WORKFORCE TURNOVER AND ABSENTEEISM IN THE MANUFACTURING SECTOR

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ABSTRACT

The manufacturing sector in the United States is simultaneously enduring record-low unemployment rates and record-high growth. These economic conditions underscore the vital role that managing human capital plays in an organization's success. Effective recruitment and retention programs are particularly key to helping manufacturing organizations perform optimally under these competitive labor market conditions. This study explores the relationships between pay practices, benefit programs, location characteristics, absenteeism, and turnover using survey data from human resource management professionals representing over 350 manufacturing organizations in the southeast. Responding organizations represented both rural and metro areas, ranged in size from 2-6,000 employees, and reported average annual sales ranging from $150k to $850k. The findings can help organizations and human resource managers develop better strategies for recruiting and retaining the skilled labor that is vital to their organizations' effectiveness.

INTRODUCTION

The United States economy has been experiencing unprecedented growth across a broad range of industries and geographic regions (U.S. Bureau of Economic Analysis, 2018a). In 2017, the real gross domestic product (GDP) in the U.S. increased by 2.3% with 20 of 22 industry groups adding to the increase (U.S. Bureau of Economic Analysis, 2018b). Likewise, the District of Columbia and 47 states experienced increases in real GDP (2018c) as did 312 of 383 metropolitan areas (2018d).

The manufacturing sector, in particular, has found renewal in this thriving economy. Manufacturing represents the sixth largest employer in the U.S. with an average weekly wage of $1,046 (Thomas & Campbell, 2018), making up nearly 11.5% of the economy (Dmitrieva, 2018; Thomas & Campbell, 2018). In September 2018, the U.S. Bureau of Labor Statistics (BLS) reported that employment in the manufacturing industry grew by 2.2% over the past 12 months (2018a), reflecting the addition of 278,000 jobs (2018b). In fact, the growth from July 2017 to July 2018 was the highest since the April 1994 to April 1995 period (Franck, 2018). Consequently, manufacturers continue to report that being unable to recruit high-quality workers is their biggest business threat (The Manufacturing Institute, 2018; 2019).

Low unemployment is a significant contributor to the shortage of skilled workers. The unemployment rate may be defined simply as the number of unemployed divided by the total number of people in the workforce (Kenton, 2018) or conceptualized as a metric showing the demand versus the supply of labor. The national unemployment rate dropped to 3.7% in September 2018 (BLS, 2018a), which was a 17-year low. While there were 488,000 job openings in manufacturing in August 2018, there were only 372,000 hires, leaving over 100,000 positions

unfilled (BLS, 2018c). In August 2019, the national unemployment rate for the manufacturing industry was 3.2% (BLS, 2019).

When the unemployment rate is low, recruiting and retaining high quality employees is even more challenging (Gardner, 2002). The influence of unemployment rates on voluntary turnover, also called quit rates, or employees leaving by their own choice, has been studied for decades (see Eagly, 1965; Carsten & Spector, 1987; Hom & Kinicki, 2001; Berry, Lelchook, & Clark, 2012). Logically, turnover may increase when unemployment is low because employees are more likely to have job alternatives. Additionally, low unemployment rates may lead to drastic strategies among competing firms, including "talent raiding" (Gardner, 2002, p.225), where all of a competitor's employees are considered fair game, not just one or two (Gardner, 2002).

While some minimal level of turnover is healthy for an organization, excessive, unhealthy turnover can be very expensive. Fitz-enz (2000) reported that turnover costs an organization a minimum of 6 months of the pay and benefits for a non-exempt employee while replacing a professional or managerial employee will cost at least 12 months' pay and benefits. The Society for Human Resource Management (SHRM) reported that the average cost per hire was $4,425 per employee in 2016 (SHRM, 2017). Using that average, 10% turnover in a firm with 100 employees would cost the organization $44,250 just in advertising and recruiting fees to find replacements for the 10 separated employees. Further, SHRM.com shared insights from the 2018 Retention Report, completed by the Work Institute. The report stated that employers in the United States will pay $680 billion in turnover costs in 2020 (Fox, 2018). Typically, human resource management professionals are heavily involved in helping organizations combat unwanted, expensive turnover.

Turnover research often also includes absenteeism as both are considered to be withdrawal behaviors by many researchers (see Berry, Lelchook, & Clark, 2012; Hom, Mitchell, Lee, & Griffeth, 2012; Sheridan, 1985). Absenteeism is also very expensive for organizations. SHRM (2014) reported that absenteeism costs organizations between 20.9-22.1% of payroll when considering direct costs, such as wages/salary, overtime, replacement workers, and indirect costs, such as lost productivity. Absenteeism is often regarded as a correlate (Mitra, Jenkins, & Gupta, 1992) or a predictor of turnover (Berry et al. 2012; Sheridan, 1985; Steel & Lounsbury, 2009).

With plenty of job alternatives available during periods of low unemployment, employees may use a variety of factors to help them decide whether to stay or to quit. For the purposes of this paper, the study is limited to factors related to pay, benefits, and other organizational characteristics, such as location. Absenteeism and turnover are the dependent variables. This paper serves two purposes. The primary goal is to assist human resource management professionals with development of recruitment and retention policies and practices that will help them maintain the skilled labor that is vital to their organizations' effectiveness. The secondary goal is to help management scholars learn more about absenteeism and turnover in the manufacturing sector.

LITERATURE SUPPORT

Despite the size and economic contributions the manufacturing sector provides – sixth largest employer in the U.S. (Thomas & Campbell, 2018), making up nearly 11.5% of the economy (Dmitrieva, 2018) – academic research on the manufacturing workforce is scarce. As discussed in the introduction, our current economic conditions are equally promising and concerning for U.S. manufacturers. The low unemployment rate, the challenge of recruiting high-quality workers, and the number of unfilled jobs create a perfect storm of sorts, and the potential costs associated with turnover and absenteeism only serve to increase the urgency with which we study these issues.

While several theories could be used to support the current study, we rely on human capital theory (Becker, 1964) to highlight the investment organizations make in their workforce and to justify exploring the different contextual variables (such as the labor market, location characteristics, unionization, etc.) that may influence the productivity of the workforce or the gains on those human capital investments. We also find theoretical support through the resource-based view (Barney, 1991) as the study aims to help manufacturers find ways to sustain competitive advantage in especially challenging labor market conditions.

RESEARCH QUESTIONS

We sought to answer five research questions using data collected from 355 human resource management professionals in the Middle Tennessee region as part of a larger wage and benefits survey. The data and methodology are explained in detail in the next section.

1. Which location characteristics, if any, correlate with turnover and absenteeism?
2. Which pay practices, if any, correlate with turnover and absenteeism?
3. Which benefit practices, if any, correlate with turnover and absenteeism?
4. What were the most common factors reported for turnover and absenteeism?
5. Which demographic variables, if any, correlate with turnover and absenteeism?

DATA AND METHODOLOGY

The majority of the data used in this paper came from a 2017 wage and benefit survey, created by the Business and Economic Research Center at Middle Tennessee State University in partnership with the Middle Tennessee Industrial Development Association. This project launched first annual survey of its kind for middle Tennessee manufacturing. The survey responses were captured using Survey Monkey software. The survey was separated into two general sections: one that asked about wages in specific job categories and one that asked institutional-level pay and benefit practices. The survey was sent out to manufacturing HR managers in middle Tennessee, resulting in a data set with 355 respondents.

