



Emotional Intelligence as a Predictor of Employee Engagement: A Study of U.S. Manufacturing Workers

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Abstract

According to the 2016 Gallup Report, manufacturing workers are the least engaged workers in the U.S. (Gallup, 2017). Studies on emotional intelligence (EI) indicate that EI has a significant, positive relationship with employee engagement (EE). Internationally, recent studies have operationalized the EI and EE constructs as a mix of unidimensional and multidimensional constructs, while domestically studies on EI and EE have been sparse, with more focus on EI and EE operationalized as unidimensional constructs examined along with other constructs. This study addressed these gaps by using the self-determination theory (SDT) to examine the extent to which EI and its dimensions of self-emotion appraisal (SEA), other's emotion appraisal (OEA), use of emotions (UOE), and regulation of emotion (ROE) predict EE and its facets of vigor (VI), dedication (DE), and absorption (AB) in 167 manufacturing workers in the continental U.S. The research study used a quantitative methodology incorporating nonexperiential reasoning in a predictive, cross-sectional survey using linear and hierarchical multiple regression analyses to analyze the data. The results go beyond the strength of the relationship between the constructs to demonstrate how each dimension of EI explains unique variance in EE and each of its facets. Data was collected using an online survey that included the WLEIS and UWES-9 instruments. The results of the study demonstrated that (a) EI and its dimensions have significant predictive relationships with EE and VI, (b) EI and its dimensions of SEA and UOE have significant predictive relationships with DE, but OEA and ROE do not, and (c) EI has a significant predictive relationship with AB, but SEA, OEA, UOE, and ROE do not. These outcomes provide information about the drivers of the relationship between EI and EE that leaders in manufacturing organizations may find influential when considering hiring practices, EI initiatives, and engagement efforts in the workplace.

Keywords: emotional intelligence, employee engagement, self-determination theory, WLEIS, UWES-9

Introduction

Gallup Inc.'s most recent meta-analysis covering over 112,000 teams, over 2.7 million employees, in 276 organizations across 54 industries in 96 countries found that employees in the top quartile on employee engagement significantly outperformed the employees in the bottom quartile in many performance outcomes: (a) 81% lower absenteeism, (b) 58% fewer patient safety incidents, (c) 18% less turnover in high-turnover organizations and 43% less turnover in low-turnover organization, (d) 28% less shrinkage, (e) 64% fewer quality issues, (f) 10% higher loyalty, (g) 18% higher productivity, and (h) 23% higher profitability (Gallup, 2020). The study results suggest that employee engagement plays a critical role in many aspects of organizational performance, presenting a major challenge for U.S. manufacturing organizations that represent the job category with the lowest level of engagement at 25% (Gallup, 2017). With only one out of four manufacturing workers engaged in the workplace, that leaves 75% of the manufacturing workers either not engaged or actively disengaged.

The research literature on emotional intelligence indicates that employees' emotional intelligence correlates with their workplace engagement level (Karamustafa & Kunday, 2018; Zhoc et al., 2020). Recent studies demonstrate that the individual dimensions of emotional intelligence can predict employee engagement (AlMazrouei et al., 2015; Barreiro & Treglown, 2020). Quantitative studies conducted in the education, health care, and business sectors of international countries find a positive relationship between the dimensions of emotional intelligence and employee engagement (Pérez-Fuentes et al., 2018; Sarangi & Vats, 2015; Zhoc et al., 2020). While a plethora of research on the EI and EE concepts has been conducted in the United States over the years, recent domestic studies have shown less focus on the specific topic of EI and EE, typically examining them along with other constructs (Boyatzis et al., 2017; Schutte & Loi, 2014).

There is considerable research regarding EI and EE, yet there is a lack of research regarding how EI and its dimensions predict EE and its facets in U.S. manufacturing workers. This research incorporates the self-determination theory as the theoretical underpinning that supports the investigation of the variables included in the study's conceptual framework. The research literature on EI indicates that EI has a significant, positive relationship with employee engagement (Barreiro & Treglown, 2020; Pérez-Fuentes et al., 2018; Sarangi & Vats, 2015). SDT states that intrinsic and extrinsic motivations drive an individual's behavior, and EI forms an intrinsic structure that motivates an employee to be engaged in the workplace.

EI

The emotional intelligence (EI) construct relates to measuring emotional intelligence. Salovey and Mayer (1990) defined emotional intelligence as "a form of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (p.189). Salovey and Mayer (1990) conceptualized EI using four sub-constructs: (a) self-emotional appraisal (SEA), defined as the appraisal and expression of emotion in the self; (b) others' emotional appraisal (OEA), defined as the appraisal and recognition of emotion in others; (c) use of emotion (UOE), defined as the use of emotion to facilitate performance; and (d) regulation of emotion (ROE), defined as the regulation of emotion in self. EI and its dimensions are measured using the Wong and Law Emotional Intelligence Scale (WLEIS) (Wong & Law, 2002). The

scale comprises 16 items on a 7-point Likert-type scale that includes the four dimensions of SEA, OEA, UOE, and ROE to measure EI.

