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Investigating Predictors of Sales Performance:

A Longitudinal Study

This study was conducted to investigate the relationships of personality and cognitive ability on subsequent sales performance in an applied setting over a four year period. The relationship between personality and cognitive ability was evaluated to determine what predicted sales performance at different stages of the employee's tenure.

Many organizations employ a sales force to identify business opportunities and bring revenue into the company. The overall health of a company can hinge on the success of its sales force. Over the years many studies have investigated what it takes to make a successful sales person (see review in Hausnecht & Langevin, 2010), but the majority of the research has examined sales performance for one point in time. Thus, there has been little to no research that has investigated the stability of the predictors over time. The objective of the present study is to use applied data to replicate previous research investigating the relationship of cognitive ability and personality traits as predictors of on-the-job sales success. In addition, we intend explore the pattern of the relationships with objective sales performance over the course of a salesperson's career.

Sales Performance Predictors

Researchers interested in understanding the predictors of sales success have focused mainly on cognitive ability and personality factors. Several meta-analyses have examined the role of these measurements in predicting sales success (Barrick & Mount, 1991; Hunter, 1986; Hunter & Hunter, 1984; Mount & Barrick,1995; Schmitt, Gooding, Noe, & Kirsch, 1984; Tett, Jackson, & Rothstein, 1991; Vinchur, Schippmann, Switzer & Roth, 1998). The results of the meta-analyses were fairly consistent with regard to personality predictors. Factors related to extraversion (specifically the subfactor related to energy and influence) and conscientiousness (specifically goal-orientation) demonstrate consistent significant positive correlations with objective sales metrics and ratings of sales performance (Conte & Gintoft, 2005; Vinchur et al., 1998). However, the examinations of cognitive ability and sales performance have provided less consistent results. For example, Vinchur et al. (1998) found a significantly positive relationship between cognitive ability and performance ratings, but not with objective performance ratings in their meta-analysis. However, other studies examining this relationship demonstrate strong relationships between general mental ability and sales performance (Hunter, 1986; Hunter & Hunter, 1984). Reasons for the inconsistent relationships have been discussed and include measurement error within objective performance measures as well as potential moderators (e.g., job complexity). The current study will seek to replicate previous studies by examining personality, factors of extraversion and conscientiousness, and cognitive ability in the prediction of objective sales performance measures.

Predictors Over Time

It is not unreasonable to posit that when organizations hire salespeople they seek to identify individuals who will be successful initially. In addition, organizations likely understand the need for selecting employees capable of maintaining high levels of performance throughout their tenure. Thus, although the previously reviewed meta-analyses have identified the major predictors of sales success, the results of the studies only provide data about performance at one point in time.

Discussion about prediction over time has focused on cognitive ability. Schmidt, Hunter, and Outerbridge (1986) proposed that cognitive ability was the main factor driving job performance regardless of job or industry type. Furthermore, they found results to suggest that cognitive ability predicts performance both in the early stages of employment and remains constant, or increases, over time. Schmidt et al. (1986) argued that job complexity is the only real moderator of cognitive ability when predicting job performance, such that cognitive ability becomes more critical in jobs characterized by high complexity.

Contrary to Schmidt et al. (1986), Murphy (1989) argued that cognitive ability does not retain its substantive influence on job performance after the initial stages of employment. Murphy posited that a dynamic model of job performance is a more likely explanation when exploring the relationship between cognitive ability and job performance. This theory suggests that general cognitive ability will be more significant in situations where the employee must consistently learn new tasks. This is a break from Schmidt et al. (1986) because Murphy (1989) argues that job complexity does not simply moderate the relationship, but in fact it may diminish the relationship between cognitive ability and performance entirely.

Murphy (1989) describes two key phases to the employee lifecycle. He refers to these phases as the transition and maintenance stages. The transition stage is described as the time when employees are new to the job and are spending the majority of their time learning new tasks and skills. The maintenance stage is the time following the transition period when employees feel comfortable with the skills needed to be successful. The theory suggests that cognitive ability is much more important during the transition stage for two reasons. First, workers must acquire new information and, second, workers cannot rely on past experiences. Conversely, during the maintenance stage, personality (e.g., conscientiousness, agreeableness, extraversion, etc.) and motivational factors (e.g., job fit, person-organization fit, etc.) have a greater weight on job performance. Murphy's theory can be outlined in four key points; (1) there are distinct phases of employment, (2) the drivers of performance vary across phases, (3) the transition phase is entered whenever new tasks or skills need to be learned, and (4) when employees are not learning new tasks they are in a maintenance stage.

