# Leader Emotional Intelligence and Work Engagement in Virtual Teams within a Healthcare Service Setting: A Quantitative Study

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## Abstract

Virtual working arrangements have become an important component of the operating model for healthcare service businesses to consider for a variety of reasons, including recruitment of top talent, effective deployment of workforce, and reduction in operational overhead. Concomitant with this evolving pattern of organizational structure, there has been debate in the literature contrasting the effectiveness of virtual teams to the effectiveness of co-located (face-to-face) teams. While virtual team focused literature has recently begun to concentrate on virtual leadership attributes versus task-orientation and/or technology, little research has been conducted to more fully understand the impact of emotional intelligence on the overall work engagement of virtual teams within a healthcare service entity. This study examined the impact of 26 virtual leaders' emotional intelligence as assessed by the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) on the overall work engagement of 107 virtual team members measured through Utrecht's Work Engagement Scale (UWES). As hypothesized, a positive and significant correlation was found between the overall emotional intelligence of the leader and the overall work engagement of virtual team members, as well as, with the dimensions of vigor and dedication. No significant correlation was found with the dimension of absorption.

## Introduction

Virtual work arrangements have become an important aspect of operating models for healthcare service entities to consider for a variety of reasons, including the recruitment of top talent, the globalization of workforce, and the continual pressures of reduction in operational overhead. With a vast and rapid expansion of technology providing substantial opportunity for connectivity regardless of location, there is an increasing interest among scholars and practitioners to understand the effective dynamics of virtual working environments.

Despite the information and digital transformation of society over the last quarter century, the exponential expansion of technology, and the desire for improved efficiencies in workforce, there is much debate in the literature regarding the effectiveness of virtual teams. Several meta-analyses comparing the effectiveness of co-located (face-to-face) teams to virtual teams suggest the latter are less effective.[1-6] In spite of this research, virtual environments have become an important aspect of operating models for healthcare service entities to consider. The Institute for Corporate Productivity conducted a survey of 250 organizations in 2008, of which 67% indicated an increased reliance on virtual teams within their respective companies over a three-year span.[7] Subsequently, in 2012, the Society of Human Resource Management conducted a separate survey finding 66% of global organizations were indeed using virtual teams.[8] Researchers have suggested virtual teams provide many benefits to organizations by increasing adaptability in addition to supporting the aforementioned performance metrics yet the debate persists on the overall effectiveness of this non-traditional operating model.[9-12]

As the prevalence of virtual teams increases, the attributes of virtual team leaders becomes an important issue. Specifically it raises the question "does the emotional intelligence of a virtual team leader have an impact on the level of engagement of virtual team members?" In traditional environments, leadership has been touted as the cornerstone of team success. Hess and Benjamin espoused leaders who connect with their own emotions are more adept in managing the frustration and anxiety associated with setbacks and even failure.[13] Leaders who have the ability to discern the group's norms while maximizing positive emotions can create highly emotionally intelligent teams.[14] Druskat and Wolff indicated the most effective teams are emotionally intelligent ones and advocated any team can attain emotional intelligence.[15]

Linking the domains of leadership, emotional intelligence, and team work engagement has the potential to enrich the effectiveness of virtual environments. Given the ongoing debate of the effectiveness of virtual teams, the question arises as to the efficacy of traditional leadership theory in this non-co-located world. More specifically, recognizing that fundamental basic human emotions exist regardless of co-location, it may be theorized the impact of a virtual leader's emotional intelligence is valuable even in a non-co-located environment. Further examination of methods to drive effectiveness in virtual teams will aid healthcare organizations, leaders, and the overall virtual workforce to meet the ever-evolving demands of the digital age.

The objective of this quantitative research study was to examine the impact the emotional intelligence of a leader may or may not exert on the work engagement of virtual team members within a mid-size healthcare consulting firm. Participation in the study was open to all leaders and employees within the organization of which a total of 26 leaders (68.4%) and 130 employees (73.4%) located across the United States volunteered by completing the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) and/or Utrecht's Work Engagement Scale (UWES) online.[16-17] The results of this study provide key insights to assist both practitioners and researchers in further understanding the impact of leadership emotional capabilities and the impact of work engagement within virtual teams.

### *Leadership, Emotional Intelligence and Virtual Teams*
Previous research conducted on the effectiveness of virtual teams focused predominately on the effectiveness of emotional intelligence of the virtual team members themselves opposed to the emotional intelligence of the leader. This appears to overlook decades of research and theories of the considerable impact of leadership on the effectiveness and engagement of teams. In *Leadership Theory and Practice*, Northouse represented leadership as a process whereby an individual influences a group of individuals to achieve a common goal expounding that leadership does not exist without the component of influence.[18] Existing virtual team literature, by virtue of focusing on individual member emotional intelligence, is deficient of key attributes of leadership theory. Certainly an individual can perform independently; however, with leader influence and guidance, an individual develops and prospers from the additional insight, knowledge, and challenge provided by the leader. More specifically, transformational leadership, a style of leadership which engages with others to create connections that raise the level of motivation and morality in both the leader and the follower, is concerned with the collective good, which transcends a leaders own interest for the sake of others. [19] Wang and Huang reported transformational leadership was positively affected by emotional intelligence and built group cohesiveness.[20]