EE

The employee engagement (EE) construct relates to measuring employee engagement. Schaufeli et al. (2006) defined engagement as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (p. 1). Schaufeli et al. (2006) conceptualized EE using three sub-constructs: (a) vigor, described as “high levels of energy and mental resilience while working, the willingness to invest effort in one’s work, and persistence even in the face of difficulties”; (b) dedication, described as “being strongly involved in one’s work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge”; and (c) absorption, described as “being fully concentrated and happily engrossed in one’s work, whereby time passes quickly, and one has difficulties with detaching oneself from work” (p. 702). Employee engagement and its facets are measured using the Utrecht Work Engagement Scale (UWES-9) (Schaufeli et al., 2006). The scale comprises nine items on a 7-point frequency rating scale that includes the three facets of vigor, dedication, and absorption used to measure employee engagement.

SDT

Self-determination theory is “a theory of human personality and motivation that focuses on the individual’s psychological needs and the extent to which the individual’s behavior is driven by intrinsic or extrinsic motivations” (Self-Determination Theory, 2015, p. 1). SDT evolved from research on intrinsic motivation, which is “the inherent tendency to seek out novelty and challenges, to extend and exercise one’s capacities, to explore, and to learn” (Ryan & Deci, 2000, p. 70). In formulating a theoretical perspective for studying the emotional intelligence and engagement of workers, self-determination theory provides a useful framework. SDT postulates that when the three basic needs of competence, autonomy, and relatedness are satisfied, it leads to enhanced self-motivation and well-being, and when thwarted, leads to diminished motivation and well-being (Ryan & Deci, 2000). When applied to the study, SDT holds that one would expect emotional intelligence and its dimensions to influence or explain employee engagement and its facets because EI acts as an intrinsic motivator, and more autonomous forms of motivation will enhance employees’ engagement at work.

EI and SDT

This study proposes that EI forms an intrinsic structure that motivates employees to be engaged in the workplace. Vallerand et al. (2014) posited that with the ability to understand and manage one’s own emotions and others’ emotions at the interpersonal and intrapersonal levels, workers with high emotional intelligence should act more autonomously. In a study of service employees in Seoul, Yang et al. (2015) examined how multi-dimensional emotional intelligence impacts intrinsic and extrinsic motivation and job satisfaction using labor perceived organizational support. The results of the study revealed that three dimensions of EI (appraisal of emotion, utilization of emotion, and expression of emotion) positively influence intrinsic motivation and that one dimension of EI (appraisal of emotion) positively influences extrinsic motivation (Yang et al., 2015). Lumpkin and Achen (2018) further illustrated the synergies between SDT and EI with the following shared characteristics: (a) EI: self-awareness and self-regulation → SDT: autonomy, (b) EI: motivation → SDT: competence, and (c) EI: empathy and social skill →

SDT: relatedness. These findings suggest that higher levels of EI should increase an employee's self-determination and, in turn, enhance their engagement in the workplace.

EE and SDT

Mueller (2019) suggested there is great merit in applying SDT as a theoretical framework in employee engagement research. SDT provides the theoretical lens that explains why employees exhibit a range of engagement levels in the workplace. SDT argues that supporting the three basic psychological needs increases intrinsic motivation and internalization, leading to higher quality motivation and performance, while trying to control motivation through extrinsic rewards and sanctions generally fails, leading to lower quality motivation and performance (Ryan & Deci, 2020). Rich et al. (2010, p. 618) posited that

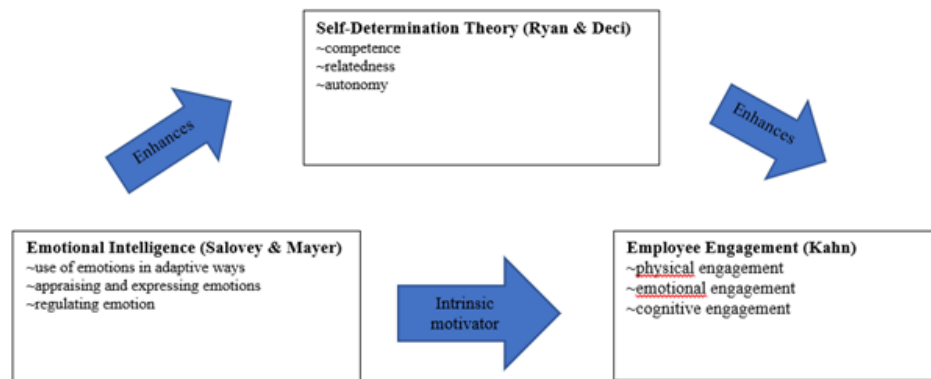
intrinsic motivation is promoted by both work contexts and individual differences that foster feelings of competence, autonomy, and relatedness (Gagné & Deci, 2005), and it is argued to influence performance because opportunities to satisfy these three intrinsic needs facilitate self-motivation and effective regulatory functioning through internalization of organizationally valued goals (Baard et al., 2004).

SDT exemplifies the logic that explains employee engagement.

Figure 1 presents the theoretical framework for the study.

Figure 1

Theoretical Framework



The purpose of this quantitative nonexperimental predictive survey research is to apply the self-determination theory that relates the emotional intelligence construct and its dimensions of SEA, OEA, UOE, and ROE as measured by the Wong and Law EI Survey (WLEIS) to the employee engagement construct and its facets of vigor, absorption, and dedication as measured by the Utrecht Work Engagement Scale

(UWES-9) for U.S. workers from manufacturing companies. The study contributes to the existing literature on the significance of EI in predicting employee engagement. The study also affirms the link between EI and EE of manufacturing workers by assessing their EI (and its dimensions) and its relationship to their EE (and its facets) via an online survey questionnaire.