The institutional-level portion of the survey relevant to this paper included 73 questions, which had various responses types (open-ended, range, and yes/no). The dependent variables are the binary questions (1) *Is absenteeism a problem for your company?* and (2) *Is turnover a problem for your company?* Using responses for these two questions as a basis for non-response exclusion, 243 observations remained for use in our models out of the original 355. Connected with our dependent variables are two other questions: (1) *What is your approximate average annual employee absentee/turnover rate?* and (2) *What are the three most important factors for employee absenteeism/turnover?* The first question group is a range, and the second is open-ended.

While the survey reports the average absenteeism and turnover rates, the responses are a mix of actual numbers and ranges. The actual numbers entered were from 1% to 10%, and the range categories' ceiling was 30%, meaning that any number above 30% was included in the 30% range category. This approach skewed the numbers downward and led us to use only the binary absenteeism/turnover variables as dependent variables to test for this paper. The ranges, however, still represent important information about what level of absenteeism or turnover would induce a company to label these issues as problems for the company. Figures 1 and 2 show the box-whisker plot of rate ranges for companies that reported a problem or no problem. To determine the box-

whisker plots, we used the same sample used in the regressions (initially n = 243) and sorted the two dependent variables separately. For example, the box-whisker plot of the turnover rates was for companies that reported no problem for turnover, regardless of if absenteeism was a problem. We examined the joint ranges (e.g. rates for companies that reported both as a problem), but they did not vary visually and thus added no new information.

Figure 1: Rates for Companies that Reported No Problem
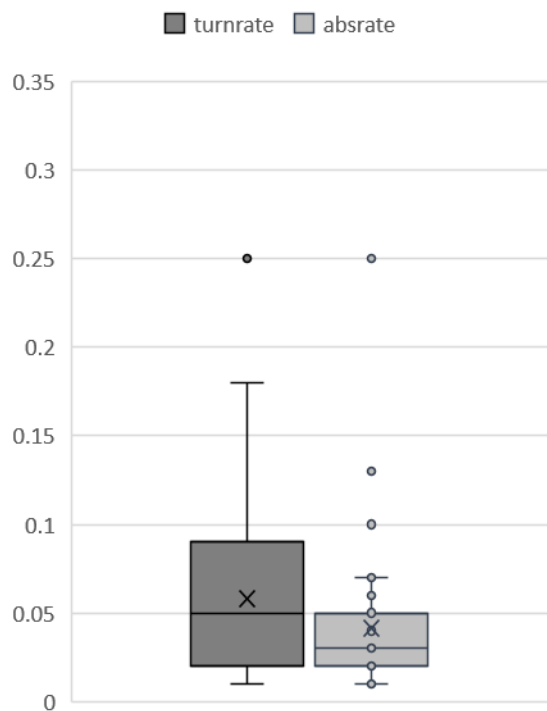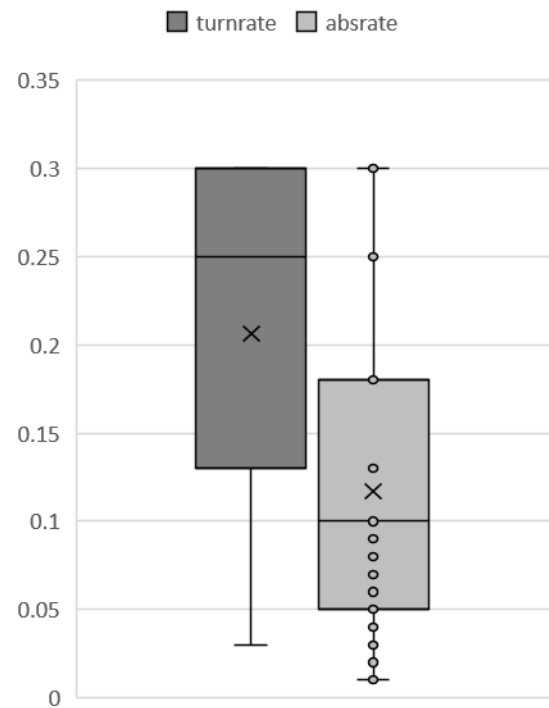

Figure 2: Rates for Companies that Reported a Problem

In addition to the company-level information from the survey, we used county-level data in our research to examine the county-level characteristics' effect on the problems of turnover and absenteeism. Table 1 reports the additional county-level data used in the study, gathered post-survey from varying sources.

Table 1: Additional County-Level Data

Data ID	Description	Source
copop2016	County population in 2016	Census.gov
perrural2010	Percent of population living in rural areas by county in 2010	Census.gov
econdiv2016	The Shannon-Weaver Index of economic diversity in 2016	IMPLAN.com (calculated from the IMPLAN data files for each county)
unemp2016	Average annual unemployment rate in 2016	Bureau of Labor Statistics (bls.gov)
babove2016	Percent of population with bachelors and higher degree by county	Census.gov (ACS-2013-2017 five-year average estimates)

Conceptual Model

Figure 3 outlines the conceptual model followed by this paper. We hold that pay practices, benefits offered, company demographics, and regional characteristics play a part in determining whether companies consider absenteeism or turnover to be a problem. We first tested the regional characteristics' effect on absenteeism, using the county-level data and the indices mentioned in the next section. For each of the four categories, we constructed and discussed correlation tables due to the lack of observations for some of our data. Then we tested each category of independent variables separately for both absenteeism and turnover, with regional characteristics entered into each of the three model categories as controls. From the model categories, we then combined the significant variables into a full model for both dependent variables.