Several research studies have been conducted to test Murphy's theories (Hofmann, Jacobs, & Baratta, 1993; Day, Sin, & Chen, 2004; Deadrick, Bennett, & Russell, 1997; Thoresen, Bradley, Bliese, & Thoresen, 2004). Zyphur, Bradley, Landis, and Thoresen (2008) conducted a longitudinal study looking at academic performance. The authors found that both cognitive ability and conscientiousness were important predictors for initial job performance. They also found evidence for the maintenance hypotheses by showing that the relationship between cognitive ability and performance lessened as individuals moved from the transitions to maintenance phase. In addition, the relationship between conscientiousness and performance persisted through the maintenance stage of performance.

One study of particular relevance to the current research is Thoresen et al. (2004). They tested Murphy's theory with personality measurements on pharmaceutical sales representatives. Although they did not examine the role of cognitive ability, they found that different personality characteristics demonstrate differential prediction based on the performance stage of the individual. For example their findings indicated that openness, agreeableness, and neuroticism predicted performance in the transition stage while conscientiousness and extraversion predicted in the maintenance stage. They reasoned that individuals in the transition stages were being introduced to new information and were under greater stress than those in the maintenance stage. As such, being open to new information, easy to get along with and emotionally stable were more predictive of early performance and after the learning curve had dissipated extraversion and conscientiousness became

more important because they were focusing on the actual job demands of the position.

Given the paucity of research that exists around predicting sales success longitudinally, our hypotheses are mainly guided by Murphy's model. This study improves upon the existing literature on predicting sales success by using an applied sales sample, examining performance over time (within person), and looking at both personality and cognitive ability. It is our contention, that cognitive ability will be more predictive of performance when the individual is still in the learning process of the job. Furthermore, when the individual has a firm grasp of the job demands personality will be more predictive, based on the strong relationships between conscientiousness and extraversion in predicting performance (Barrick & Mount, 1991) Thus, our hypotheses are as follows:

Hypothesis 1a: Cognitive ability will be positively related to sales performance early on in one's sales career.

Hypothesis 1b: The relationship between cognitive ability and sales performance will reduce over time.

Hypothesis 2a: The personality traits related to conscientiousness (achievement and dependability) and extraversion (outgoing and reads people) will be positively related to sales performance early on in one's sales career.

Hypothesis 2b: The relationship between personality traits and sales performance will increase over time.

Method

Participants and Procedures

Incumbent Sample. A sample of 124 incumbent sales people (52% male) from a national office product retailer was used in this present study. The target position is a business to business consultative sales role. All individuals completed a sales assessment test battery in December of 2007 as part of a concurrent validation research study examining the assessment validity. The ethnic distribution was 82% White/Caucasian, 7% Black/African American, 6% Hispanic, 4% Asian. The organizational tenure ranged from 14 months to 29 years (M=8.29 years, SD=6.18 years).

Archival annual sales performance metrics were subsequently obtained for four years following the initial testing (years 2008, 2009, 2010, and 2011). As expected, data attrition occurred as some individuals were no longer employed by the organization, moved to a significantly different type of job within the organization, or other reasons. Subsequently, the sample size decreased over time. The sample sizes were 2008 (n=124), 2009 (n=76), 2010 (n=70), 2011 (n=49).

Applicant Sample. Another sample of 153 applicants consisting of new hires for the same organization was obtained. Individuals who applied for the sales positions were required to complete the sales assessment battery and selection decisions were made based on assessment results. Of the participants, 37% were females, 50% were males, and 12% were unknown. The ethnic distribution was 40% White/Caucasian, 2% Black/African American, 1% Hispanic, less than 1% for American Indian/Alaska Native and Asian, and 55% unspecified. It is noteworthy that between 2008 and 2011, more than 1400 individuals applied and tested. Therefore, there are considerable range restriction issues in the assessment results of new hires.