Methods

Participants

A total of 167 continental U.S. manufacturing workers who were 21-70 years of age, able to read and understand English, had been employed full-time in a manufacturing setting for more than one year, and currently worked for a manufacturing organization with at least 250 employees were recruited through the Alchemer panel system. The participants completed a web-based survey that included four screening questions, the informed consent form, and the two instruments which were used to measure emotional intelligence and employee engagement.

Measures

Emotional Intelligence. Emotional intelligence was measured using the WLEIS developed by Wong and Law (2002), consisting of 16 items on a 7-point Likert-type scale to measure the four dimensions of self-emotion appraisal, others' emotion appraisal, use of emotion, and regulation of emotion. The WLEIS instrument was normed using samples of students and workers. The WLEIS survey instrument shows convergent, discriminant, and incremental validity of the 16-item EI scale (Wong & Law, 2002). The WLEIS also shows good convergence with other EI measures such as the Trait Meta-Mood and the EQ-i. The internal consistency of the WLEIS scale was evaluated by computing Cronbach's coefficient alpha for each dimension: SEA = .83, OEA = .75, UOE = .79, and ROE = .87. The overall scale had high reliability of .90.

Employee Engagement. Employee engagement was measured using the UWES-9 developed by Schaufeli et al. (2006), which consists of nine items on a 7-point frequency rating scale to measure the three facets of vigor, dedication, and absorption. The UWES-9 instrument was normed using various occupational groups from 27 different studies. The factorial validity of the instrument is demonstrated using confirmatory factor analyses, and the three scale scores have good internal consistency and test-retest reliability (Schaufeli et al., 2006). The internal consistency of the UWES-9 was evaluated by computing Cronbach's coefficients alpha for each facet: VI = .81, AB = .70, and DE = .83. The overall scale had high reliability of .90. The EI and EE scales demonstrated good internal consistency reliability with all Cronbach coefficient alphas at or above the minimum desirable value of .70 (Pyrzszak & Tcherni-Buzzeo, 2019).

Results

Preliminary Analyses

The initial step in analyzing the data was to calculate the participant scores for EI and SEA, OEA, UOE, and ROE dimensions. When complete, each participant had a mean score for EI, SEA, OEA, UOE, and ROE. The WLEIS scale includes 16 questions on EI: four for SEA, four for OEA, four for UOE, and four for ROE. The mean score for emotional intelligence was calculated in SPSS by taking all 16 questions and dividing the total by 16. The mean score of the four subscales was calculated in SPSS by adding the four scores on each subscale and dividing the total by four.

Similarly, the scores for EE and its facets of VI, DE, and AB were calculated. The UWES-9 scale includes nine questions on EE: three questions for VI, three questions for DE, and three questions for AB. The mean score for employee engagement was calculated in SPSS by taking all nine questions and dividing the total by nine. The mean score of the three subscales was calculated in SPSS by adding the three scores on each subscale and dividing the total by three. Each participant had a mean score for EE, VI, DE, and AB when complete.

The minimum sample size for the study was calculated using G*Power. The minimum sample size required for the study was 92 manufacturing workers (using an alpha of .05, a power of .80, a medium effect size of .15, and the multiple linear regression statistical test with five predictors). The study provided an actual sample size of 167 manufacturing workers, which was sufficient to conduct statistical analyses to test the hypotheses of the research questions. Outliers were identified by reviewing Casewise Diagnostics in a preliminary linear regression model that included all the data collected (EI Total vs. EE Total). The extreme outliers identified in the Casewise Diagnostics of the preliminary model were case #'s 69, 73, 91, 147. The four cases identified in the Casewise Diagnostics table were removed. The case processing summary was rerun to validate 163 valid responses (cases) with no missing responses (cases) for each study variable after removing the four extreme outliers.

At this point, the data were ready to run descriptive statistics. Descriptive statistics were run on the 163 cases to include minimum, maximum, mean, standard deviation, skewness, and kurtosis. Table 1 reflects the descriptive statistics for the nine variables used in the study.

Table 1

Descriptive Statistics

Variable	<i>N</i>	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
SEA	163	1.00	7.00	5.8819	.91300	-1.927	6.983
OEA	163	3.00	7.00	5.6902	.83741	-.653	.302
UOE	163	1.75	7.00	5.9969	.80746	-1.434	4.202
ROE	163	1.00	7.00	5.6012	1.05798	-1.271	2.129
EI Total	163	2.69	6.94	5.7926	.68185	-.769	1.878

VI	163	.33	6.00	4.0061	1.16503	-.482	-.167
AB	163	.67	6.00	3.9550	1.12065	-.488	-.002
DE	163	.33	6.00	4.3497	1.14324	-.653	.245
EE Total	163	.44	6.00	4.1036	1.01476	-.556	.259

All nine variables were within the range for skewness (± 2) and kurtosis (± 7) (*Testing of Assumptions*, 2021). Skewness looks at the symmetry of the distribution, while kurtosis looks at the pointiness of the distribution (Field, 2018).