Figure 3: Conceptual Model
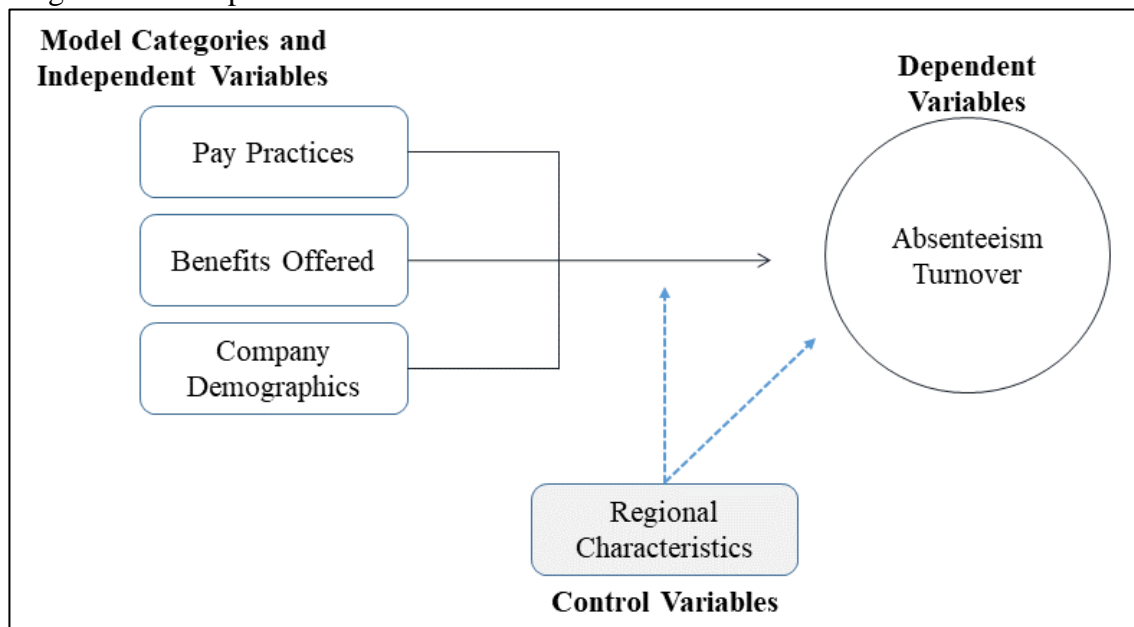
Indices

We utilized the county-level data in our models to attempt to capture the effects of environmental factors on whether absenteeism and turnover are considered problems by manufacturing companies by county. A priori, we constructed two indices using the county-level data with the thought that relative regional vitality and relative regional economic resilience would be able to explain the dependent variables. Taking the five county-level variables in Table 1, we used their respective means and standard deviations to transform each variable's values into normally distributed values, allowing the variables to be added and averaged together. Each index was calculated using the following formula:

$$f(Variable, \mu, \sigma) = \frac{1}{\sqrt{2\pi}\sigma} e^{-[\frac{(Variable - \mu)^2}{2\sigma^2}]}$$

where Variable is the variable of interest, μ is the average value for the variable of interest, and σ is the standard deviation for the variable of interest.

The first index created is the relative regional vitality index (RRVI) and includes the county's population, the percent of the county's population living in rural areas, and the percent of the county's population with bachelor's degrees or higher. Not knowing the effect of each of these three variables, we weighted them equally. RRVI evaluates the labor force characteristics of the counties. We postulated that a higher RRVI number would correlate with a lower probability that absenteeism or turnover is a problem.

The second index created is the relative regional economic resilience index (RRERI) and includes county's economic diversity and the county's unemployment rate, initially weighted equally. A county's economic diversity was calculated using the following formula:

$$EDI = \sum s_i X ln(s_i)$$

where EDI stands for Economic Diversity Index, s_i is the employment share of each sector, and $ln(s_i)$ is the natural log of s_i (Shannon and Weaver, 1949). The RRERI on the whole assesses the institutional characteristics of the countries. As with RRVI, we hypothesized that higher RRERI numbers would correlate with lower probabilities that absenteeism or turnover are problems for the companies.

Methods

Due to the binary nature of the dependent variables, this paper uses a logit model for all regression models, following Campione (2015). With the mfx package in R, logit model outputs can be directly interpreted as marginal effects. Unfortunately, large number of missing responses for many variables of interest prevent the use of logistical regression for some interest categories. The logistic regression model for both absenteeism and turnover is specified as:

$$Abs \; or \; Turnover = \; \alpha_1 + \; \beta X_i + \varepsilon_i$$

where Xi represents the independent variables, which includes indicators for *Pay Practices*, *Benefits Offered*, *Company Demographics*, and *Regional Characteristics* as control variables.

        To determine correlations apart from regression methods, we create correlation tables using the Pearson method using the Hmisc package in R. These correlations use pair-wise deletion, which preserves some data lost due to row deletion in the logit models. However, the results, unlike the logistic regression results, cannot be directed interpreted as causal marginal effects, only as correlations with varying levels of significance.

        We began determining the relevant independent variables by choosing indicators for the four categories mentioned above that could affect our dependent variables – pay practices, benefit offerings, company demographics, and location characteristics. Each category's model separately tests the two dependent variables, and independent variables for pay, benefits, and demographics models are shown in Table 2. The regional characteristics are not from the survey and the regional characteristics model uses the county-level variables shown previously in Table 1.

Table 2: Models and Variables

Variable Name	Survey Question	Response Type	Used in Model?
Pay Practices Model			
secshdif9	If you have a second shift, what differential do you pay?	Forced choice range	
thrshdif11	If you have a third shift, what differential do you pay?	Forced choice range	
profshar37	Profit-sharing?	Yes/No	X
col49	Do you pay an annual cost of living increase?	Yes/No	X
Benefit Offerings Model			
benperwag48	On average, what is the value of benefits as a percent of annual wages?	Typed number as percent	
pdhol12	Number of annual paid holidays (Christmas, Thanksgiving, etc.)	Typed number of days	X
pddays1718	Annual number of paid vacation days plus annual number of paid sick days	Typed number of days	X
retirescore	Traditional pension plan? 401K or 403b plans? Profit-sharing? Employee stock ownership plan?	Index of yes/no (max=4)	X
med19	Does your company offer MEDICAL insurance benefits?	Yes/No	X
medempper20	Ratio of what employer pays for employee's individual medical benefits	Ratio	
medfamper21	Ratio of what employer pays for employee's family medical benefits	Ratio	
medperall	Average of individual and family employer medical ratios	Ratio	
den24	Does your company offer DENTAL benefits?	Yes/No	X
denempper25	Ratio of what employer pays for employee's individual dental benefits	Ratio	
denfamper26	Ratio of what employer pays for employee's family dental benefits	Ratio	
denperall	Average of individual and family employer dental ratios	Ratio	
vis27	Does your company offer VISION benefits?	Yes/No	X
visempper28	Ratio of what employer pays for employee's individual vision benefits	Ratio	
visfamper29	Ratio of what employer pays for employee's family vision benefits	Ratio	
visperall	Average of individual and family employer vision ratios	Ratio	
cardev40	Career development?	Yes/No	X
tut41	Tuition payment?	Yes/No	X
childc42	Child care assistance?	Yes/No	X
pdjur43	Paid jury duty?	Yes/No	X
pdvot45	Paid time off to vote?	Yes/No	X
Company Demographics Model			
numemp2	Number of employees	Typed number of people	X
pttime3	Part-time employees (% of total)	Typed number as percent	
avhours4	Total hours worked during the average week	Forced response number of hours	X
union6	Is your workforce unionized?	Yes/No	X
avansale5	Average annual sales	Typed number in dollars	
resico7	What percentage of your current employees reside in the county where your business is located?	Typed number as percent	X

Source: MTIDA 2017 Wage and Benefit Survey

Table 3: Means, standard diviations, and correlations for location characteristics, turnover, and absenteeism.