Drucker acknowledged the effective leader builds on strengths.[21] When individuals focus on innate abilities, performance outcomes are at a high level of consistency, or near perfect performance.[21] A strength is not just a competency in skill; a strength is a feeling coupled with a strong emotion of involvement to increase engagement, which in turn increases productivity.[21]

Leaders demonstrating astuteness of group norms and proficiency in maximizing positive emotions have the ability to create highly emotionally intelligent teams.[14] Zhou and George concluded emotional intelligence can enhance leadership within team settings while Dulewicz and Higgs discovered emotional intelligence among managers correlated positively with the quality of work life and morale.[22-23] Additionally, Hess and Benjamin identified emotional intelligence as a significant factor in job performance and effectiveness.[13]

## Methods

This study utilized the "ability model" of emotional intelligence originally constructed and defined by Mayer and Salovey as "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 action" (pg. 189).[24] The ability model of emotional intelligence is considered a unique intelligence, comprised of four measurable abilities (perceive emotion, use emotion, understand emotions, and manage emotion), which enable understanding and reasoning through emotional information, combining thought and emotion to effectively perform in specific situations.[24] Furthermore, research has determined socially capable individuals are recognized to have a well-developed theory of mind skills making them more attuned to the emotions and intentions of others, including enabling them to make accurate interpretations of situations, influence the emotions and behaviors of others, as well as, predict what others think or believe.[25-26]

The study examined the relational effect a leader's emotional intelligence, asserts, if any, on the work engagement of virtual team members using Mayer and Salovey's ability theory of emotional intelligence.[24] Existing valid and reliable assessments were employed to compare responses in order to ascertain the relationship of the two variables. The independent variable, leaders' emotional intelligence ability, was measured by team leaders completing the computerized Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) administered by Multi-Health Systems.[27-28] The dependent variable, work engagement as determined through vigor, dedication, and absorption of the work group, was measured by virtual team members anonymously completing Utrecht's Work Engagement Scale (UWES) administered through an online survey method.[17] A correlation analysis was performed to ascertain the association between the two variables, leaders' emotional intelligence and the work engagement of virtual team members.

### Hypotheses

Given that the study focused on the impact leaders' emotional intelligence has on the work engagement of virtual team members, two research questions and four related hypotheses were identified.

R1: What is the relationship between a virtual leader's emotional intelligence score and the overall work engagement of their virtual workforce as measured by the MSCEIT and UWES?

    *H1: High emotional intelligence in a leader results in a positive correlation with the overall work engagement of virtual team members.*

R2: What is the relationship between virtual leaders' emotional intelligence and the individual elements (vigor, dedication, and absorption) of work engagement for their virtual team members as measured by UWES?

    *H2: High emotional intelligence in a leader results in a positive correlation with the vigor of virtual team members.*

    *H3: High emotional intelligence in a leader results in a positive correlation with the dedication of virtual team members.*

    *H4: High emotional intelligence in a leader results in a positive correlation with the absorption of virtual team members.*

### *Setting and Participants*

For this quantitative study, the setting proposed was a mid-size medical consulting organization specializing in non-acute healthcare. This organization defines themselves as entirely virtual, comprised of five different business units with a total of 177 employees, of which 38 hold various leadership roles and responsibilities. Given the size of the organization, the entire workforce was invited to participate in the study. Seventy-three percent (73.4%) of the employee population completed the Work Engagement Scale, while 68.4% of the leaders participated in the MSCEIT assessment.

### Table 1. UWES Response Summary

| Department | # of leaders | # of employees | # UWES participation | % of participation |
|---|---|---|---|---|
| **Advisory & Consulting** | 2 | 4 | 6 | 100.0% |
| **Coding Services** | 16 | 87 | 76 | 73.8% |
| **Revenue Management** | 7 | 27 | 29 | 85.3% |
| **Sales & Marketing** | 2 | 6 | 4 | 50.0% |
| **Support Services** | 11* | 15 | 15 | 57.7% |
| **Total** | **38** | **139** | **130** | **73.4%** |

*Includes CEO and Executive team members*

Coding services was the largest department within the organization, accounting for roughly 62% of the overall employees and 42% of leadership. Demographic data was collected on all participants, in addition to measurement of emotional intelligence utilizing the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) for leader participants and Utrecht's Work Engagement Scale (UWES) for employee participants.[17,27-28] The Utrecht Work Engagement Scale (UWES) was recreated in a digital format using Google forms to easily capture team member engagement. The survey was available to all 177 employees to anonymously participate regardless of title.

The selected organization had a basic understanding of emotional intelligence (EI) as defined by Goleman's mixed model theory.[14] The CEO of the organization was highly aware of emotional intelligence and commissioned six online EI modules for personal development. These modules were offered to the workforce through the company's learning management system and were assigned to employees as suggested training. These modules provided a brief overview of what emotional intelligence is, in addition to quick videos highlighting the components of Goleman's mixed model theory.[14] Prior assessment opportunities for leaders within the organization had not been provided preceding this research. In relation to work engagement measurements, the sample organization had expressed interest in administering engagement surveys previously; however, a measurement strategy was not employed prior to this study.

### Data Collection Procedures

An internal company email was sent to all employees by the sample organization's Human Resource manager explaining the research, requesting employee participation, and directing employees to www.virtualeiresearch.com, a website created by the researcher specifically to collect data for this study. Participants were informed in the communication, as well as, within the electronic consent form on the website, of the precautions taken to protect information collected, as well as, the anonymity of the respondents. The researchers removed personal identifying information by assigning a distinct identifier in the data collected, which was only viewed and used by the researchers for correlational purposes.

