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JCM, VIE and Engagement in Predicting Federal Workers' Performance
6/23/2014

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The 29th Annual SIOP Conference

May 17, 2014, Honolulu, Hawai`i (Oahu) Poster session: 264-12

ABSTRACT
We compared the relative effectiveness of the JCM and VIE theories as predictors of performance and the mediating role of employee engagement in federal employees ($N = 42,020$). VIE was a stronger predictor of performance and rewards than JCM. Engagement fully mediated the relationship between JCM and performance.

PRESS PARAGRAPH
Federal agencies are under pressure to reduce spending and increase efficiency. As organizations face the loss of more experienced employees, they must ensure current employees remain motivated and committed. Our findings show that employees are motivated to perform well when they believe they can accomplish what is asked of them and their efforts lead to valued rewards. They are more engaged at work when provided with a meaningful and challenging job. By structuring jobs that lead to higher levels of employee engagement, managers in the federal government can increase worker productivity without having to rely solely on monetary incentives.

Introduction

The federal government is under increasing pressure to reduce spending and increase efficiency. Sequestration and continual media debate as to the role and size of government have taken their toll on workplace morale. At the same time, the rise in retirement eligibility and retirement rates among federal employees means that federal workplaces are facing the loss of their most experienced employees. (Leeds, Roth, & Tsugawa, 2009) One key to overcoming these challenges is to increase the motivation and commitment

of individual employees. We examined two predominant work-related motivational theories, Hackman and Oldham's (1980) Job Characteristics Model (JCM) and Porter and Lawler's (1968) revision of Vroom's expectancy theory (VIE) (Vroom, 1964) regarding their relative effectiveness in motivating federal employees. We also tested the role of employee engagement as a performance mediator of both JCM and VIE theory constructs.

Engagement

Employee engagement, having originated in the HR consulting arena, has found traction among academic researchers (Macey & Schneider, 2008). Employee engagement can be best conceptualized as performing discretionary work (Bakker, 2011) such as organizational citizenship behaviors (Smith, Organ, & Near, 1983). Engaged workers believe in the organization's mission and are motivated by more than external rewards (Bakker, 2011; Marciano, 2010). Engagement differs from motivation (Pinder, 2008). It involves both cognitive and affective components, and engaged employees are expected to display high levels of performance (Bakker, 2011).

Engagement plays an important motivational role in both the private and public sectors. In the private sector engaged employees have been shown to contribute to a better service climate and higher profits (Salanov, Agut, & Peiró, 2005). Evidence from two meta-analyses found that employment engagement was positively related to organizational outcomes of customer loyalty, productivity, and profitability and negatively related to turnover, safety accidents, absenteeism, and shrinkage (Christian, Garza, & Slaughter, 2011; Harter, Schmidt, & Keyes, 2003). In the public sector, findings from recent studies conducted by the U.S. Merit Systems Protection Board revealed a positive relationship between employee engagement and organizational effectiveness (Nierle, Ford, and & Shugrue, 2008). Therefore, *Hypothesis 1* stated that engagement scores would be positively related to federal employee performance ratings and merit awards received.

JCM

The Job Characteristics Model (JCM), a theory of work design (Hackman and Oldham, 1975), posits that workers will be highly motivated to perform jobs that: (1) require a variety of skills, (2) have a significant impact on others, (3) have clearly defined tasks, (4) provide veridical feedback on performance, and (5) provide autonomy (i.e. a discretion in how work is performed). The JCM focuses on how these five characteristics can be used to design a job that will increase workers' intrinsic motivation to perform well. The JCM's primary driver for motivation is the nature of the job; in Expectancy theory (VIE), motivation is driven by obtaining valued rewards.

Fried and Ferris's (1987) meta-analysis found that the five characteristics of the JCM were strongly related to work motivation and, to a lesser degree, job performance and absenteeism. A more recent meta-analysis by Humphrey et al. (2007) found that the five characteristics explained substantial variance in job satisfaction (34%), performance (25%), and organizational commitment (24%). Therefore, *Hypothesis 2* stated that Motivation Potential Levels (MPL) derived from the Hackman and Oldham's JCM would be significantly associated with federal employee performance ratings and awards received.