Correlation analysis was also used to analyze the data. Table 2 presents the correlations between the variables in the study.

Table 2

Correlation Between Variables

Variables	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9
1. SEA	5.882	0.913	1	.482**	.503**	.395**	.785**	.546**	.298**	.527**	.517**
2. OEA	5.690	0.837		1	.368**	.311**	.698**	.456**	.329**	.367**	.433**
3. UOE	5.997	0.807			1	.493**	.769**	.514**	.347**	.583**	.543**
4. ROE	5.601	1.058				1	.762**	.484**	.298**	.451**	.465**
5. EI Total	5.793	0.682					1	.663**	.419**	.637**	.647**
6. VI	4.006	1.165						1	.629**	.797**	.913**
7. AB	3.955	1.121							1	.618**	.841**
8. DE	4.350	1.143								1	.908**
9. EE Total	4.104	1.015									1

**Correlation is significant at the 0.01 level (2-tailed), $N = 163$.

All dimensions of EI are positively correlated with facets of EE. SEA has the strongest correlation with VI (.546), UOE has the strongest correlations with AB (.347) and DE (.583). OEA had the weakest correlations with VI (.456) and DE (.367). SEA and ROE have the weakest correlation with AB (.298). Overall, the correlation results provide preliminary support for the hypotheses.

The data were also tested to verify that the linear and hierarchical multiple regression assumptions were met. The assumptions for linear regression include (a) level of measurement, (b) independence of scores, (c) linearity, (d) homoscedasticity, (e) outliers, and (f) normality. One additional assumption was tested for hierarchical multiple regression, multicollinearity (Field, 2018). The level of measurement was verified using descriptive statistics. Independence of scores was tested using the Durbin-Watson test statistic. Linearity for the linear regression model was inspected by visually inspecting a scatterplot of the DV plotted against the IV. For HMR, linearity was tested in two parts. Step one determined if a linear relationship exists between the dependent and independent variables collectively, which was achieved by plotting a scatterplot. Step two determined if a linear relationship exists between the dependent variable

and each independent variable, which was achieved using partial regression plots. Homoscedasticity was checked using the scatterplot created to check for linearity. Outliers, high leverage points, and highly influential points were detected by checking Casewise Diagnostics and studentized deleted residuals (SDR), leverage points (LEV), and Cook's Distance (COO). Normality was determined by looking at the distribution of residuals using a histogram with superimposed normal curve and P-P Plots or normal Q-Q Plots of the studentized residuals. Last, multicollinearity was checked by inspecting correlation coefficients and Tolerance/VIF values. All assumptions for linear and HMR were met except for some possible outliers; bootstrapping was applied to address any potential outliers in the data (Field, 2018).

Main Analyses

The study aimed to answer the following research questions:

RQ1: To what extent does emotional intelligence (EI) predict employee engagement (EE) in U.S. manufacturing workers?

RQ1a: To what extent do EI and its dimensions of SEA, OEA, UOE, ROE predict the vigor facet of EE?

RQ1b: To what extent do EI and its dimensions of SEA, OEA, UOE, ROE predict the dedication facet of EE?

RQ1c: To what extent do EI and its dimensions of SEA, OEA, UOE, ROE predict the absorption facet of EE?

RQ1d: To what extent do SEA, OEA, UOE, and ROE predict EE?

Once the data was screened by reviewing key descriptive statistics, testing the data to ensure the assumptions were met, and adjusting for outliers, SPSS was used to conduct hypothesis testing and answer the research questions. Regression analysis was used in this study to conduct complex analyses with different types and quantities of predictor and outcome variables. Linear regression allows the prediction of a continuous dependent variable (DV) based on one continuous independent variable (IV). Multiple regression allows the prediction of a continuous dependent variable based on multiple continuous or nominal independent variables (*Hierarchical Multiple Regression*, 2013). Regression analysis was appropriate for this study because the independent and dependent variables are continuous and treated as ordinal data in the analysis (Field, 2018).

Linear regression was run to understand the effect of emotional intelligence (predictor variable) on employee engagement and its facets of vigor, dedication, and absorption (outcome variables). The regression results for **EI Total** to **EE Total** demonstrate that $R^2 = .419$ and emotional intelligence explains 41.9% of the variability of employee engagement. H_01 is rejected and concludes that emotional intelligence is a statistically significant predictor of employee engagement. The regression results for **EI Total** to **VI** demonstrate that $R^2 = .439$ and emotional intelligence explains 43.9% of the variability of vigor. H_{01a1} is rejected and concludes that emotional intelligence is a statistically significant predictor of vigor. The regression results for **EI Total** to **DE** demonstrate that $R^2 = .406$ and emotional intelligence

explains 40.6% of the variability of dedication. H_{01b1} is rejected and concludes that emotional intelligence is a statistically significant predictor of dedication. The regression results for **EI Total** to **AB** demonstrate that $R^2 = .176$ and emotional intelligence explains 17.6% of the variability of absorption. H_{01c1} is rejected and concludes that emotional intelligence is a statistically significant predictor of absorption.

Table 3 summarizes the linear regression results for EI Total.