	M	SD	1	2	3	4	5	6	7	8
1 Absenteeism problem	0.55	0.5								
2 Turnover problem	0.46	0.5	.63**							
3 Absenteeism rate	0.14	0.1	.54**	.41**						
4 Turnover rate	0.07	0.07	.47**	.71**	.42**					
5 Purrual2010	53.7	25.7	.10	.17*	.00	.15*				
6 Econdiv2016	0.7	0.03	-.10	-.19*	-.05	-.18*	-.76**			
7 Unemp2016	0.05	0.01	.05	.08	-.03	.06	.67**	-.69**		
8 Babove2017	0.2	0.08	-.11	-.11	.04	-.12	-.88**	.59*	-.65**	
9 Copop2016	107,628	133,664	-.07	-.08	.06	-0.05	-0.79**	.56**	-0.55**	0.82

Notes: N = 183 for the Pearson correlations. *p < .05, **p < .01

RESULTS AND DISCUSSION

Location Characteristics

For research question 1, we explored which location characteristics, if any, correlated with turnover and absenteeism. As shown in Table 3, strong correlations exist among the five location characteristics variables, as well as among the rates and binary variables. Rurality and economic diversity both correlate with whether turnover is a problem in a company. Economic diversity, as expected, correlates negatively with a company's turnover problem. Economic diversity represents the number of industries present in a specific county, with the assumption that increased diversity leads to increased economic resilience. Diversity's negative correlation with turnover suggests that counties with many industries may represent places that potential employees want to move to, which cuts out length of commute as a reason why an employee would quit. Additionally, diverse counties which have many different types of jobs could lead to people choosing for which company they want to work, which would lead to less turnover.

Rurality is the percentage of a county's population that lives in rural areas. Rurality's positive correlation with turnover suggests that those companies located in counties with larger rural populations could institutionally differ from those companies located in counties with higher urban populations (e.g. manufacturing plants could be larger due to less urban area codes and restrictions). Another reason for rurality's positive correlation with the problem of turnover could be in the type of worker that lives in a rural versus an urban area. Rural populations might find commuting long distances difficult and thus the turnover problem could rooted in inconvenient commuting distances in those counties.

In addition to correlations, we ran logit regressions on regional characteristics' effects on the problems of turnover and absenteeism, presented in Table 4.

Table 4: Regional Characteristics Logistic Regression

	Absenteeism				Turnover			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
RRVI	-0.1872		-0.1909		-0.0865		0.6016	
RRERI	-0.0413	-0.1057			-0.2945	-0.2823		
perrual2010		0.0000		-0.0017		0.0051		0.0026
econdiv2016			-1.4523	-2.5568			**-5.01595** *	**-4.8396** .
unemp2016			-3.8421	-4.8044			0.3126	-6.9656
babove2017		-0.7230		-1.2420		0.4470		-0.3036
copop2016		0.0000		0.0000		0.0000		0.0000
AIC	241.4000	245.4507	242.8993	246.5489	239.6985	241.1966	238.2598	241.1470

Notes . p < .10, * p < .05, ** p < .01

As noted in the discussion on the created location indices, the location characteristics were a priori considered to jointly and equally affect the problem of absenteeism and turnover. The results for Model 1 for both absenteeism and turnover prove that the indices are not good indicators of whether turnover or absenteeism is considered a problem by companies. The results for Model 2 show that no component of the RRVI index correlates with problems with absenteeism or turnover. The results for Model 3 show that economic diversity has a negative effect on whether turnover is considered a problem, and the same results are mirrored in the full model (Model 4)

and in the previous correlation table (Table 3). Models in the following sections will include some or all of the regional characteristics mentioned above, with the exception of the the variable measuring percent of bachelor's degree-holding population. Table 3 shows that the variable correlates above the 0.80 threshold with the variable measuring the percent of rural population and with the variable measuring county population; we removed the bachelor's variable to avoid collinearity in our models.

Pay Practices

For research question 2, we sought to identify which pay practices, if any, correlated with turnover and absenteeism. As shown in the correlation matrix (Table 5), several significant correlations were found.

Table 5: Means, standard diviations, and correlations for location characteristics, turnover, and absenteeism.

	M	SD	1	2	3	4	5	6	7
1 Absenteeism problem	0.55	0.5							
2 Turnover problem	0.46	0.5	.58**						
3 Absenteeism rate	0.14	0.1	.53**	.4**					
4 Turnover rate	0.07	0.07	.48**	.71**	.45**				
5 Second shift differential	0.86	0.35	-.03	-.07	-.05	-.05			
6 Third shift differentia;	0.87	0.34	-.08	-.09	-.13	-.09	.58**		
7 Profit sharing available	0.23	0.42	.05	.02	-.04	.14*	.00	.18	
8 Cost of living raises given	0.47	0.50	.09	.11	.11	-.03	.00	-.02	.10

Notes: N ranges from 93 to 243 for the Pearson correlation pairs. *p < .05, **p < .01

Strong correlations were observed, as expected, between absenteeism being seen as a problem and turnover being seen as a problem as well as the absenteeism and turnover rates. There were two other significant correlations. First, the positive correlation between the second shift differential and the third shift differential is expected. Organizations that offer a second shift differential would likely also offer a third shift differential in an equal or higher proportion. The second significant correlation was unexpected: the existence of profit sharing programs (a yes/no item) was positively correlated with the turnover rate. We would expect that the existence of a profit sharing program would be negatively correlated with turnover, so this result warrants further investigation. Perhaps the profit sharing program was perceived negatively by employees, which would nullify the desired impact on turnover. We did not observe any significant correlations between shift differentials and cost of living adjustments and any of the turnover and absenteeism variables, which was unexpected. Future research on theses variables may be warranted.

Benefit Programs

For research question 3, we examined which benefit programs, if any, correlated with turnover and absenteeism. As shown in the correlation matrix (Table 7), several significant correlations were present.

All four turnover and absenteeism variables were negatively correlated with the percentage of medical insurance paid by the company for employees with individual coverage. These correlations ranged from -.16 to -.23. This result is not completely surprising given the high cost of medical insurance. Companies that contribute more toward their employees' medical insurance premiums may benefit from lower turnover and absenteeism. The average percentage of medical insurance paid by the company for individual and family coverage was negatively correlated with the absenteeism rate. This distinction is unexpected and is possibly due to the stronger correlation

of the percentage of medical insurance paid by the company for individual employees with the same absenteeism variable.

Both variables measuring the simple availability of dental and vision insurance had small, positive correlations with turnover being reported as a problem. This result is unexpected and does not align well with the other results. For example, the percentage of dental paid by the company for employees with individual coverage was negatively correlated with both absenteeism variables, which is the expected direction. A similar result occurred between the percentage of vision insurance paid by the company for individual coverage and absenteeism rate. These mixed results lead us to believe that by bearing some of the costs of individual medical, dental, and vision insurance, companies may be gaining some form of commitment from employees as demonstrated by lower absenteeism and turnover. However, the simple offering of dental and vision insurance without any financial support may have the opposite effect. One study using 200 organizations in Canada found that human resource management practices, such as promoting from within, fairness, flexible scheduling, health and insurance, and professional development, had a negative impact on voluntary turnover during times of substantially low, local, and industry-specific unemployment, which was defined as being one standard deviation below the mean (Schmidt, Willness, Jones, & Bourdage, 2018). The effect was not present when unemployment rates were higher. Thus, low unemployment rates could be moderating the relationship between medical, dental, and vision insurance contributions and turnover as well as absenteeism.

Offering childcare assistance was negatively correlated (-.16) with turnover being reported as a problem for organizations. Around 2 percent of respondents offered some type of childcare assistance. Additional analyses could help us study these organizations in more detail to determine more precisely which benefits they are offering, the monetary value, etc. that are potentially shaping their turnover and absenteeism.