The same set of archival annual sales performance metrics from year 2008 to 2011 were obtained and utilized. The sample sizes were 2008 (n=15), 2009 (n=41), 2010 (n=75), and 2011 (n=104). In order to examine and differentiate transition versus maintenance phase in this sample, the sales performance data were restructured such that we looked at sales performance for in their first year, second year, and third year on the job. For example, if an individual was tested and hired in 2008, the sales performance data from 2008 would be their first year performance, the sales performance data from 2009 would be their second year performance, etc. The following analyses were based on the

restructured sales dataset (1st year sales performance n=153; 2nd year sales performance, n=59, and 3rd year sales performance, n=18).

Measures

Test Battery. The sales assessment used in this study was comprised of four personality scales and a cognitive ability section. The content of the assessment is proprietary and has been used in previous research (Lawrence, Quist, & O'Connell, 2009) with acceptable scale reliabilities. Four personality scales were used that covered two subscales of extraversion and two subscales of conscientiousness. The constructs and scale reliabilities were: 1) conscientiousness: achievement orientation (21 items, α=.81); 2) conscientiousness: dependability (19 items, α =.78); 3) extraversion: outgoing (14 items, α =.87); 4) extraversion: reads people (36 items, α =.88). Responses to each item were indicated on a 5-point Likert-type scale (1=strongly disagree, 5=strongly agree). The cognitive ability section was a job-related business simulation where individuals were required to calculate sales percentages and quotas as well as draw conclusions from sales data. The quantitative items were open-response which required them to type in their answer while the qualitative reasoning items were multiple choice. There were 15 total items with a Cronbach's alpha of .79.

Objective Sale Performance. Two types of annual sales metrics were obtained from the organization, including sales attainment and profit margin attainment. Both metrics were percentage of sales goal met with sales attainment referring to the goal of overall sales dollar amount generated and the profit margin referring to the goal comparing the revenue versus actual sales.

Results

We first analyzed the incumbent data. The results from this sample represent test validity in the maintenance phase. Table 1 presents the means, standard deviations and intercorrelations among the personality and cognitive ability measures collected at end of year 2007 for 129 sales people. Table 2 presents the means, standard deviations, and intercorrelations among objective performance metrics from year 2008 to year 2011. As mentioned earlier, data attrition resulted in smaller sample sizes for subsequent years with sample size ranged from 80 to 52.

Table 3 presents the assessment validity of the test battery in predicting objective sales metrics. Correlations corrected for range restriction and criteria unreliability are also reported in Table 4. An estimate of .85 was used for criteria unreliability as this represents a very conservative estimate of measurement errors by Hunter and Schmidt (1990) and has been utilized in previous meta-analytic studies with objective sales performance data (Rich, Bommer, Mackenzie, Podsakoff, & Johnson, 1999). Corrected correlations were also evaluated for significance using a formula developed by Raju and Brand (2003) for correlations corrected for unreliability and range restriction.

As illustrated in Table 3 and 4, except for outgoing, all predictors were significantly and positively correlated to sales attainment in 2008; the strongest relationship was found for achievement orientation (observed r = .19, corrected r = .26). However, for the profit margin attainment metric, only cognitive ability was significantly related (observed r = .22, corrected r = .23).

Next, we examined the relationship between personality and cognitive ability with sales performance in the applicant sample. Table 5 and 6 presents the descriptive and inter-correlations; Table 7 and 8 present the observed and corrected assessment validity. As shown in Table 7 and 8, cognitive ability was significantly and positively correlated to profit margin attainment for the first year (observed r = .16, corrected r = .19). The strength of this relationship remains similar in the 2nd year, albeit non-statistically significant. The relationship with personality measures was, by and large, non-significant, except for reads people at the first

year. The strength of the relationship, however, seems to increase over time.

These results provide support for Hypothesis 1a that cognitive ability is significantly related to early sales performance. The results provide partial support for Hypothesis 2a by showing significant relationships for the extraversion competency Reads People in the applicant sample. With regard to performance over time, cognitive ability did seem to become less predictive and is not significantly related to performance for the three subsequent years (2009, 2010 or 2011). This supports Hypothesis 1b. The findings for Hypothesis 2b are mixed. In the applicant sample, although the results are not significant, the relationship with personality seems to increase over time when examining profit margin which follows the expected pattern of results. However, the relationship between personality and sales is relatively inconsistent and thus it would seem does not support our hypothesis.