In an effort to increase participation, a follow up email was sent by the Human Resource Manager one week after the original email. Once the work engagement survey was closed, leaders were requested via email to participate in the MSCEIT assessment and given a two week window to participate. Upon completion of the emotional intelligence assessment, leaders were given the option to participate in a review session of their individual MSCEIT results with the researcher, who is a certified MSCEIT assessor through Multi-Health Systems.

In addition to the MSCEIT and Utrecht instruments, all participants completed a demographic survey to classify basic elements of the participant population, including gender, age, department, and tenure. The independent variable (emotional intelligence level of leaders) was measured utilizing the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT).[27-28] The EI raw scores, including subscale scores and total EI scores, were provided via MHS generated Resource Report per participant. The dependent variable (work engagement of team members) was measured utilizing Utrecht's Work Engagement Scale (UWES) and assessed online utilizing Google forms. Data collection was administered via a secured website (www.virtualeiresearch.com) dedicated to the collection of the research data with results accessible only by the researcher. The results for each instrument were combined into an Excel spreadsheet by the researcher and uploaded into SPSS© for further analysis. Work engagement data was analyzed at an aggregate level using the mean engagement score per leader to safeguard suggestive identifiers of individuals.

### Emotional Intelligence Measurement

According to the Consortium for Research on Emotional Intelligence in Organizations, there are nine distinct emotional intelligence measurements, of which, eight employ self-rated or multi-rater methods.[29] The MSCEIT is currently the lone performance-based emotional intelligence

test rooted in the psychometric body of social science. The MSCEIT instrument was selected to quantify the emotional intelligence in this study for two reasons. First, the MSCEIT was specifically designed to measure the ability model theory defined by Mayer et al., which is the primary theory being tested within this study.[30] Designed as an intelligence test, the MSCEIT measures actual performance versus multi-rater or self-report measurement minimizing potential misleading results.[16] Second, the MSCEIT has undergone extensive reliability and validity testing of the instrument lending it to be considered the most widely accepted model by the academic community.[31-32] Subsequently, researchers have found many self-report measures overlap with existing scales of personality, whereby the MSCEIT has sufficient distinction from the Big Five personality tests.[30]

Comprised of 141 items, the MSCEIT, unlike other emotional intelligence assessments, has what the assessment creator considers "correct" answers based on two distinct scoring keys generated from general consensus scoring, comprised of over 5,000 test takers, and expert scoring derived from the judgements of 21 international emotions researchers.[30] It is incumbent upon the assessor to choose the scoring option of preference when administering the test. While the assessment manual and targeted articles suggest the general consensus scoring is the preferred method, recent communication with Caruso yielded advocacy for the expert scoring key given more recent analysis of version 2 demonstrated higher correlation between the two scoring keys at the Total, Area, and Ability levels (.90 and higher versus .88 in version 1).[33] Based on this suggestion, the expert scoring key was employed for this study.

The MSCEIT yields a Total score, two Area scores, four Ability scores, and eight distinct Task scores (two to measure each of the four abilities within the model).[30] Given the lower reliability in the individual Task scores, these were excluded from interpretation.

The Experiential area is comprised of the first two abilities of the model. Ability 1 (Perceive Emotions), assesses the ability to accurately identify one's own and other's emotions through perceiving emotions in facial and postural expressions. Individuals were asked to indicate how likely each emotion listed is present in a photograph. This is the most universal ability within the model and is considered to be a foundational attribute of emotional intelligence. If one misperceives emotions, the ability to use, understand, and manage those emotions are employed using misperceived information. Ability 2 (Use Emotions) focuses on one's ability to use emotions to facilitate thought and problem solve. This is considered the least cognitive ability as it is not always able to be replicated. This ability is a passive process where how one feels influences what one pays attention to and how one thinks, although, part of intelligence relies on developing a knowledge base of experience upon which to draw.[30] This ability is measured using facilitation and sensation tasks by matching feelings to situations.

The second Area of the MSCEIT is the Strategic EI, which is derived from the final two abilities. Ability 3 (Understand Emotions), is considered the most cognitive ability as it reflects the capacity to define, analyze, predict, and understand the complexity of emotions. The tasks associated with this ability include defining complex emotion (blends), as well as, determining progressions of emotion (changes) derived from emotions theory. The final ability (Managing Emotions), focuses on the ability to manage emotions oneself and others. Mayer et. al. denotes emotions are managed in the context of individual's goals, self-knowledge, and social

awareness.[30] This ability is not about suppressing emotions or acting unemotionally. This section was measured using vignettes and multiple choice options.

Standard scores from MSCEIT parallel those used in the Wechsler scales, whereby, the average score is 100 with a standard deviation of 15. The majority of testers (68%) score between 85 and 115, with total scores ranging from 55 to 145. A scatter score is produced to indicate the variability of the test takers performance. High scatter scores indicate strong variability and may require additional analysis of results.