A number of other interesting correlations emerged. The number of significant correlations with benefits as a percentage of wages is not surprising as the more benefits that a company offers, then the more they are spending on benefits as a percentage of wages. Those correlations included every other variable except retirement offerings, the percentage of medical insurance paid by the company for individual coverage, offering career development, offering child care assistance, and paid time off to vote. However, the benefits as a percentage of wages did not correlate with any of the turnover or absenteeism measures despite some individual benefits having a significant correlation. We suspect that this result is due in part to companies not clearly communicating the value of the benefits package to employees, which is a common oversight.

Table 6: Means, standard deviations, and correlations for benefit practices, turnover, and absenteeism (continued on next page).

		M	SD	1	2	3	4	5	6	7	8	9	10
1	Absenteeism problem	0.55	0.5										
2	Turnover problem	0.46	0.5	.58**									
3	Absenteeism rate	0.14	0.1	.53**	.40**								
4	Turnover rate	0.07	0.07	.48**	.71**	.45**							
5	Benefits as percent of wages	0.22	0.13	-0.1	-0.06	-0.1	-0.08						
6	Paid holidays	8.43	2.41	0.03	-0.03	0.13	-0.08	.29**					
7	Paid vacation and sick days	11.76	6.7	-0.11	-0.04	0.04	-0.07	.30**	.18**				
8	Retirement options	1.14	0.78	0.07	0	0.03	0.09	0.09	.28**	.15*			
9	Medical insurance offered	91.80%	0.28	0.01	0.09	0	0.05	.31**	.27**	.20**	.33**		
10	Medical paid by company (individual)	68.60%	0.27	-.16*	-.16*	-.23**	-.19*	0.11	0.08	-0.01	-0.02	NA	
11	Medical paid by company (family)	55.50%	0.3	0.05	0.05	-0.08	0.05	.28**	.31**	.17*	.35**	NA	.51**
12	Average percentage of overall medical paid by company	61.40%	0.27	-0.1	-0.09	-.19*	-0.13	.18*	.16*	0.08	0.13	NA	.88**
13	Dental insurance offered	84.70%	0.36	0.11	.14*	0.1	0.12	.40**	.29**	.13*	.40**	.64**	0
14	Dental paid by company (individual)	39.50%	0.41	-.17*	-0.1	-.18*	-0.11	.23*	.21**	0.11	0.13	0.08	.31**
15	Dental paid by company (family)	35.30%	0.38	-0.1	-0.04	-0.1	-0.02	.38**	.32**	.18*	.25**	0.08	.20*
16	Average percentage of overall dental paid by company	36.80%	0.38	-0.13	-0.06	-0.16	-0.07	.30**	.29**	.16*	.19*	0.08	.27**
17	Vision insurance offered	78.70%	0.41	0.05	.13*	0	0.13	.32**	.23**	.16*	.36**	.57**	0.01
18	Vision paid by company (individual)	23.20%	0.37	-0.14	-0.08	-.20*	-0.07	.21*	.22*	0.06	0.05	NA	.22*
19	Vision paid by company (family)	19.10%	0.33	-0.02	-0.06	-0.11	0.01	.30**	.22*	0.07	0	NA	.21*
20	Average percentage of overall vision paid by company	21.20%	0.34	-0.07	-0.05	-0.14	-0.01	.28*	.22**	0.07	0.01	NA	.22*
21	Career development offered	46.50%	0.5	0.02	-0.02	0.1	0.11	0.11	.25**	.15*	.30**	.23**	-0.11
22	Tuition reimbursement offered	39.90%	0.49	0.07	0.03	0.09	0.03	.35**	.41**	.17*	.28**	.24**	0.02
23	Child care assistance offered	1.60%	0.13	0.01	-.16*	-0.07	-0.08	0.04	.15*	-0.03	.25**	0.06	-0.04
24	Paid jury duty	85.80%	0.35	0.09	0.08	0.12	0.04	.26**	.22**	0.12	.25**	.22**	0.1
25	Paid time off to vote	41.00%	0.49	-0.1	-0.09	0.04	-0.02	0.07	0.06	.25**	-0.03	.15*	0.04

Notes. N ranges from 91 to 243 for the Pearson correlation pairs. *p < .05, **p < .01.

Table 6 (cont.)

		M	SD	11	12	13	14	15	16	17	18	19	20	21	22	23	24
12	Average percentage of overall medical paid by company	61.40%	0.27	.91**													
13	Dental insurance offered	84.70%	0.36	0.03	0												
14	Dental paid by company (individual)	39.50%	0.41	.36**	.40**	NA											
15	Dental paid by company (family)	35.30%	0.38	.58**	.48**	NA	.86**										
16	Average percentage of overall dental paid by company	36.80%	0.38	.49**	.45**	NA	.97**	.96**									
17	Vision insurance offered	78.70%	0.41	0.14	0.06	.72**	-0.09	0.04	0								
18	Vision paid by company (individual)	23.20%	0.37	.39**	.35**	-.24**	.56**	.53**	.57**	NA							
19	Vision paid by company (family)	19.10%	0.33	.39**	.34**	-.22*	.46**	.55**	.53**	NA	.86**						
20	Average percentage of overall vision paid by company	21.20%	0.34	.40**	.35**	-.27**	.53**	.57**	.58**	NA	.97**	.96**					
21	Career development offered	46.50%	0.5	.16*	-0.02	.27**	.17*	.21*	.17*	.30**	0.07	0.1	0.1				
22	Tuition reimbursement offered	39.90%	0.49	.30**	0.12	.28**	0.13	.30**	.21**	.27**	0.04	0.13	0.09	.52**			
23	Child care assistance offered	1.60%	0.13	0.11	0	0.08	-0.05	0.02	0.01	0.1	0.04	.21*	0.12	.15*	.21**		
24	Paid jury duty	85.80%	0.35	.17*	0.14	.35**	0.01	0.08	0.06	.22**	-0.03	0	-0.04	0.08	.15*	0.01	
25	Paid time off to vote	41.00%	0.49	-0.04	0.02	.13*	0.09	0.05	0.08	0.09	-0.01	-0.03	-0.01	.15*	0.09	-0.05	0.11

Notes. N ranges from 91 to 243 for the Pearson correlation pairs. *p < .05, **p < .01.

Table 7: Means, standard deviations, and correlations for demographic variables, turnover, and absenteeism.

		M	SD	1	2	3	4	5	6	7	8	9	10	11
1	Absenteeism problem	0.55	0.50											
2	Turnover problem	0.46	0.50	.58**										
3	Absenteeism rate	0.14	0.10	.53**	.40**									
4	Turnover rate	0.07	0.07	.48**	.71**	.45**								
5	Number of employees	166	257	.13*	.13*	.14*	.15*							
6	Part-time employees	8.1%	0.17	.01	.01	.16	-.06	.20						
7	Average hours per week	41.06	5.11	.16*	.14*	.01	.15*	-.01	-.16					
8	Unionized	0.05	0.22	.10	-.01	.16*	-.04	.20**	-.02	-.03				
9	Average annual sales	$55.6 million	$109.4 million	.06	.14	.12	.17*	.45**	-.04	.02	.28**			
10	Employees live in county	64.6%	0.23	.06	-.01	-.01	-.08	-.20**	-.12	.00	-.07	-.07		
11	Economic diversity (2016)	0.70	0.03	-.05	-.09	-.07	-.10	.02	-.11	.11	.02	.06	-.03	
12	County unemployment (2016)	0.05	0.01	.00	.04	-.01	.06	.04	.14	-.01	-.02	-.06	.17**	-.58**

Notes. N ranges from 77 to 243 for the Pearson correlations pairs. *p < .05, **p < .01.