Table 3

Linear Regression Results for EI Total

Variable	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% CI	<i>p</i>	BCa 95% CI
EE Total (DV)							
EI Total (IV)	0.963	0.089	10.774	** .000	[.787, 1.140]	N/A	
<i>N</i> = 163, $R^2 = .419$, adj. $R^2 = .415$, $p < .001$							
VI (DV)							
EI Total (IV)	1.133	0.101	11.235	** .000	[.934, 1.332]	N/A	
<i>N</i> = 163, $R^2 = .439$, adj. $R^2 = .436$, $p < .001$							
DE (DV)							
EI Total (IV)	1.068	0.102	10.482	** .000	[.867, 1.269]	0.001	[.882, 1.244]
<i>N</i> = 163, $R^2 = .406$, adj. $R^2 = .402$, $p < .001$; bootstrap = no significant changes							
AB (DV)							
EI Total (IV)	0.689	0.118	5.862	** .000	[.457, .922]	N/A	
<i>N</i> = 163, $R^2 = .176$, adj. $R^2 = .171$, $p < .001$							
** $p < .001$							

Hierarchical multiple regression (HMR) allows you to add blocks of variables to a regression equation and determine how much each block of variables uniquely adds to the prediction of the dependent variable (*Hierarchical Multiple Regression*, 2013). HMR was used for hypothesis testing, in which each of the four dependent or outcome variables (VI, DE, AB, and Total EE) was analyzed against all five independent or predictor variables (SEA, OEA, UOE, ROE, and Total EI). Similar statistical analyses were used in past empirical research on EI and EE (Sarangi & Vats, 2015).

Hierarchical multiple regression was run to understand the effect of the emotional intelligence dimensions of self-emotion appraisal, others' emotion appraisal, use of emotion, and regulation of emotion on employee engagement and its facets of vigor, dedication, and absorption. The HMR results for **SEA**, **OEA**, **UOE**, and **ROE** to **EE Total** demonstrate that $R^2 = .425$ and **SEA**, **OEA**, **UOE**, and **ROE** explain 42.5% of the variability of employee engagement. As Table 4 indicates, **SEA** with $\beta = .248$, $t = 2.937$, $p = .004$ significantly predicted **EE Total**. Therefore, H_{01d1} is rejected and concludes that SEA is a statistically significant predictor of EE. **OEA** with $\beta = .200$, $t = 2.358$, $p = .020$ significantly predicted

EE Total. Therefore, H_{01d2} is rejected and concludes that OEA is a statistically significant predictor of EE. **UOE** with $\beta = .349$, $t = 3.667$, $p < .001$ significantly predicted **EE Total**. Therefore, H_{01d3} is rejected and concludes that UOE is a statistically significant predictor of EE. **ROE** with $\beta = .181$, $t = 2.653$, $p = .009$ significantly predicted **EE Total**. Therefore, H_{01d4} is rejected and concludes that ROE is a statistically significant predictor of EE.

The HMR results for **SEA**, **OEA**, **UOE**, and **ROE** to **VI** demonstrate that $R^2 = .442$ and **SEA**, **OEA**, **UOE**, and **ROE** explain 44.2% of the variability of vigor. As Table 4 indicates, **SEA Total** with $\beta = .343$, $t = 3.587$, $p < .001$ significantly predicted VI Total. Therefore, H_{01a2} is rejected and concludes that SEA is a statistically significant predictor of VI. **OEA** with $\beta = .255$, $t = 2.651$, $p = .009$ significantly predicted VI. Therefore, H_{01a3} is rejected and concludes that OEA is a statistically significant predictor of VI. **UOE** with $\beta = .292$, $t = 2.711$, $p = .007$ significantly predicted VI Total. Therefore, H_{01a4} is rejected and concludes that UOE is a statistically significant predictor of VI. **ROE** with $\beta = .244$, $t = 3.167$, $p = .002$ significantly predicted VI. Therefore, H_{01a5} is rejected and concludes that ROE is a statistically significant predictor of VI.

The HMR results for **SEA**, **OEA**, **UOE**, and **ROE** to **DE** demonstrate that $R^2 = .436$ and **SEA**, **OEA**, **UOE**, and **ROE** explain 43.6% of the variability of dedication. As Table 4 indicates, **SEA** with $\beta = .321$, $t = 3.406$, $p = .001$ significantly predicted **DE**. Therefore, H_{01b2} is rejected and concludes that SEA is a statistically significant predictor of DE. **OEA** with $\beta = .089$, $t = .935$, $p = .350$ did not significantly predicted **DE** (to be significant $p < .05$). Therefore, H_{01b3} fails to reject and concludes that OEA is not a statistically significant predictor of DE. **UOE** with $\beta = .501$, $t = 4.721$, $p = .001$ significantly predicted **DE**. Therefore, H_{01b4} is rejected and concludes that UOE is a statistically significant predictor of DE. **ROE** with $\beta = .168$, $t = 2.206$, $p = .050$ did not significantly predicted **DE**. Therefore, H_{01b5} fails to reject and concludes that ROE is not a statistically significant predictor of DE.