### *Work Engagement Measurement*

Work Engagement is comprised of three dimensions (vigor, dedication, and absorption), which UWES distinctively measures.[17]

> Vigor is characterized by 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. Dedication refers to being strongly involved in one's work, and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work (p.13).[34]

Developed in 1999 at Utrecht University in the Netherlands, two versions of the survey exist, the original 17-item scale and a shortened 9-item scale.[17] Seppala et. al. conducted a validity study of the instrument through structural equation modeling to find a high rank-order stability for the work engagement factors (.82 and .86).[35] This instrument has been utilized cross-nationally within a variety of professions. While no previous research was found indicating use in the virtual environment, it would appear a viable instrument given the viability cross-culturally. Therefore, the 17-item scale was selected for the dependent variable of this proposed study.

The 17 items of the UWES measuring the three aforementioned dimensions of work engagement are categorized as follows and outlined in Table 2:

> Vigor is measured by six items (1, 4, 8, 12, 15, 17); dedication by five (2, 5, 7, 10, 13); and absorption by six (3, 6, 9, 11, 14, 16). Items are rated on a seven-point scale ranging from 0 (never) to 6 (every day). The internal consistencies (Cronbach's alpha) of the UWES-17 ranged between 0.75 and 0.83 for vigor, between 0.86 and 0.90 for dedication, and between 0.82 and 0.88 for absorption.[35]

**Table 2. Utrecht Work Engagement Scale Elements[35]**

| Dimension | Question |
|---|---|
| **Vigor** | 1. At my work, I feel bursting with energy |
| | 4. At my job, I feel strong and vigorous |
| | 8. When I get up in the morning, I feel like going to work |
| | 12. I can continue working for very long periods at a time |
| | 15. At my job, I am very resilient, mentally |
| | 17. At my work I always persevere, even when things do not go well |
| **Dedication** | 2. I find the work that I do full of meaning and purpose |
| | 5. I am enthusiastic about my job |
| | 7. My job inspires me |
| | 10. I am proud of the work that I do |
| | 13. To me, my job is challenging |
| **Absorption** | 3. Time flies when I'm working |
| | 6. When I am working, I forget everything else around me |
| | 9. I feel happy when I am working intensely |
| | 11. I am immersed in my work |
| | 14. I get carried away when I'm working |
| | 16. It is difficult to detach myself from my job |

In 2003, an explorative factor analyses was conducted, which led to the recommendation to use the total-score on the UWES for measurement.[17] The higher the total-score, the stronger the work engagement.

While this instrument is well tested, validated, and reliable as a measurement of work engagement, it is not as complex as the MSCEIT instrument employed for the independent variable in the study.[16-17,35] Comparatively, the MSCEIT consists of 141 questions categorizing two areas, four abilities, and eight tasks versus 17 questions in the UWES for three components cumulating into one total-score.[16-17] This research utilized both instruments total-score for the numeric value for each participant. Additionally, the research analyzed the MSCEIT Area (Experiential and Strategic) and Ability (Perceive, Use, Understand, and Manage) scores in correlation to the three dimensions of the UWES (vigor, dedication, and absorption).

*Data Analysis*

The resulting data from the instruments detailed above were analyzed utilizing a one-tail Pearson's *r* correlation test to determine the positive relationship between the two defined variables and further analyzed with linear regression analysis to control for demographic data. The level of significance was set at 0.05 for this study. SPSS© for Windows version 24 (2017) was utilized to analyze the data.

# Results

*Hypothesis 1: High EI in a leader results in a positive correlation with the overall work engagement of virtual team members.*

The initial analysis of research question one investigated the relationship between the virtual leaders' total MSCEIT score and the work engagement of the virtual team members without consideration of other variables. Utilizing a one-tailed test to determine the positive effect, there was a significant correlation between the leaders' emotional intelligence and overall work engagement of the virtual team members ($r(26) = .353$, p=.038). Therefore, this hypothesis was supported.

*Hypothesis 2: High emotional intelligence in a leader results in a positive correlation with the vigor of virtual team members.*

It was determined the emotional intelligence of the leader had a significant correlation with the vigor of virtual team members ($r(26) = .480$, p=.007) at the .01 level. Therefore, hypothesis two was supported. This was the most significantly correlated dimension of work engagement.

*Hypothesis 3: High emotional intelligence in a leader results in a positive correlation with the dedication of virtual team members.*

This hypothesis was supported. The correlation between the emotional intelligence of the leader and the dedication dimension of work engagement of the virtual team members is significant ($r(26) = .330$, p=.0499).

*Hypothesis 4: High emotional intelligence in a leader results in a positive correlation with the absorption of virtual team members.*

The data indicated this hypothesis was not supported. There was not a significant correlation between the emotional intelligence of the leader and the absorption dimension of work engagement of virtual team members ($r(26) = .318$, p=.057).

# Discussion

Past studies of co-located teams in various industries such as information technology, policing, and food service, have found a correlation to exist between the emotional intelligence of the leader and the work engagement of team members.[36,37,38] This study sought to establish whether similar correlations exist in virtual environments.