VIE

Vroom's (1964) Expectancy theory, or VIE (Valence, Instrumentality, Expectancy) posits that motivation depends upon the extent to which the worker expects that his or her efforts will lead to successful performance which, in turn, will lead to valued outcomes. In Porter and Lawler's (1968) enhanced model, these rewards can be either internal (e.g. meaningfulness of work), external (e.g. pay), or both.

As with JCM, VIE has wide support in both the private and public sectors. Van Eerde and Thierry (1996) showed that objective measures of work effort were related to the components of the model. In a study using government workers, Prichard and Sanders (1973) found that Vroom's model predicted job performance particularly with regard to valence of job outcomes. Regarding internal rewards (Porter & Lawler, 1968), Lindner (1998) found that private sector workers derive value from rewarding work and rank interesting work as highly motivating. Because VIE accounts for the intrinsic value (Locke, 1968) that employees place on rewarding and interesting work, it is reasonable to assume that it lends itself to an examination of public sector employee motivation as well. Therefore, *Hypothesis 3* stated that Motivation Force Scores (MFS) derived from VIE model would be positively associated with employee performance ratings and awards received. Considering that the three scores measure distinct aspects of employee workplace perceptions, *Hypothesize 4* stated that engagement scores, VIE scores, and MPL will contribute uniquely to the prediction of performance ratings and merit awards.

Role of Engagement

There is evidence that employee engagement serves to either partially (Schaufeli & Bakker, 2004) or fully mediate (Biswas & Bhatnagar, 2013; Hakanen, Bakker, & Schaufeli, 2005; Salanova, Agut and Peiró, 2005) the relation between organizational antecedents and important organizational outcomes. However, Putter (2010) found that engagement did not mediate the relation between organizational climate and financial/operational performance indicators including measures of profitability, sustainability/growth, and productivity.
Fried and Ferris (1987) commented that the research examining the degree to which psychological states (e.g., engagement) mediate the relation between job characteristics and job performance is inconclusive. In our review the evidence for engagement's role as a mediator of workplace outcome is not entirely clear, and we found no research exploring the role of employee engagement as a mediator between motivational attitudes and individual-level job performance. Therefore, *Hypothesis 5* proposed that engagement scores would partially mediate the relationships between scores based on the JCM (*Hypothesis 5a*) and for VIE (*Hypothesis 5b*).

Method

Participants

The 2010 Merit Principles Survey (MPS 2010) (Leeds et al, 2013) was distributed online and in paper form to 71,970 full-time, permanent, federal employees, to which 42,020 responded (58% response rate) (Leeds, Osowski, and Roth, 2013). Participation was voluntary. Employees were ensured of confidentiality and that no data about individual responses would be disclosed.

Predictor and Outcome Measures

Three predictor variables measuring components of the JCM, VIE and engagement were obtained from a subset of the 310-item MPS 2010 survey (Leeds, Osowski, and Roth, 2013) where VIE model valence ratings were 1 = Unimportant to 5 = Very Important. All items in our study used a standard 5-point Likert scaling where: 1 = Strongly Disagree to 5 = Strongly Agree. Two outcome measures of performance were obtained from employees' personnel records: (1) annual overall supervisor performance ratings (PR) (5-point scale from 1 = Unacceptable to 5 = Outstanding) and (2) the total number of merit awards (MA) received by each employee during the survey year (ranging from zero to four).

Predictors

Motivation Potential Level (MPL). The Motivation Potential Level (MPL) (Leeds et al., 2013), an aggregate measure of the five components of the JCM, was an adaptation from Hackman and Oldham's (1975) original formula with 15 items. Our abbreviated version consisted of the five items shown in Table 1 and was calculated as: [(Skill Variety + Task Identity + Task Significance) ÷ 3] × Autonomy × Feedback. The MP scores ranged from one to 125. The average of the five items means was 3.89 ($SD = .25$; $\alpha = .74$).

Place Table 1 Here

Motivation Force Score (MFS). The Motivation Force Score (MFS) (Leeds et al., 2013) incorporates in one score the three VIE model components: (1) Effort to performance (E>P);
(2) Performance to valence (P>V); and (3) Value of rewards (V). See Table 2.

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The MFS is computed based on eleven Motivation Force statistics (MF_i) and is the product of the employee's response to three items measuring the extent to which: (1) effort results in performance, (2) performance yields the particular reward, and (3) the importance of the reward (i.e., valence). Thus, $MF_i = [(Q1) \times (Q2) \times (Q3)]$ (Leeds et al., (2013)).