Reasons for Turnover and Absenteeism

For research question 4, we asked open-ended questions to determine what the common factors for turnover and absenteeism were from the perspective of the human resource management professionals. Specifically, the questions were "What are the three most important factors for employee turnover? (i.e., dissatisfaction with the job, age, gender, education, tenure, pay rate, lack of advancement opportunities, lack of training, organizational commitment, job opportunities in the market, job-hopping, etc.)" and "What are the three most important factors for employee absenteeism in your company? (i.e., bullying and harassment, burnout, stress and low morale, children and elder care, depression, disengagement, illness, injuries, job hunting, etc.)."

Human resource management professionals from 236 companies responded with at least one factor on the turnover question for a total of 612 factors. Because respondents were given some choices, we were able to sort the majority of responses alphabetically. We then sorted through the remaining responses to find which category was the best fit. As shown in Figure 3, eight factors emerged as most common. Job opportunities and job hopping was the most common factor with 139 responses followed by dissatisfaction with job, supervisor, company, and/or work environment (88), pay rate (85), and absenteeism or attendance (79). The next most common factors were substantially lower and consisted of advancement opportunities (28), motivation (26), schedule (24), and discipline/poor performance (23). The remaining responses including factors such as retirement, transportation, age, benefits, personal/family issues, relocation, and drugs, medical, or legal issues. All but one of the top four responses (absenteeism/attendance) were prompted in the question. An argument could be made that all four of the top factors are at least partly related to the employee-friendly labor market conditions and the ease with which employees can change jobs.

The next four factors were smaller but are still relevant. While career advancement was prompted through the question, the remaining three factors were not available in the question: Motivation, work schedule/hours, and discipline/poor performance. Yet, 26 respondents indicated that motivation was one of their top three. The verbatim responses given on motivation included phrases like "Don't want to work," "Lack of work ethic," "Laziness," and "Unwillingness to

work." This factor may warrant further research, especially in the area of generational differences as 17 respondents identified age as one of their top three issues.

Human resource management professionals from 232 companies responded with at least one factor on the absenteeism question for a total of 583 factors. Because respondents were given some prompts, we were able to sort the majority of responses alphabetically. We then sorted through the remaining responses to find which category was the best fit. As shown in Figure 4, three factors stood out as most common: personal illness (184), child and elder care (117), and disengagement/morale (85). The next four most common factors were substantially lower, including burnout/stress (37), family issues (36), transportation (24), and personal issues (24). The remaining categories included company policy/tardies, drugs/legal issues, job/working conditions, job hunting, age/maturity, and other factors. Some verbatim responses provide contextual insight into the perceptions of human resource management professionals on this topic: "I wish I knew!" "Age-young-doesn't have desire to work" and "Outside interests conflicting with work schedules."

Figure 4: Most Common Reasons for Turnover

Figure 5: Most Common Reasons for Turnover
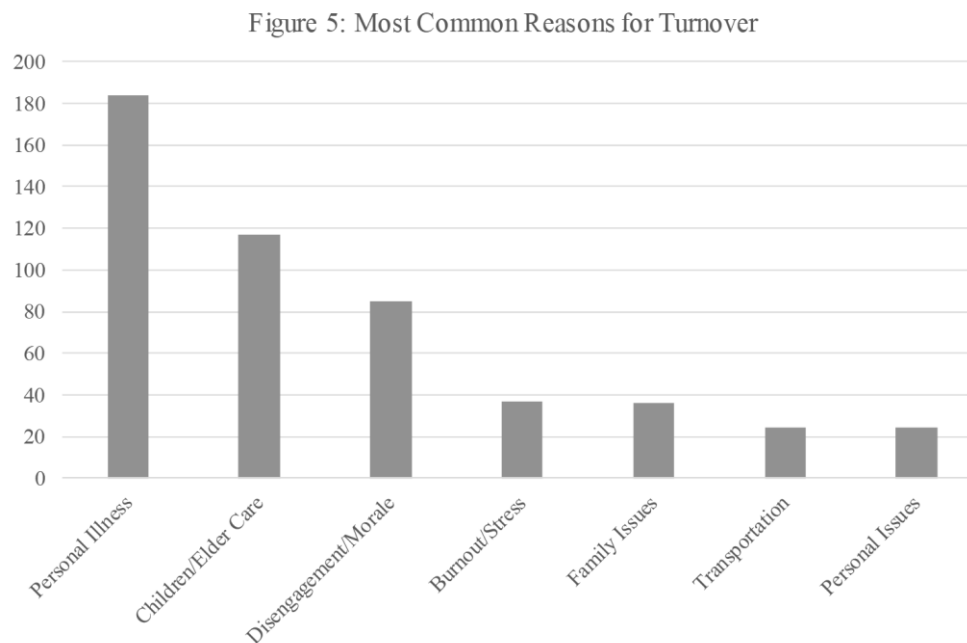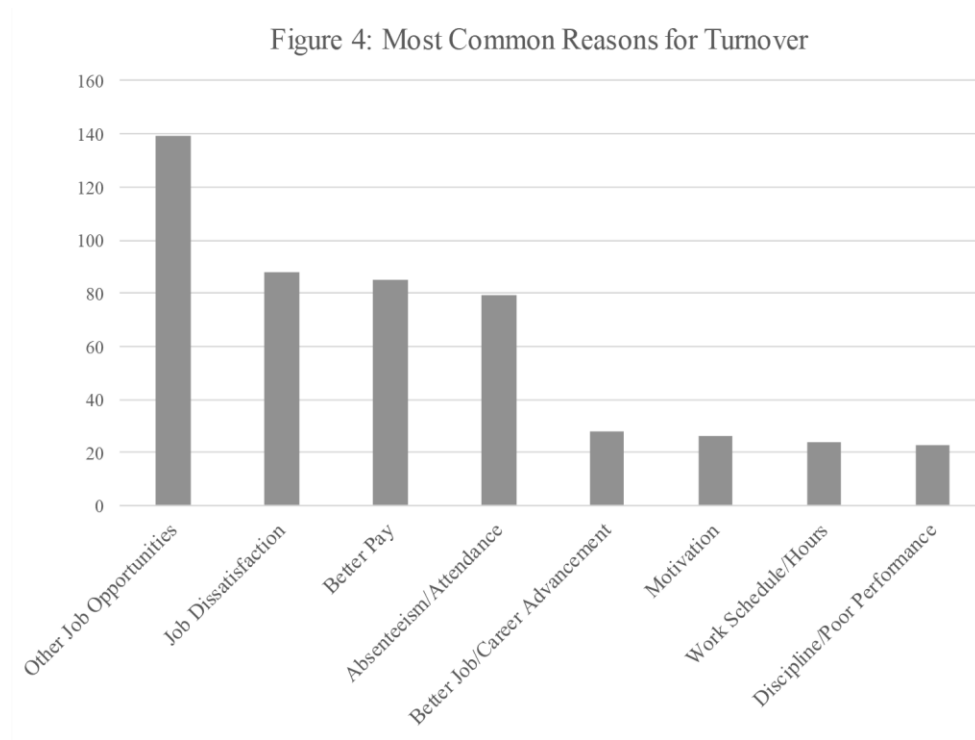
If we combined family issues with child and elder care, then the top two categories would be related to the employee's own health or caring for family members. These results are not surprising given what we know about the aging workforce and the generational differences in the workforce. Companies can implement wellness programs and have generous medical plans that help manage care. They could also offer dependent care benefits and child or elder care assistance to help with the second item. Disengagement and morale issues, including low commitment and