The HMR results for **SEA**, **OEA**, **UOE**, and **ROE** to **AB** demonstrate that the four dimensions of EI are not statistically significant predictors of absorption, $R^2 = .183$, $p = .149$. Therefore, H_{01c2} fails to reject and concludes that SEA is not a statistically significant predictor of AB; H_{01c3} fails to reject and concludes that OEA is not a statistically significant predictor of AB; H_{01c4} fails to reject and concludes that UOE is not a statistically significant predictor of AB, and H_{01c5} fails to reject and concludes that ROE is not a statistically significant predictor of AB.

See Table 4 for a summary of the HMR results.

Table 4

Hierarchical Multiple Regression Results

Variable	B	SE	b	t	p	95% CI for B		p	BCa 95% CI	
						LL	UL		LL	UL
EE Total (DV)										
SEA (IV)	0.248	0.084	0.223	2.937	.004	.081	.415	.005	.068	.413
OEA (IV)	0.200	0.085	0.165	2.358	.020	.033	.368	.020	.032	.384
UOE (IV)	0.349	0.095	0.278	3.667	**.000	.161	.537	.003	.146	.523

ROE (IV)	0.181	0.068	0.188	2.653	.009	.046	.315	.031	.009	.350
<i>N</i> = 163, <i>R</i>² = .425, adj. <i>R</i>² = .411, <i>p</i> = .009; bootstrap = no significant changes										
VI (DV)										
SEA (IV)	0.343	0.096	0.269	3.587	** .000	.154	.531	.002	.080	.538
OEA (IV)	0.255	0.096	0.183	2.651	.009	.065	.445	.014	.065	.444
UOE (IV)	0.292	0.108	0.202	2.711	.007	.079	.504	.006	.081	.492
ROE (IV)	0.244	0.077	0.222	3.167	.002	.092	.396	.008	.043	.445
<i>N</i> = 163, <i>R</i>² = .442, adj. <i>R</i>² = .427, <i>p</i> = .002; bootstrap = no significant changes										
DE (DV)										
SEA (IV)	0.321	0.094	0.256	3.406	.001	.135	.507	.001	.140	.476
OEA (IV)	0.089	0.095	0.065	0.935	.351	-.099	.276	.350	-.071	.280
UOE (IV)	0.501	0.106	0.354	4.721	** .000	.292	.711	.001	.268	.753
ROE (IV)	0.168	0.076	0.155	2.206	.029	.018	.318	.050	-.016	.339
<i>N</i> = 163, <i>R</i>² = .436, adj. <i>R</i>² = .421, <i>p</i> = .029; bootstrap = significant changes										
AB (DV)										
SEA (IV)	0.080	0.111	0.065	0.722	.472	-.139	.300	.383	-.113	.321
OEA (IV)	0.258	0.112	0.192	2.302	.023	.037	.479	.028	.008	.504
UOE (IV)	0.253	0.125	0.182	2.021	.045	.006	.501	.055	-.009	.455
ROE (IV)	0.130	0.090	0.123	1.451	.149	-.047	.307	.255	-.083	.366
<i>N</i> = 163, <i>R</i>² = .183, adj. <i>R</i>² = .162, <i>p</i> = .149; bootstrap = significant changes										

The study demonstrated that emotional intelligence statistically significantly predicts employee engagement and its facets of vigor, dedication, and absorption. The emotional intelligence dimension of self-emotion appraisal statistically significantly predicted employee engagement and its facets of vigor and dedication, but not absorption. The emotional intelligence dimension of others' emotion appraisal statistically significantly predicted employee engagement and its facet of vigor, but not dedication and absorption. The emotional intelligence dimension of use of emotion statistically significantly predicted employee engagement and its facets of vigor and dedication, but not absorption. The emotional intelligence dimension of regulation of emotion statistically significantly predicted employee engagement and its facet of vigor, but not dedication and absorption.

The results of the hypotheses tests are summarized in Table 5.

Table 5

Summary of Hypotheses Tests Results

RQ1		
H ₀₁	reject	EI is a statistically significant predictor of EE
RQ1a		
H _{01a1}	reject	EI is a statistically significant predictor of VI
H _{01a2}	reject	SEA is a statistically significant predictor of VI
H _{01a3}	reject	OEA is a statistically significant predictor of VI
H _{01a4}	reject	UOE is a statistically significant predictor of VI
H _{01a5}	reject	ROE is a statistically significant predictor of VI

RQ1b		
H ₀ 1b1	reject	EI is a statistically significant predictor of DE
H ₀ 1b2	reject	SEA is a statistically significant predictor of DE
H ₀ 1b3	fail to reject	OEA is NOT a statistically significant predictor of DE
H ₀ 1b4	reject	UOE is a statistically significant predictor of DE
H ₀ 1b5	fail to reject	ROE is NOT a statistically significant predictor of DE
RQ1c		
H ₀ 1c1	reject	EI is a statistically significant predictor of AB
H ₀ 1c2	fail to reject	SEA is NOT a statistically significant predictor of AB
H ₀ 1c3	fail to reject	OEA is NOT a statistically significant predictor of AB
H ₀ 1c4	fail to reject	UOE is NOT a statistically significant predictor of AB
H ₀ 1c5	fail to reject	ROE is NOT a statistically significant predictor of AB
RQ1d		
H ₀ 1d1	reject	SEA is a statistically significant predictor of EE
H ₀ 1d2	reject	OEA is a statistically significant predictor of EE
H ₀ 1d3	reject	UOE is a statistically significant predictor of EE
H ₀ 1d4	reject	ROE is a statistically significant predictor of EE

Discussion

The study examined one overarching research question further divided into four sub-questions. To what extent does emotional intelligence, defined as “a form of social intelligence that involves the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (Salovey & Mayer, 1990, p.189) predict employee engagement, defined as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (Schaufeli et al., 2006, p. 702) in U.S. manufacturing workers?