The eleven MF_i's combine to form a single MFS score computed as the sum of the employee's highest MF_i (denoted MFh) and the average of the employee's remaining 10 MF_i's. Thus, $MFI = MFh + (\Sigma MF_i / 10)$.

➢ MFh = the highest Motivation Force statistic among the 11 computed statistics
➢ MF_i = the individual Motivation Forces statistics for the 10 rewards not the MFh

The MFS formula gives equal weight to the reward most motivating to the employee and to the combined motivating influence of the other rewards. It summarizes in one score the three components of the VIE model and is expected to correlate with job performance (Leeds et al., 2013). MFS scores ranged from: 1 = Minimal Motivation to 250 = Maximal Motivation with an Alpha of $\alpha = .97$.

Engagement Scale (ES). The Engagement Scale (ES) (Nierle et al., 2008) was a sum of the 16 items (Table 3) with scores ranging from 16 to 80 with higher scores representing stronger engagement. The average of the item means was 3.82 and *SD* of .27 (N = 39,440; α = .94).

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Outcome Measures

      Two work performance measures were obtained from each employee's most recent annual performance review. The first was their overall job performance rating (PR) ranging from: 1 = Unacceptable to 5 = Outstanding with a mean of 4.02 and a *SD* of .78 (N = 20,672). The second was the number of monetary merit awards (MA) (M = 0.88; SD = .55; N = 38,212).

      For the reader's benefit, we have provided abbreviations and formulas of the theoretical associated constructs discussed above (Table 4).

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Results

Hypothesis 1, 2, and 3

      Table 5 shows the correlation analysis. As predicted, MPL (JCM), MFS (VIE), and engagement (ES), scores were significantly ($p < .01$) positively related to performance ratings (PR) with r = .13, r = .22, r = .15 respectively and to merit awards (MA) with r = .06, r = .08, and r = .08 respectively. Thus, *Hypotheses 1, 2,* and *3* are supported with MPL, MFS, and ES scores having small but significant relations to performance ratings and merit awards with stronger relations observed for performance ratings than for merit awards.

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      We used AMOS (version 20) structural equation modeling (SEM) software and a sample of 17,792 respondents to test *Hypothesize 4*. Table 6 shows the standardized path coefficients (with standard errors), total effects, and fit statistics for each of the models evaluated. Model 1 models all three motivational constructs at once. Models 2, 3, and 4 model the three motivation constructs in paired combination and Models 5, 6, and 7 present them in isolation.

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Examining Model 1 in Figure 1, the VIE construct had the strongest standardized path coefficient (*spc* = .30; p < .01) to the Performance construct while engagement had the next strongest (*spc* = .06; p < .01) and the MPL construct having the weakest (*spc* = -.05, *NS*). Thus, *Hypothesize 4* is only partially supported with only VIE and engagement contributing to total performance effects.

Place Figure 1 (Model 1) Here

Examining construct pairs in Models 2, 3, and 4 for contributions to total effects on performance, engagement prevailed over JCM (*spc* = .25 (*p* < .01) versus *spc* = .021 *NS*). However, VIE prevailed over both engagement (*spc* = .30 (*p* < .01) versus *spc* = .02 *NS*) and JCM (*spc* = .33 (*p* < .01) versus *spc* = -.015 *NS*)

Turning to Models 5,6, and 7 which show the three constructs modeled in isolation, VIE had the strongest standardized effect on performance (*spc* = .32 (*p* < 01)) followed by engagement (*spc* = .26 (*p* < 01)) and finally JCM (*spc* = .22 (*p* < 01)).

We used an AMOS SEM procedure to test the JCM-Engagement-Performance mediation (*Hypotheses 5a)* and VIE-Engagement-Performance mediation (*Hypotheses 5b*). Two mediation models were estimated treating in turn (1) JCM and (2) VIE as exogenous constructs with engagement as the mediator to the endogenous performance construct. Direct effects and indirect effects on performance were estimated. Results are presented as Model 8 and shown as Figure 2.