work ethic, were a strong third in commonality. This factor is the only top one that falls partly within management's control to change. The recruiting and selection procedures should select employees who can be motivated either internally or within the work environment. Their managers must be skilled in motivating and leading based on each employee's individual personality, strengths, and weaknesses.

Demographic Variables

For research question 5, we explored which demographic variables, if any, correlated with turnover and absenteeism. As shown in the correlation matrix (Table 7), several significant correlations were found. As observed previously, strong correlations were observed, as expected, between absenteeism being seen as a problem and turnover being seen as a problem as well as the absenteeism and turnover rates.

The number of employees was positively correlated to all four turnover and absenteeism measures. The average hours worked per week was positively correlated with both the turnover and absenteeism rates and with turnover being seen as a problem. However, the correlation with absenteeism being seen as a problem was not significant. The presence of a union was positively correlated with the absenteeism rate and with the number of employees. This finding is interesting but not surprising as union members would likely have more generous paid time off benefits and may miss work without being penalized financially. Average annual sales was positively correlated with turnover rate, number of employees, and presence of a union. The number of employees has an obvious connection to sales as growth in employee numbers could be partly due to sales growth.

The percentage of employees residing in the same county as the company was negatively correlated, as expected, with the total number of employees. As a company's workforce increases, the need to increase the geographic reach of recruiting efforts also increases. Economic diversity was not significantly correlated with any other demographic variables, which is unexpected. Further research should examine this variable in more detail. The county unemployment rate was positively correlated with the percentage of employees who live in the same county as the company. County unemployment had a strong, negative correlation with the economic diversity variable.

Table 8 reports the results for marginal effects from the logistic regression for each of the model categories and the full model that includes variables from each category. Each category had at least four model tested, with the best fitting model for each reported in Table 8. The full model similarly had four models tested, and only the best fit is shown. From Models 1 through 3, many variables had a significant marginal effect on the problem of absenteeism, and the initial full model included paid sick and vacation days (pddays1718), paid days for jury duty (pdjur), a measure of number of employees in a company (logged numemp2), average weekly hours (avhours4), the percent of employees that live within the county (resico7), and the economic diversity index number (econdiv2016). The final model chosen did not include the variable for paid jury duty and it did include the variable for available childcare (childc42). The childcare variable was added as a test, but that full model variation was validated as best fit by the Hosmer-Lemeshow goodness of fit test, the AIC, and an ANOVA chi-square test. Offering childcare has a strongly significant and negative effect on whether absenteeism is a problem, implying that having children is a major reason that people miss work (the second most commonly reported factor for absenteeism, see Figure 5).

Absenteeism Logistic Regression

Table 8: Logistic Regression — Absenteeism

Dependent Variable: *Is absenteeism a problem for your company?*

	Model 1	Model 2	Model 3	Full Model
Pay Practices				
profshar37	0.0008			
col49	0.0644			
incent46	-0.0369			
econdiv2016	-2.3848			
unemp2016	-1.2955			
perrual2010				
Benefits Offered				
pdhol12				
pddays1718		-0.0116 .		-0.0105
retirescore		-0.0152		
cardev40				
tut41		0.1172		
childc42				-0.4497 ***
pdjur43		0.2253 *		
pdvot45		-0.0371		
med19		-0.0073		
den24				
vis27				
perrual2010				
econdiv2016		-2.0046		
unemp2016				
copop2016				
Company Demographics				
log(numemp2)			0.1218 ***	0.1392
avhours4			0.0214 .	0.0220
union6			0.1635	
resico7			0.4059 *	0.3747
copop2016				
perrual2010				
econdiv2016			-4.3721 *	-3.0138
unemp2016			-5.2122	

Notes . p < .10, * p < .05, ** p < .01, *** p < .00. Values reported are marginal effects. Models of best fit for absenteeism were determined in the most part by the C-statistic from Hosmer-Lemeshow goodness of fit test for logistic regression. A clear best fit for the benefit offerings model was not apparent, so an ANOVA chi-square test was used to choose between the models. VIF statistics for the full model for each variable used were less than 2.

Other significant variables in Models 1 through 3 move in the expected directions. Increases in the number of paid vacation and sick days and increases in counties' economic diversity decrease the likelihood of absenteeism. The impact of economic diversity likely has to do with the people a diverse country draws to it. Increases in numbers of employees and average weekly hours both increase the likelihood of absenteeism. The significant effect of the numbers of employees is most likely due to the increased perception of a problem when managers see higher numbers even if the percentage is lower than a company with fewer employees. To see the difference, see Table 9, which shows the average employees for companies with problems versus no problems with absenteeism and turnover. In future papers, these numbers should be controlled for.

Table 9: Average employees for companies with:

Turnover problems	299.4	No turnover problems	183.7
Absenteeism problems	304.4	No absenteeism problems	162.9
Both problems	**296.1**	Neither problem	**117.0**
Average number of employees for entire sample (n=243)			228.1

Source: MTIDA 2017 Wage and Benefit Survey

The other two significant variables, those for paid jury duty days and percent of employees that reside within the county, have unpredictable effects. Paid jury duty days have a positive effect on the problem of absenteeism, meaning that when paid jury duty is offered, absenteeism is more likely to be a problem for a company. Similarly, the percentage of employees that reside within a county positively affects the problem of absenteeism. We would expect absenteeism to be less of a problem when more people reside within a county, as they would most likely have a shorter commute.

Turnover Logistic Regression

Table 10 reports the results for marginal effects from the logistic regression for each of the model categories and the subsequent full model. Each category had at least four model tested, with the best fitting model for each reported in Table 10. The full model similarly had four models tested, and only the best fit is shown. Using the significant variables from Models 1 through 3, the initial full model for turnover used the variables for cost of living raises (col49), tuition reimbursement (tut41), availability of childcare (childc42), paid days for jury duty (pdjur43), the number of employees (logged numemp2), average weekly hours (avhours4), and the economic diversity index variable (econdiv2016). The final best-fit full model dropped the variables for cost of living raises and paid jury duty days.