### Emotional Intelligence in Leadership

Since the introduction of emotional intelligence in 1990, debate persists on the relevance of EI, despite the growing body of empirical research demonstrating its validity.[39-45] Criticism generally hales from the perspective constructs with substantial empirical overlap are theoretically similar to the extent that neither of the constructs offer efficacy over another.[46-50] However, meta-analytic findings have consistently supported the incremental validity of EI (both ability and mixed model EI) over and above personality.[43,51-52]

In the context of leadership, Grewal and Salovey utilize Mayer and Salovey's original definition of emotional intelligence (a set of capabilities that focus on an individual's capacity to access, monitor, and discriminate between one's own emotions and those of others) to apply EI within the relational and social attributes of leadership.[24,53] Socially capable individuals are recognized to have a well-developed theory of mind skills making them more attuned to the emotions and intentions of others, including enabling them to make accurate interpretations of situations, influence the emotions and behaviors of others, as well as, predict what others think or believe.[25-26] Given leader influence, one would expect the leader's emotional intelligence to be a substantial factor in the overall climate of the team. Dulewicz & Higgs posit emotional intelligence is a critical factor of effective leadership for today's organizations.[23] Furthermore, Feather and Cummings et al. link EI to resonant leading, a style of leadership that seeks to minimize the emotional impact of organizational change on team members.[54-55] Resonant leaders are empathetic and supportive of the needs of their teams while also effectively managing their own emotions; they are therefore able to develop effective relationships with others.[56] Goleman and subsequently, Hess and Benjamin, identified a resonant leader as one who is in touch with feelings of others and is able to move individuals in a more positive emotional direction connecting with followers resulting in feelings of motivation and inspiration while creating a more positive and productive work environment.[13-14] Conversely, Goleman, Boyatzis, and Mackee attribute dissonant leadership to the failure to connect with others, being insensitive to others reactions, creating distance between the leader and the followers. Consequently, coworkers are off-balance, feel disconnected, and perform poorly.[14]

Kouzes and Posner, as well as, Wheatley describe successful leadership trait as understanding not only one's emotions but those of others as well.[57-58] EI capabilities can be linked to various leadership styles encompassing the capacity to inspire and empower others and enable leaders' behaviors to be more congruent with the beliefs and values of organizational members.[59] Furthermore, Dulewicz and Higgs found in a seven-year longitudinal study emotional intelligence was significantly more important than intellect in the career progression of managers.[23] Hess and Benjamin posit the emotionally intelligent leader focuses on the development of self and others.[13]

> Emotionally intelligent leaders learn to assess their own strengths and weaknesses and complement those characteristics with those surrounding them. Additionally, these leaders exhibit the trait of developing others not just for the benefit of the organization but also the professional and personal growth of the individuals themselves. Rather than feeling threatened by the individuals under them, EI leaders concerned about relationship management will develop those individuals into executives who are equipped to deal with setbacks, hardships, and failures (p.118).[13]

### Virtual Teams

Virtual teams are defined in the literature with slight nuances yet one factor remains synonymous with the nomenclature, members of the team are not face-to-face and communicate through various mediums of technology including, but not limited to, audio and video conferencing, chat rooms, instant messenger, file and application sharing, in addition to other virtual reality options.[60-62] Sarker et al. takes a more definitive approach to defining virtual teams as geographically dispersed, lacking shared social context, and face-to-face encounters, while

Kirkman and Mathieu profess geographical distance is not a requisite for a team to be considered virtual, only that the members utilize virtual means to communicate and adopt tasks.[63-64]

Technology-deterministic theory indicates virtual teams will perform more poorly compared with face-to-face teams because of imposed challenges some of which are the fundamental attributes of team forming, norming, and storming, which look different in virtual teams than traditional co-located peers.[65] McGrath identified team performance activities address three distinctly different types of outcomes simultaneously (a) task performance, (b) social relationship/wellbeing inclusive of developing and maintaining of good social relationships among team members, and (c) individual development.[66] It is expected these three components hold true for virtual teams, albeit how these are performed are relatively different. Nonetheless, a good balance between these focus areas are important for effective team functioning.[66]

Chieh Liu suggested Technology-Task Fit (TTF) and self-disclosure (revealing information to others) are fundamental functions of virtual teams, which precede working ties (interaction between team members) ultimately progressing performance and satisfaction outcomes.[67] Self-disclosure plays a key role in the development of social relationships, which have gradually been considered important in the development of virtual teams.[68-69] Ultimately, humanistic attributes of team dynamics remain true regardless of co-location. Patel, Pettitt, and Wilson espoused the important factors essential for collaboration are culture, trust, interaction processes, teams, and tasks whereby Gautier et al. indicated communication is a core element in creating a collaborative culture.[70-71] Pornsakulvanicha et al. denoted self-disclosure is a significant positive predictor of online relationship closeness and positively predicts communication satisfaction.[72,67] In a review of eight studies with meta-analyses highlighting differences between face-to-face and virtual workplace related outcomes, Malhorta et al. found literature touts face-to-face teams have better performance, greater efficiency, better communication, and shorter decision making time while virtual teams generated better ideas.[65] Inversely, virtual teams in 20 field research studies found virtual consultant projects brought in significantly more revenue than traditional consultant projects with 85% of the teams in these studies achieving performance management expectations. IBM and US West (Centurylink) indicated a 14 to 40% increase in productivity amongst virtual teams.[65]

There are sufficient benefits to evolving team structure beyond the co-located face-to-face traditional team. Virtual teams help organizations manage the globalization of business, the movement towards horizontal organizational structures, and customers' demands for increased efficiency, in addition to cost reduction of logistical expense and increased adaptability.[9-11,60]

*Leadership in Virtual Teams*
As virtualness becomes more prevalent, the question arises whether or not existing leadership theory and practices will remain relevant for the future. Bolden et al. notate the models of leadership today are founded on face-to-face interaction.[73] While Ruggieri determined these models can be extended to virtual teams, Zigurs argues virtual teams provide a unique opportunity to redefine leadership.[74-75]