Discussion

This study adds to the research literature on predictors of sales performance and provides much needed research examining the extent to which these variables are capable of predicting performance over time. To our knowledge, this is the first study to look at both cognitive ability and personality predictors, using an applied sales sample, with longitudinal data for the individuals over the course of several years. Our results replicated previous findings by showing significant prediction of sales performance with personality factors, conscientiousness and extraversion, and cognitive ability. However, our longitudinal results were not as clear cut. Although the relationship with cognitive ability dissipated in subsequent years, supporting Murphy's model, the relationship with personality did not provide a clear pattern of results by which we can make strong conclusions. Thus, our longitudinal results are not directly in line with Thoresen et.al (2004) with regard to personality. They found that extraversion and conscientiousness were predictive of maintenance performance while we found it for transitional performance.

One potential reason for the lack of a consistent relationship with personality could be that early in the tenure conscientiousness and extraversion are critical to building client relationships, but as there is a longer standing relationship these personality variables become less critical. Future research should continue to investigate the role that personality plays in predicting sales performance over time. Specifically, determining the extent to which the type of sales role moderates the relationship between personality and sales performance over time.

Limitations & Future Directions

One of the major limitations of this study was data attrition; only forty percent of sample was retained after four years. Although this is probably expected for data collected in applied settings, it prohibits us from drawing strong conclusions or using more robust statistical tests to examine the hypotheses. It is possible there are some unknown yet common reasons for the data attrition to occur that would meaningfully affect the relationships of interest.

The second limitation of the study was the nature of the performance criteria. One might question whether objective sales attainment data can truly reflected individuals' performance on the job. Research has shown that subjective and objective sales performance data are not interchangeable (Bommer, Johnson, Rich, Podsakoff, & MacKenzie, 1995). Unlike supervisor ratings of job performance, objective criteria are often affected by a number of other factors outside of individual's control. For example, the economic down turn in 2009 could arguably have affected how easily even the best salesperson could meet his or her goal. Inspecting the relationship between the same metric over time affirms this concern. Interestingly, the sales attainment in 2008 had no relationship with sales attainment in 2009 and 2011 but did have a significant relationship with sales attainment in 2010

(r = .45, p<.01). Future research would benefit by incorporating supervisor ratings of job performance in addition to objective measures of job performance in a longitudinal design.

Conclusion

Strong organizations clearly understand the importance of looking long-term in all of their business decisions and investments. However, the selection model (some combination of cognitive ability and personality) has largely been validated with the use of cross-sectional research that has not investigated the extent to which these variables predict over time. The present study sought to provide a longitudinal investigation of the extent to which these variables are able to predict sales performance over time. The results indicate both cognitive ability and personality predicted initial performance. In addition, over time the relationship between cognitive ability and performance lessened, whereas to some extent the performance and personality relationship increased. Thus, additional research is needed to determine what predicts performance in the maintenance stage and if those variables should be considered when designing organizational selection systems.

Table 1. Descriptives and Inter-correlations among Assessment Battery (Incumbent Sample)

	M	*SD*	1	2	3	4
1. Conscientiousness: Achievement Motivation	3.86	0.31	--			
2. Conscientiousness: Dependability	3.80	0.31	.67**	--		
3. Extraversion: Outgoing	4.06	0.44	.44**	.33**	--	
4. Extraversion: Reads People	3.97	0.28	.53**	.71**	.57**	--
5. Cognitive Ability	6.78	3.53	.20*	.08	-.04	.08

*Note. N=124, **p<.01, *p<.05*

Table 2. Descriptives and Inter-correlations among Objective Sales Metrics between Year 2008 and 2011 (Incumbent Sample)

	N	M	SD	1	2	3	4	5	6	7
1. Sales Attainment (08)	124	114%	59%	--						
2. Profit Margin Attainment (08)	124	104%	11%	.27**	--					
3. Sales Attainment (09)	76	92%	19%	.02	.02	--				
4. Profit Margin Attainment (09)	76	98%	8%	.06	.12	.09	--			
5. Sales Attainment (10)	70	101%	16%	.45**	.09	.14	-.05	--		
6. Profit Margin Attainment (10)	70	101%	9%	.18	-.02	.08	.14	.14	--	
7. Sales Attainment (11)	49	98%	16%	.06	.39**	.05	-.02	-.17	.07	--
8. Profit Margin Attainment (11)	49	108%	9%	.06	-.13	-.04	.09	.40**	.16	-.04