EI and EE

The first research question (**RQ1**) asked: To what extent does emotional intelligence (EI) predict employee engagement (EE) in U.S. manufacturing workers? The study results directly answered **RQ1** which focused on how EI predicts EE in U.S. manufacturing workers. The results demonstrated that emotional intelligence is a statistically significant predictor of employee engagement in U.S. manufacturing workers. Manufacturing workers with higher emotional intelligence demonstrate higher engagement in the workplace. The results signified a statistically significant positive relationship between EI and EE.

This finding aligns with other studies on the predictive relationship between EI and EE. For example, Zhoc et al. (2020) found that EI significantly predicted student engagement and promoted key learning outcomes in a study of first-year university students in Hong Kong. Similarly, in a study of business professionals in Istanbul, Karamustafa and Kunday (2018) found a significant positive relationship between emotional intelligence and employee engagement.

EI and Its Dimensions and Vigor

The second research question (**RQ1a**) asked: To what extent do EI and its dimensions of SEA, OEA, UOE, and ROE predict the vigor facet of EE? The study results directly answered **RQ1a** which focused on how EI and its dimensions predict the vigor facet of EE. The results demonstrated that EI, SEA, OEA, UOE, and ROE are all statistically significant predictors of vigor. Manufacturing workers with higher emotional intelligence, self-emotion appraisal, others' emotion appraisal, use of emotion, and regulation of emotion demonstrate higher vigor defined as "high levels of energy and mental resilience while working, willingness to invest effort in one's work, and persistence even in the face of difficulties" (Schaufeli et al., 2006, p. 702). The results signified a statistically significant positive relationship between EI and VI, SEA and VI, OEA and VI, UOE and VI, and ROE and VI.

The only finding in previous studies that aligns with the current study is the statistically significant positive relationship between EI and VI. Merida-López et al. (2017) found that EI was a significant predictor of vigor when studying teaching professionals in Spain. Extremera et al. (2018) found similar results in a study of Spanish professionals.

The previous studies on EI and EE that measured and reported the variables as multidimensional constructs used a combination of instruments that defined and measured the sub-constructs differently from the current study. Therefore, the relationship between SEA and VI, OEA and VI, UOE and VI, and ROE and VI were not compared with previous findings.

EI and Its Dimensions and Dedication

The third research question (**RQ1b**) asked: To what extent do EI and its dimensions of SEA, OEA, UOE, ROE predict the dedication facet of EE? The study results directly answered **RQ1b** which focused on how EI and its dimensions predict the dedication facet of EE. The results demonstrated that EI and its dimensions of SEA and UOE are statistically significant predictors of dedication, but OEA and ROE are not statistically significant predictors of dedication. Manufacturing workers with higher emotional intelligence, self-emotion appraisal, and use of emotion demonstrate higher dedication, defined as "being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge" (Schaufeli et al., 2006, p. 702). The results signified a statistically significant positive relationship between EI and DE, SEA and DE, UOE and DE, but not OEA and DE, and ROE and DE.

The only finding in previous studies that aligns with the current study is the statistically significant positive relationship between EI and DE. Merida-López et al. (2017) found that EI was a significant predictor of dedication when studying teaching professionals in Spain. Extremera et al. (2018) found similar results in a study of Spanish professionals.

The previous studies on EI and EE that measured and reported the variables as multidimensional constructs used a combination of instruments that defined and measured the sub-constructs differently from the current study. Therefore, the relationship between SEA and DE, OEA and DE, UOE and DE, and ROE and DE were not compared with previous findings.

EI and Its Dimensions and Absorption

The fourth research question (**RQ1c**) asked: To what extent do EI and its dimensions of SEA, OEA, UOE, ROE predict the absorption facet of EE? The study results directly answered **RQ1c** which focused on how EI and its dimensions predict the absorption facet of EE. The results demonstrated that EI is a statistically significant predictor of absorption, but SEA, OEA, UOE, and ROE are not statistically significant predictors of absorption. Manufacturing workers with higher emotional intelligence demonstrate higher absorption, defined as “being fully concentrated and happily engrossed in one’s work, whereby time passes quickly, and one has difficulties detaching oneself from work” (Schaufeli et al., 2006, p. 702). The results signified a statistically significant positive relationship between EI and AB, but not SEA and AB, OEA and AB, UOE and AB, and ROE and AB.

The only finding in previous studies that aligns with the current study is the statistically significant positive relationship between EI and AB. Merida-López et al. (2017) found that EI was a significant predictor of absorption when studying teaching professionals in Spain. Extremera et al. (2018) found similar results in a study of Spanish professionals.

The previous studies on EI and EE that measured and reported the variables as multidimensional constructs used a combination of instruments that defined and measured the sub-constructs differently from the current study. Therefore, the relationship between SEA and AB, OEA and AB, UOE and AB, and ROE and AB were not compared with previous findings.