Place Figure 2 (Model 8) Here

For *5a* the model fit was reasonable (*DF* = 206; X^2 = 12,748; *RMSEA* = .059). Results show that absent the engagement mediator, the path from JCM to performance was *spc* = .23 (*p* < .01). After the inclusion of the engagement mediator the path from JCM to performance became non-significant (*spc* = .02) while the indirect effect of JCM on performance through the engagement mediator was significant (*spc* = .21 (*p* < .01)). Thus *Hypothesis 5a* is supported in these analyses.

For *5b*, results are presented as Model 9 and shown as Figure 3.

Place Figure 3 (Model 9) Here

Again the model fit was reasonable (*DF* = 352; X^2 = 18,788; *RMSEA* = .054). Results show that absent the engagement mediator, the path from VIE to performance was *spc* = .31 (*p* < .01). After the inclusion of the engagement mediator the path from VIE to performance remained significant (*spc* = .29 (*p* < .01)) while the indirect effect of VIE on performance through the engagement mediator was non-significant (*spc* = .04). Thus *Hypothesis 5b* was not supported.

Discussion

The first three hypotheses were supported with small but non-trivial significant correlations for each of the predictors (JCM, VIE, Engagement) on both performance (PR) and the awards (MS) criteria. VIE was a stronger predictor of performance than

engagement which in turn was stronger than JCM. All three predictors showed higher correlations with PR than for MA. We speculate that the small correlations partially result from (1) the difficulty of conducting performance appraisal in the federal civil service (Oh & Lewis, 2013) and (2) the strong range restriction observed among the performance ratings ($M = 4.02$, $SD = .78$) where 70% of employees were rated a four or a five and only 5% were rated a one or a two.

Hypothesis 4 stated that each predictor would account for unique variance in total performance (PR and MA combined). An SEM model simultaneously estimating direct effects of engagement, VIE, and JCM constructs on job performance revealed that only VIE and engagement contributed significantly to total effects on performance. VIE was clearly the strongest driver of performance effects with engagement significant but substantially less, and JCM not at all. A series of follow-up SEMs showed that VIE was the strongest and most consistent driver of performance. When paired with JCM, engagement alone contributed to total effects but failed to contribute at all when paired with VIE. Results show that, ignoring any mediator effects, employees who value workplace rewards (e.g., performance ratings and recognition) and believe that these rewards are contingent on performance tend to perform better than when this is not the case and the characteristics of their job and their level of engagement seem to play smaller roles.

Engagement as a Mediator

We found that engagement mediated the relationship between JCM-Performance but not for VIE-Performance. The fact that engagement was a mediator only for JCM seems reasonable given that workers should be more engaged when their jobs are intrinsically motivating (Ryan & Deci, 2000). Other research has shown that job characteristics do predict engagement (Bakker & Demerouti, 2008; Saks, 2006) and that engagement mediates the relationship between job characteristics and performance outcomes (Dullaghan, Loo, & Johnson, 2010). Thus, one's level of engagement appears to facilitate the impact of JCM, but not VIE, to job performance and the two constructs. Specifically, for each standard unit of change in their combined direct and indirect effects, job performance can be expected to change by about ½ a *SD*.

Limitations

Given that the sample consisted of employees in federal agencies, the findings may generalize only to the public sector workforce. Our MPL construct was only an approximation to the original JCM construct derived from the Job Diagnostics Survey (Hackman & Oldham, 1975). Likewise, because our VIE score was composed of an item asking about the degree to which employees were motivated by and valued a high performance appraisal rating, it may not be comparable to measures used in other studies. It is also conceivable that one's rating on this item may be influenced by the degree to which an employee received a favorable performance rating. Similarly, with regard to its construct standing, our ES is only one of many such measures used to assess employee engagement (Hallberg & Schaufeli, 2006; Schaufeli et al., 2002). Finally, because this was a relational study we could not establish the temporal precedence of the survey response collection with the occurrence of the performance review rating. Therefore, the observed effect for VIE may be due to reciprocal causality.

Contributions

To our knowledge our study is the first comparing JCM and VIE theories directly using the same objective performance outcomes with a large, robust sample of public sector workers. We believe this constitutes a reasonable test of the two theories and

provides additional support for both. Our construct measure for VIE (MFS) incorporates the important concept of individual differences in valence (i.e. relative importance of a particular outcome) posited in Locke's (1976) Value Theory. Finally, our study provides support for the important role of employee engagement as a mediator between job characteristics and performance outcomes.