*Note. **p<.01, *p<.05 Number in parenthetical indicates the year of the data.*

Table 3. Observed Assessment Validity in Predicting Objective Sales Metrics over Time (Incumbent Sample)

	Year 2008		*Year 2009*		*Year 2010*		*Year 2011*	
	Sales	Profit Margin	Sales	Profit Margin	Sales	Profit Margin	Sales	Profit Margin
Conscientiousness: Achievement Motivation	.20*	.06	-.04	-.16	.11	.03	.04	-.07
Conscientiousness: Dependability	.20*	.07	.09	-.07	.04	.14	-.02	-.18
Extraversion: Outgoing	.12	.08	.12	-.12	.11	.08	.06	.04
Extraversion: Reads People	.18*	.04	.13	-.13	.02	.10	.00	-.12
Cognitive Ability	.20*	.21*	.06	.10	.07	.11	.19	.02

Table 4. Assessment Validity Corrected for Range Restriction and Criteria Unreliability (Incumbent Sample)

	Year 2008		*Year 2009*		*Year 2010*		*Year 2011*	
	Sales	Profit Margin	Sales	Profit Margin	Sales	Profit Margin	Sales	Profit Margin
Conscientiousness: Achievement Motivation	.28**	.09	-.06	-.23*	.15	.05	.06	-.10
Conscientiousness: Dependability	.25*	.09	.12	-.10	.05	.18	-.03	-.24
Extraversion: Outgoing	.14	.10	.12	-.13	.12	.09	.06	.04
Extraversion: Reads People	.23*	.05	.15	-.15	.04	.12	.00	-.14
Cognitive Ability	.21*	.22*	.07	.11	.09	.12	.23	.03

Table 5. Descriptives and Inter-correlations among Assessment Battery (Applicant Sample)

	M	SD	1	2	3	4
1. Conscientiousness: Achievement Motivation	4.31	0.34	--			
2. Conscientiousness: Dependability	4.25	0.30	.73**	--		
3. Extraversion: Outgoing	4.51	0.35	.56**	.51**	--	
4. Extraversion: Reads People	4.32	0.28	.67**	.81**	.61**	--
5. Cognitive Ability	8.16	3.21	.22**	.19*	0.11	0.13

*Note. N=153, **p<.01, *p<.05*

Table 6. Descriptives and Inter-correlations among Objective Sales Metrics between Year 2008 and 2011 (Applicant Sample)

	N	*M*	*SD*	1	2	3	4	5
1. Sales Attainment (1st)	153	88%	42%	--				
2. Profit Margin Attainment (1st)	153	96%	61%	.05	--			
3. Sales Attainment (2nd)	59	92%	22%	.31*	-.06	--		
4. Profit Margin Attainment (2nd)	59	97%	24%	-.04	.53**	.21	--	
5. Sales Attainment (3rd)	18	87%	24%	-.17	-.06	-.05	-.03	--
6. Profit Margin Attainment (3rd)	18	107%	13%	.22	.01	-.16	-.19	-.82**

*Note. **p<.01, *p<.05. Number in parenthetical indicates the year of the performance data.*

Table 7. Observed Assessment Validity in Predicting Objective Sales Metrics over Time (Applicant Sample)

	1st Year		*2nd Year*		*3rd Year*	
	Sales	Profit Margin	Sales	Profit Margin	Sales	Profit Margin
Conscientiousness: Achievement Motivation	-.06	.12	-.12	.20	-.03	.21
Conscientiousness: Dependability	.01	.09	-.16	.16	-.07	.17
Extraversion: Outgoing	-.04	.13	-.04	.19	.03	.16
Extraversion: Reads People	-.02	.07	-.18	.07	-.10	.21
Cognitive Ability	-.04	.16	.07	.15	-.09	.34

Table 8.

Assessment Validity Corrected for Range Restriction and Criteria Unreliability (Applicant Sample)

	1st Year		*2nd Year*		*3rd Year*	
	Sales	Profit Margin	Sales	Profit Margin	Sales	Profit Margin
Conscientiousness: Achievement Motivation	-.07	.15	-.15	.26	-.04	.27
Conscientiousness: Dependability	.01	.12	-.22	.21	-.10	.23
Extraversion: Outgoing	-.04	.14	-.04	.20	.03	.16
Extraversion: Reads People	-.04	.13*	-.31**	.13	-.18	.36
Cognitive Ability	-.05	.19*	.08	.18	-.11	.40

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