Table 10: Logistic Regression — Turnover

Dependent Variable: *Is turnover a problem for your company?*

	Model 1	Model 2	Model 3	Full Model
Pay Practices				
profshar37	-0.0449			
col49	0.1285 .			
incent46	-0.0159			
econdiv2016	-4.8662 .			
unemp2016	-7.3089			
perrual2010	0.0015			
Benefits Offered				
pdhol12		-0.0156		
pddays1718		-0.0068		
retirescore		-0.0133		
cardev40		-0.0599		
tut41		0.1959 *		-0.0149
childc42		-0.5430		-0.5648 ***
pdjur43		0.1898 .		
pdvot45		-0.1171		
med19		0.0091		
den24		-0.0294		
vis27		0.0879		
perrual2010		0.0027		
econdiv2016		-5.2586 .		
unemp2016		-8.9633		
copop2016		0.0000		
Company Demographics				
log(numemp2)			0.1363 ***	0.1509 **
avhours4			0.0262 *	0.0273 .
union6			-0.0850	
resico7			0.0852	
copop2016				
perrual2010				
econdiv2016			-7.5940 **	-6.7161 **
unemp2016			-7.1619	

Notes . p < .10, * p < .05, ** p < .01, *** p < .00. Values reported are marginal effects. Models of best fit for turnover were determined by the C-statistic from Hosmer-Lemeshow goodness of fit for logistic regression. VIF statistics for the full model for each variable used were less than 2.

As in the previous section, the availability of childcare had a strong negative effect on the likelihood of whether turnover is considered a problem, though it is not listed as a common factor (see Figure 3) for turnover. Also, like the models for absenteeism, the number of employees and the average weekly hours have positive effects on the likelihood that turnover is a problem, with

the explanations for these variables mirroring those for absenteeism. The more employees a company has, the same percentage of absenteeism or turnover will seem like a bigger problem. The more hours an employee works, the more likely he or she is to skip work or quit altogether. Offering tuition reimbursement has a significant positive effect on turnover in Model 2 but has a negative and insignificant effect in the full model, where the negative effect is expected as we assumed that employees would be more willing to stay with a company if that company offered the employee ways to better him or herself.

CONCLUSIONS, IMPLICATIONS, AND FUTURE RESEARCH

Effective management of human capital is as important now as it ever has been in manufacturing industries. This sector of the workforce is facing a shortage of labor that we have not seen in decades. We know that turnover and absenteeism exact a heavy cost on companies – an estimated $680 billion for turnover alone in 2020 (Fox, 2018). Thus, the impetus for effective recruiting and retention of a qualified workforce is clear. Manufacturers must be keenly aware of how their human resource management practices and programs could be impacting their ability to sustain their organizations.

To help with the labor shortage, states, technical schools, and companies have begun exploring innovative partnerships. For example, the Manufacturing Skills Institute (MSI) facilitates a partnership network among institutions ranging from middle schools to universities and workforce centers to facilitate a pipeline of skilled workers (Manufacturing Skills Institute, 2017). One MSI award-winning program encompasses a variety of potential workers, including local unemployed individuals, community college students, and soon-to-be released jail inmates, and provides several education and training paths, including industry-recognized certificates and credentials (Manufacturing Skills Institute, 2017).

The county-level location characteristic of economic diversity entered into many of the models as a significant variable in determining whether absenteeism or turnover represent problems to companies. The push for counties to become more diverse with respect to industry is a common theme in county-level and city-level planning. The negative effect of diversity on the problems of absenteeism and turnover for manufacturing has interesting implications, as manufacturing is considered a low-skill job. Comparing the effects of economic diversity on other industries' absenteeism and turnover problems could be informative. Does manufacturing behave the same way as other industries in this respect? Is Tennessee manufacturing unique in being affected by economic diversity in this way?

Pay practices should be studied in more depth in the next iteration of the survey. Compensation is expected, either directly or indirectly, to relate to turnover; however, no significant results were found in our correlations. Benefits programs provided some important insights, especially when viewed with the reasons for turnover and absenteeism. An average of 1.6% of the companies that we surveyed offer child care assistance. That item correlated with turnover being seen as a problem at -.16. Further, the second most common factor for absenteeism was children/elder care, and the fourth most common factor for turnover was absenteeism/attendance. This complex, interconnected relationship between child care assistance, children/elder care, absenteeism, and turnover warrants further study, especially given how so few of the organizations are offering child care assistance as a benefit. Providing child care assistance seems like a small investment to potentially help organizations with absenteeism and turnover. Companies should also recognize the importance of contributing meaningfully toward employees'

individual medical, dental, and vision insurance coverage as all of those variables were negatively correlated with one or more measures of turnover and/or absenteeism.

Average hours worked per week was positively correlated with both turnover and absenteeism being seen as a problem and with the turnover rate. The average hours per week for our respondents was 41. Working too few hours per week could worsen turnover and absenteeism if employees are not getting enough hours, while working too many hours could have the same effect depending upon what employees want. We need to collect data from employees to better understand the relationship between work hours, turnover, and absenteeism.

The respondents indicated that the top four factors affecting turnover were (1) other opportunities, (2) dissatisfaction with the job, supervisor, or company, (3) pay, and (4) absenteeism/attendance. While managers cannot limit the other opportunities that are available to employees, managers may influence the other three factors. Managers may help reduce dissatisfaction by first learning more about what causes it and then learning how to facilitate job satisfaction instead. The expression management professors like to say in class is often true: employees do not quit the job – they quit the supervisor. The management team is crucial to job satisfaction in the organization, and they need to be trained on this important topic and then held responsible for the associated outcomes. Regarding pay, when the labor market is highly competitive, it is extremely important for companies to monitor their pay structure for internal equity and external market competitiveness. Many human resource management professionals lack the expertise needed to execute this task, and outsourcing it can be expensive. Nonetheless, companies cannot afford to unknowingly fall behind the market in terms of pay and total rewards. Finally, absenteeism and attendance are obvious predictors of turnover. Managers should monitor attendance trends and consider implementing innovative retention strategies, such as conducting a stay interview a month or so before those points in time where employee attendance typically becomes a problem and when employees often quit. The stay interview opens a dialogue so that managers may be able to intervene before a small annoyance becomes a big enough problem to cause an employee to leave.

LIMITATIONS

One of the recurring limitations of this study is the small number of observations in the subset for the variables of interest. This limitation stems from incomplete survey data, where some respondents would answer the yes/no questions of interest but leave other selected questions blank, forcing the model to exclude them. Some variables of interest, such as the variable for benefits as a percent of wages, are not used due to the low number of responses.

Other limitations having to do with survey construction, as the 2017 Wage and Benefit survey was the first of its kind, will attempt to be addressed in the 2018 survey. One major limitation of this study was in the questions' use of ranges for answers for the turnover and absentee rates, in that the ranges have an upper bound of 30%. That means that while a company may have a turnover rate of 80%, the true value of the rate is obscured under the blanket range of "30% or above." This question modification should prove valuable to future studies on absenteeism and turnover using the MTIDA MTSU Wage and Benefit survey.

The human resource management professionals who completed the survey took around 90 minutes to complete it. Issues related to the length of the survey, such as survey fatigue, could have introduced error or increased the incidents of missing data. In future iterations of the survey, we should separate collection of the company data, such as benefits, turnover, and absenteeism,

from collection of the occupational data, including wages. This approach would help with survey fatigue and may improve the completeness of the data.

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