Conclusion

The findings from this study support Pinder's (1998) contention that "At the very least it [VIE] is a probably an accurate representation of how people form work-related intentions." (p. 359). Additionally, given that the two theories were compared directly using a robust sample, our results provide evidence that VIE is a stronger motivator than JCM. Employee engagement was shown to play an important role not only as a motivator for performance, but also as a mediator between job characteristics and valued performance outcomes. Employees who are absorbed in their work and feel a sense of connectedness to the people, job, and organization may be more able to appreciate the favorable qualities of their job than employees who are disconnected and lack passion about what they do. Finally, our findings suggest that by structuring jobs that lead to higher levels of employee engagement, managers in the federal government may be able to boost worker productivity without having to rely solely on monetary incentives.

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BOLD indicates reference is in Zotero

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Tables

Table 1

Five Components and Items of the Job Characteristics Model (JCM)

MPL Component	Survey Item
Skill Variety	My job allows me to perform a variety of tasks that require a wide range of knowledge, skills, and abilities.
Task Identity	My job allows me to complete a single piece of work (rather than bits and pieces) from beginning to end.
Task Significance	My job has a significant positive impact on others, either within the organization or the public in general.
Autonomy	My job gives me the freedom to make decisions regarding how I accomplish my work.
Feedback	I receive information about my job performance and the effectiveness of my efforts, either directly from the work itself or from others.

Table 2

Motivation Force Score Items Measuring VIE Components

MFi	Survey Item
Q1 (E>P)	"When I put forth my best effort, I achieve a high performance appraisal rating."
Q2 (P>V)	"In my work unit, the better I perform on the job, the greater my opportunity for… (the specific reward of which there were 11)."

Q3 (V) An employee's indication of how important *each job factor* was to him or her in seeking and continuing employment in his or her organization.

MFS Reward Number	Reward Item
1	Personal Satisfaction
2	Awards and Bonuses
3	Interesting Work
4	Being Included in Decisions
5	Feeling Appreciated
6	Being Able to Serve the Public
7	Getting Forgiveness
8	Job Security
9	Advancement Opportunity
10	Informal Perks
11	Training and Development Opportunities

*Note: Five point Likert-scaling was used for all items: MFi items ranged from strongly disagree to strongly agree; MFS items ranged from unimportant to very important.

Table 3
Engagement Scale Items

Engagement Scale Items (Alpha = .94, n = 16)	Mean	*SD*	N
I have sufficient opportunities (such as challenging assignments or project) to earn a high performance rating	3.763	1.086	39440
I am satisfied with the recognition and rewards I receive for my work	3.417	1.189	39440
Recognition and rewards are based on performance in my work unit	3.478	1.184	39440
My opinions count at work	3.666	1.098	39440
I am treated with respect at work	3.914	1.017	39440
I am given a real opportunity to improve my skills in my organization	3.549	1.106	39440
My job makes good use of my skills and abilities	3.889	1.086	39440
A spirit of cooperation and teamwork exists in my work unit	3.744	1.111	39440
Overall, I am satisfied with my supervisor	3.891	1.130	39440
I know what is expected of me on the job	4.181	.829	39440
My work unit produces high quality products and services	4.208	.821	39440
I would recommend my agency as a place to work	3.917	1.003	39440
My agency is successful in accomplishing its mission	4.035	.835	39440
Overall, I am satisfied with managers above my immediate supervisor	3.479	1.189	39440
The work I do is meaningful to me	4.318	.793	39440
I have the resources to do my job well	3.692	1.014	39440

Table 4

Abbreviations & Associated Constructs

Abbreviations & Associated Constructs	Abbreviation	Formula
Engagement Score	ES	
Job Characteristic Model (Hackman & Oldman)	JCM	
Highest Motivation Force Statistic	MFh	
Motivation Force Statistic (Individual)	MFi	$[MFi = (Q1) \times (Q2) \times (Q3)]$
Motivation Force Score	MFS	$MFh + (\Sigma MFi / 10)$
Motivation Potential Level	MPL	$[(\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}) \div 3] \times \text{Autonomy} \times \text{Feedback}$
Vroom's Expectancy Model (Valence, Instrumentality, Expectancy)	VIE	

Table 5

Correlations Among Predictors and Outcomes

Measure	1	2	3	4	5
1. MPL (JCM)	.74				
2. MFS (VIE)	.636**	.97			
3. ES (Engagement)	.683**	.708**	.94		
4. MA (Awards)	.059**	.084**	.080**	-	
5. PR (Perf Rating)	.129**	.222**	.153**	.338**	-

**. Correlation is significant at the 0.01 level (2-tailed). Correlations Ns range from 17,792 and 38,642. Coefficient Alphas are in the diagonals.

