field experiment which examines how interventions targeting social support (e.g., using work-related happy hours to facilitate bonding; see Sayette et al., 2012) might relate to changes in personality at work would be informative. Regardless, it does appear that changes in work demands (e.g., enriching work) can trigger changes in the personality system over a long period of time.⁶ However, longitudinal and experimental research is needed to corroborate this view.

4.2. Strengths and limitations

As we have discussed, our analysis should be considered as hypothesis-generating for putative causal structures that require empirical validation. The appeal of Bayesian networks is their promise to disclose potentially causal links among nodes, even in cross-sectional data sets. Yet, this comes with several stringent assumptions. To infer causation from cross-sections, one must be confident no important variables have been omitted from the network (Antonakis et al., 2010). Obviously, if a key variable driving purpose at work is not part of the input, one cannot detect its causal influence. While we have included several major personality, job, and social variables, there may nevertheless be other key factors that we have failed to include in our analysis.

To a related point, we have only measured all of our factors once at a single point in time. This imposes particular constraints on our conclusions; namely, the most plausible causal model (see our DAG graph)

represents, at best, a system in a relatively stable state with the assumption of no cycles. Longitudinal study of our factors, which will involve at least three measures of each of the constructs across a significant period of time (several months or years), would further clarify how changes in one element of the system relate to others. Such a study would allow investigation of virtuous cycles whereby activation origination from one indicator activates other indicators that then loop back to influence the original state (e.g., personality changes as a function of changing perceptions in the work environment). Therefore, we call for future research in this area to include temporal and experimental data to test our claims.

Additionally, as our research examines the interrelations between personality, job characteristics, experienced meaningfulness, and work behavior, we have not accounted for any possible person-situations interactions. Unfortunately, this is because there is little guidance for incorporating statistical interactions in the context of network analysis. Therefore, we call for network analysts to offer guidance regarding how person-situation interactions might be studied with the context of network analysis. Such research will help us determine whether certain personality-work characteristic interactions give rise to experienced meaningfulness (and, correspondingly, performance behavior) at work.

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⁶ It is worth pointing out that the opposite is also quite plausible; namely, that allowing a job to lack enriching qualities might produce undesirable changes in personality (e.g., learned helplessness; see Roth, 1980).

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