In a comparative study, Purvanova and Bono ascertained transformational leadership was equally important in face-to-face and virtual teams and ultimately exhibited a stronger influence on the performance of virtual team environments.[76] Wadsworth and Blanchard sought to understand

influence tactics manifested and enacted within virtual teams and determined ambiguity reduction, used only by the virtual leader, required a certain level of empathy and perspective that necessitates a knowledge of the person being influenced.[62] This was a neoteric influence tactic, which emerged within the research specific to virtual teams' need to mediate misinformation. As Hess and Benjamin point out, leaders need to choose the applicable leadership style in order to achieve positive outcomes.[13]

> Leaders play many roles including inspirer, developer, and change agent while determining the appropriate style to create the team climate. Choosing the correct leadership style will lead to positive interactions, encouraging others to be supportive, and committee to subsequent endeavors.[13]

As in co-located environments, virtual leaders will need to choose the applicable leadership style in order to achieve the most effective outcomes for their team.

### *Work Engagement*
Aon Hewitt asserts employee engagement is in a decline in the United States with only 40% of employees conveying they are engaged.[77] This staggering statistic highlights the need for organizations to tap into new areas to bolster the connection with their workforce. Schaufeli and Baker define work engagement as "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (p.295).[17] Vigor is the willingness to invest effort in one's work and refers to high levels of persistence, energy, and mental resilience while working. Dedication is being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is full immersion in one's work such that time passes quickly and one has difficulties detaching oneself from work. Higher emotional intelligence has been linked to improved team collaboration, higher job satisfaction, and lower turnover.[78]

In *Organizational Culture and Leadership,* Schein creates a clear delineation between leadership and culture. He states, "what we end up calling a culture in such systems is usually the embedding what a founder or leader has imposed on a group that has worked out.[79] In this sense, culture is ultimately created, embedded, evolved, and ultimately manipulated by leaders." (pg.3)[79] This would indicate the influential nature of leadership has the propensity to drive the work engagement of their team.

Barsade validated the work of Torrente by suggesting that people who work together experience collective emotions may also be applied to work engagement.[80-81]

### *Demographics of the Study Population*
Demographics regarding gender, age, department, and time in current position were collected. Few respondents excluded the demographic data, however, when those components were null, the full respondent data was removed as appropriate within the analysis of those variables.

The gender of the leader respondents was heavily skewed female (see Table 3. Sample Characteristics: Gender). Of those who indicated gender, female respondents comprised 73% of the leader sample while 23% indicated male as their gender. Similarly, team member gender demographics mirrored leader gender demographics with 86% identifying as female.

**Table 3. Sample Characteristics: Gender**

| Participant | Male | Female | Total |
|---|---|---|---|
| **Leader** *(N=25)* | 6 (23.1%) | 19 (73.1%) | 25 (96.2%) |
| **Team** *(N=107)* | 14 (13%) | 93 (86.1%) | 107 (100%) |

*Note: One gender value was null within the leader group.*

The ages in leadership outlined in Table 4. Sample Characteristics: Age, ranged from 25 to 60 years, with 57.7% of leaders over the age of 40. The majority of the team members, 39.8%, also categorized their age in the 50+ category with 66.7% of the population being 40 years of age or older.

**Table 4. Sample Characteristics: Age**

| | 20-29 | 30-39 | 40-49 | 50+ |
|---|---|---|---|---|
| **Leader** *(N=24)* | 2 (7.7%) | 7 (26.9%) | 7 (26.9%) | 8 (30.8%) |
| **Team** *(N=107)* | 7 (6.5%) | 28 (25.9%) | 29 (26.9%) | 43 (39.8%) |

*Note: Two leader age values were null.*

The largest representation of team members categorized themselves in the one-to-three years of service category, representing 47.7% of the total participants (see Table 5. Sample Characteristics: Tenure/Length of Service).

**Table 5. Sample Characteristics: Tenure/Length of Service**

| Tenure/Length of Service | Frequency | Percent of Total |
|---|---|---|
| **Less than 6 months** | 16 | 14.9 |
| **6 months to a year** | 9 | 8.4 |
| **1-3 years** | 51 | 47.7 |
| **3-6 years** | 16 | 15.0 |
| **6-9 years** | 7 | 6.5 |
| **9-12 years** | 3 | 2.8 |
| **Over 12 years** | 5 | 4.7 |
| **Total** *(N=107)* | **107** | **100.0** |

According to the U.S. Bureau of Labor Statistics (2016), this is slightly below average based on the median tenure of 4.2 years, although this has trended downward nationally since 2014.[82]

Team leaders varied in the number of employees assigned to their area of supervision, ranging from one to 20 employees supervised with an average team size of 4.12. Table 6 outlines the number of team members assigned to each team leader.