Table 6

Structural Equation Model of Standardized Path Coefficients (with standard errors), Total Effects, and Fit Statistics for Expectancy, Job Characteristics, Engagement, and Job Performance Constructs (*N* = 17,792)

Model	df	ChSqr	Engagement Scale	Job Characteristics Scale	Expectancy Scale	Total Sig. Standardized Direct Effects on Performance	Fit Statistics		
			Standardized Path Coefficients(with Standard Error) to Individual Job Performance				CFI	GFI	RMSEA
1	498	27246.2	.064* (.014)	-.048 (.014)	.303* (.000)	.367	.941	.906	.055
2	205	12330.1	.250* (.017)	.021 (.015)	-	.250	.943	.939	.058
3	352	18805.2	.024 (.009)	-	.298* (.000)	.298	.955	.926	.054
4	121	6714	-	-.015 (.009)	.328* (.000)	.328	.973	.958	.055
5	52	3489.1	-	-	.319* (.000)	.319	.984	.969	.061
6	12	522.7	-	.220* (.008)	-	.220	.976	.991	.049
7	117	6666.1	.259* (.009)	-	-	.259	.963	.958	.056

1=   Engagement + Job Characteristics Theory + Expectancy Theory

2=   Engagement + Job Characteristics Theory

3=   Engagement + Expectancy Theory

4=   Job Characteristics Theory + Expectancy Theory

5=   Expectancy Theory Model

6=   Job Characteristics Theory

7=   Engagement

* *p* < .01

Individual Job Performance = Performance Appraisals Rating (5 point scale) and Number of Awards and Bonuses

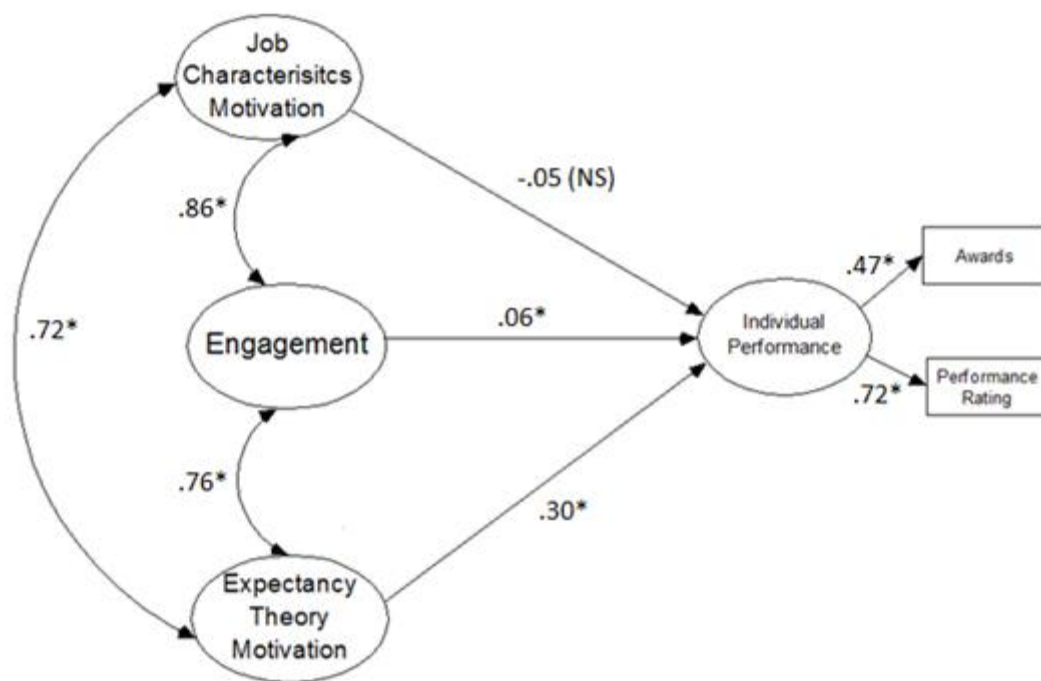Note: All Exogenous latent constructs were covered where possible