EI Dimensions and EE

The fifth research question (**RQ1d**) asked: To what extent do SEA, OEA, UOE, and ROE predict EE? The study results directly answered **RQ1d** which focused on the extent to which SEA, OEA, UOE, and ROE predict EE in U.S. manufacturing workers. The results demonstrated that all four EI dimensions of SEA, OEA, UOE, and ROE are statistically significant predictors of EE. Manufacturing workers with higher self-emotion appraisal, others’ emotion appraisal, use of emotion, and regulation of emotion demonstrate higher engagement in the workplace. The results signified a statistically significant positive relationship between SEA and EE, OEA and EE, UOE and EE, and ROE and EE. The UOE dimension had the strongest correlation with EE.

These findings align with and contradict previous studies that examine the extent to which the EI dimensions of SEA, OEA, UOE, and ROE predict employee engagement. In a study that examined the impact of EI on work engagement of registered nurses in China, Zhu et al. (2015) found that all four sub-dimensions of EI positively correlated with work engagement, and the UOE dimension had the strongest correlation with EE. These results align completely with the results of the current study. However, two additional studies did not completely align with the current study. First, in a study of business employees in Oman, AlMazrouei et al. (2015) found that EI significantly predicted EE and that the dimensions of SEA, UOE, and ROE significantly predicted EE, but OEA did not. The UOE dimension had the strongest correlation with EE. AlMazrouei et al. explained that their study sample may have influenced the insignificant relationship between OEA and EE. The Oman culture does not allow women to interact openly with anyone except relatives, and more than half of their participants were women. D’Amico et al. (2020) conducted a study to assess if teachers who perceive themselves as emotionally competent experience higher levels of work engagement and job satisfaction and lower

levels of burnout. The study results demonstrated that EI significantly predicted EE and that the EI dimensions of UOE and OEA significantly predicted engagement, but SEA and ROE did not. Once again, the UOE dimension was found to have the strongest correlation with EE.

Limitations

There were four inherent limitations acknowledged in the study. First, the use of an online platform restricted the researcher's ability to (a) control the process, (b) clarify participant questions, and (c) ensure survey completion at the time it is administered (Theofanidis & Fountouki, 2018). Second, self-reported data introduced the possibility of participant bias when assessing themselves or reporting on their own experiences. Participants may also consciously or unconsciously misrepresent their actual, true behaviors or actions to appear socially acceptable, leading to responses that do not accurately reflect reality. Third, rating scales can be limiting when asking questions concerning attitudes or behaviors. There is also the possibility of participants being heavily concentrated on one response side or avoiding the extreme options on the scale, resulting in inaccurate survey results. Last, quantitative statistical analyses examined the relationship between variables, but they could not determine or establish causality (Field, 2018).

Conclusions

The study used SDT as a framework for examining EI and its dimensions as predictors of EE and its facets. Vallerand et al. (2014) posited that with the ability to understand and manage one's own emotions and others' emotions at the interpersonal and intrapersonal levels, workers with high emotional intelligence should act more autonomously. Lumpkin and Achen (2018) illustrated the synergies between EI and SDT that suggested higher levels of EI should increase an employee's self-determination and, in turn, enhance their engagement in the workplace. The study found that EI is a significant predictor of employee engagement and its facets of vigor, dedication, and absorption. The study also demonstrated that all four dimensions of EI, SEA, OEA, UOE, and ROE are significant predictors of employee engagement.

These findings support previous research on the alignment of the EI and EE constructs with SDT as the study's theoretical framework. Ashforth and Humphrey (1995) posited that strong motivation and cognitive engagement are not possible without an emotional connection to the work or work context. Emotional intelligence forms the intrinsic structure that motivates an employee to be engaged in the workplace. The study provides further understanding of the self-determination theory and the role of intrinsic motivation by demonstrating that EI can be measured as an intrinsic motivator to frame and explain how EI and its dimensions work to improve employee engagement in the manufacturing workforce.

The manufacturing sector of the U.S. workforce employs the least engaged workers in the U.S. The meta-analysis conducted by Gallup Inc. (2020) highlighted the significance of employee engagement to many individual performance outcomes that directly or indirectly impact overall organizational performance. Self-determination theory provides the theoretical lens that explains why employees exhibit a range of engagement levels in the workplace.

The study examined the extent to which EI and its dimensions predict EE and its facets in U.S. manufacturing workers. This study proposed that EI forms an intrinsic structure that motivates employees to be engaged in the workplace. Findings from the study demonstrate a strong positive relationship between EI and its dimensions and EE and EI and its dimensions and vigor. However, EI and its dimensions of SEA and UOE exhibited a significant relationship with dedication, but OEA and ROE did not; EI showed a significant relationship with absorption, but SEA, OEA, UOE, and ROE did not. Previous studies were found that used WLEIS to measure EI and UWES-9 to measure EE, but they did not operationalize both EI and EE as multidimensional constructs. Therefore, the findings that examined the extent which SEA, OEA, UOE, and ROE predict vigor, dedication, and absorption could not be confirmed or refuted by previous research. A recommendation for a future study is to repeat this study adding demographic information to validate or refute the current study's findings and further examine the significance of investigating EI and EE at a more granular level.

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