**Table 6. Sample Characteristics: Team Size**

|  | # of Team Members | % of Total Team Members |
|---|---|---|
| **Leader 1** | 6 | 5.6 |
| **Leader 2** | 1 | 0.9 |
| **Leader 3** | 1 | 0.9 |
| **Leader 4** | 3 | 2.8 |
| **Leader 5** | 3 | 2.8 |
| **Leader 6** | 3 | 2.8 |
| **Leader 7** | 4 | 3.7 |
| **Leader 8** | 4 | 3.7 |
| **Leader 9** | 4 | 3.7 |
| **Leader 10** | 4 | 3.7 |
| **Leader 11** | 6 | 5.6 |
| **Leader 12** | 8 | 7.5 |
| **Leader 13** | 10 | 9.3 |
| **Leader 14** | 20 | 18.9 |
| **Leader 15** | 1 | 0.9 |
| **Leader 16** | 1 | 0.9 |
| **Leader 17** | 1 | 0.9 |
| **Leader 18** | 2 | 1.9 |
| **Leader 19** | 2 | 1.9 |
| **Leader 20** | 2 | 1.9 |
| **Leader 21** | 3 | 2.8 |
| **Leader 22** | 3 | 2.8 |
| **Leader 23** | 3 | 2.8 |
| **Leader 24** | 5 | 4.7 |
| **Leader 25** | 5 | 4.7 |
| **Leader 26** | 2 | 1.9 |
| **Total** | **107** | **100.0** |

*Independent Variable MSCEIT*

The MSCEIT instrument is comprised of four levels of scoring as identified in Figure 1.

MSCEIT

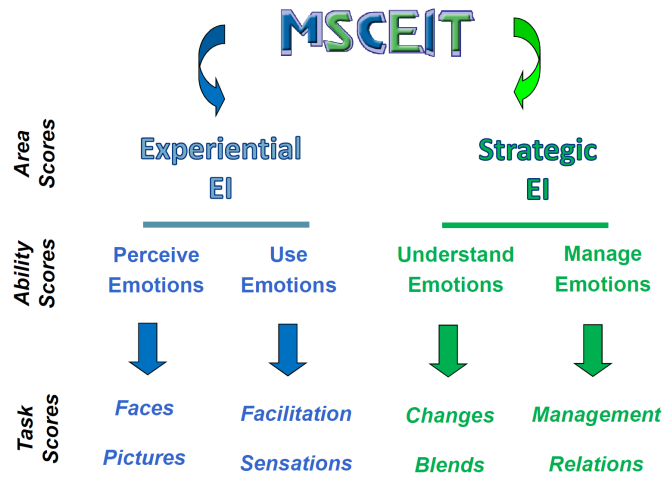|  | Experiential EI | | Strategic EI | |
|---|---|---|---|---|
| Area Scores | | | | |
| Ability Scores | Perceive Emotions | Use Emotions | Understand Emotions | Manage Emotions |
| Task Scores | Faces / Pictures | Facilitation / Sensations | Changes / Blends | Management / Relations |

**Figure 1 inclusive of the total score, the two area scores, four ability scores, and eight task scores**.

For the purposes of this study, the analysis did not focus on the tasks scores due to the lower reliability and recommendation by the assessment creators to not use the task level within analysis.[16,33]

MSCEIT scores fall within five levels of performance (improve, consider developing, competent, skilled, and expert). Figure 2 outlines the total general population of individuals who have taken the MSCEIT and the ratio within each of the five levels of performance.
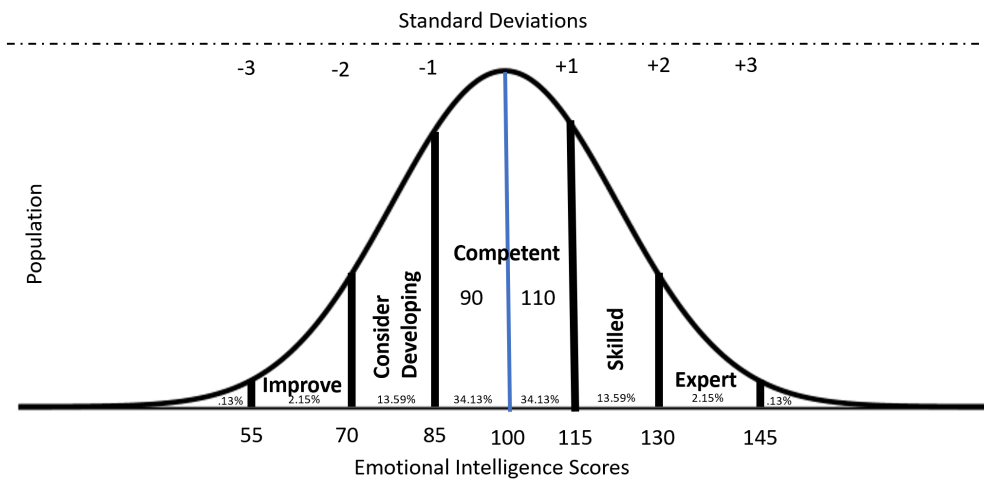
Standard Deviations