Figures

Figure 1. *Standardized Coefficients for the Full Model*
Latent Constructs are show in the ellipses and observed variables are shown in the rectangles (*N* = 17,792, *p* < .01).
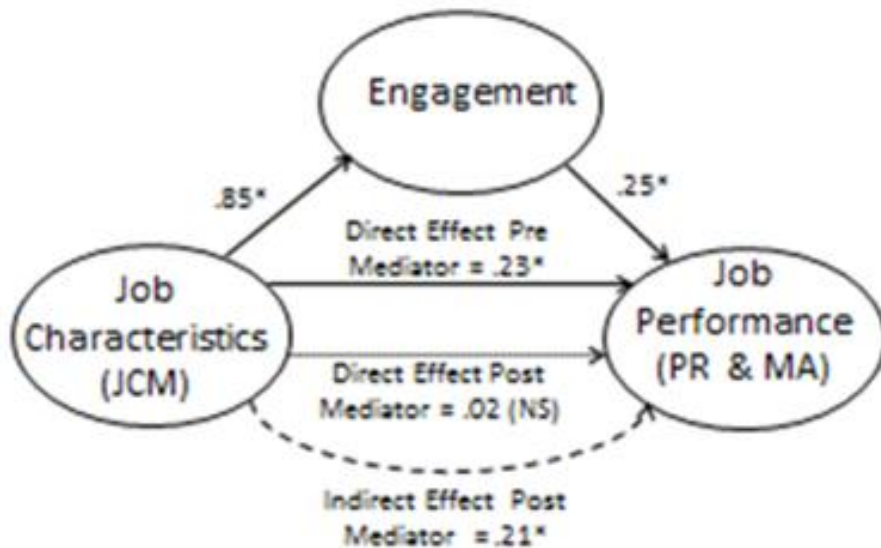
Figure 2 (Model 8). *Structural Equation Mediation Model of Hackman and Oldham Job Characteristic Model, Engagement, and Job Performance*
The total significant standardized effects post mediators are .48 ($p < .01$) with a RMS error of .059.
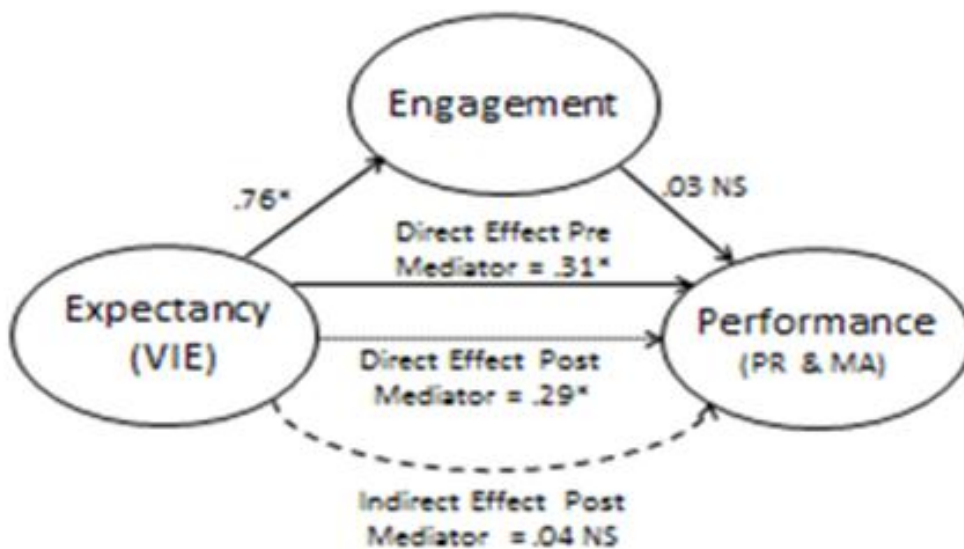

Figure 3 (Model 9). *Structural Equation Mediation Model of Vroom's Valence Instrumentality Expectancy (VIE) Model Score, Engagement, Score, and Job Performance*
The total significant standardized effects post mediators are .32 ($p < .01$) with a RMS error of .054.