-3   -2   -1   +1   +2   +3

Population

Competent

90   110

Consider Developing

Skilled

Improve          Expert

.13%   2.15%   13.59%   34.13%   34.13%   13.59%   2.15%   .13%

55   70   85   100   115   130   145

Emotional Intelligence Scores

**Figure 1. MSCEIT General Population Standard Scores**
*Source: MSCEIT training manual*

The organization studied followed a similar bell curve in the overall categorization of results; however, the curve skewed left with higher percentages of the sample falling in the areas of consider development and competent with no individuals representing the expert range. Figure 3 represents the sample studied with 3.8% categorized as improve, 50% categorized as consider development, 42.4% categorized as competent, 3.8% categorized as skilled, and 0% scoring within the expert range.
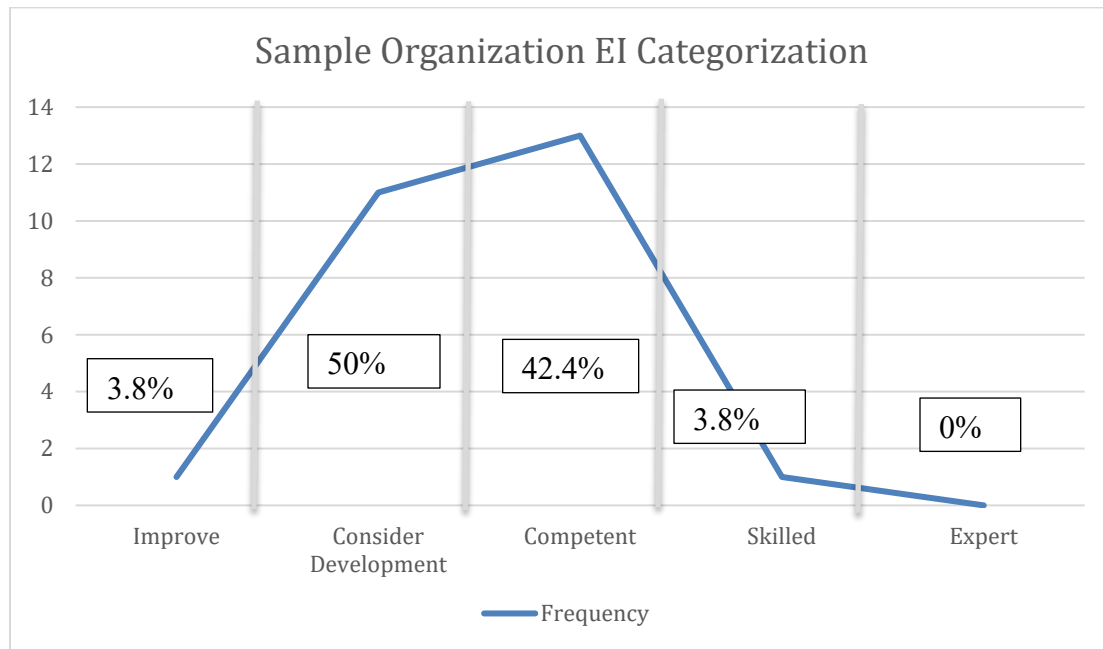


**Figure 2. Sample Organization MSCEIT Performance Categorization**

The individual leader EI ability scores and categorization are detailed in the Table 7 below. The Area scores have not been included in the table due to the high correlation between the MSCEIT Total score and the two area scores (experiential and strategic).

**Table 7. Team Leader EI Scores**

|  | MSCEIT | Perceive | Use | Understand | Manage | Performance Level |
|---|---|---|---|---|---|---|
| **Leader 1** | 111 | 102 | 96 | 118 | 108 | Skilled |
| **Leader 2** | 99 | 80 | 114 | 115 | 109 | Competent |
| **Leader 3** | 102 | 105 | 91 | 94 | 114 | Competent |
| **Leader 4** | 101 | 110 | 105 | 81 | 111 | Competent |
| **Leader 5** | 106 | 110 | 90 | 104 | 102 | Competent |
| **Leader 6** | 93 | 93 | 80 | 106 | 100 | Competent |
| **Leader 7** | 103 | 92 | 101 | 110 | 108 | Competent |
| **Leader 8** | 105 | 109 | 120 | 83 | 123 | Competent |
| **Leader 9** | 95 | 104 | 77 | 97 | 102 | Competent |
| **Leader 10** | 96 | 85 | 96 | 103 | 123 | Competent |
| **Leader 11** | 97 | 91 | 107 | 92 | 112 | Competent |
| **Leader 12** | 109 | 117 | 105 | 96 | 104 | Competent |
| **Leader 13** | 99 | 80 | 118 | 130 | 97 | Competent |
| **Leader 14** | 94 | 110 | 120 | 79 | 90 | Competent |
| **Leader 15** | 86 | 82 | 98 | 83 | 122 | Consider Developing |
| **Leader 16** | 88 | 81 | 101 | 97 | 100 | Consider Developing |
| **Leader 17** | 73 | 84 | 86 | 79 | 73 | Consider Developing |
| **Leader 18** | 80 | 82 | 84 | 82 | 104 | Consider Developing |
| **Leader 19** | 75 | 76 | 73 | 103 | 81 | Consider Developing |
| **Leader 20** | 78 | 61 | 74 | 100 | 146 | Consider Developing |
| **Leader 21** | 81 | 76 | 80 | 104 | 92 | Consider Developing |
| **Leader 22** | 88 | 84 | 105 | 89 | 102 | Consider Developing |
| **Leader 23** | 85 | 123 | 100 | 77 | 71 | Consider Developing |
| **Leader 24** | 88 | 97 | 74 | 94 | 100 | Consider Developing |
| **Leader 25** | 80 | 87 | 73 | 87 | 96 | Consider Developing |
| **Leader 26** | 69 | 74 | 115 | 73 | 72 | Improve |

MSCEIT total score was highly correlated to both the Experiential and Strategic areas of the assessment tool; however, the individual Area scores were not correlated with one another. Further analysis was conducted to determine the correlation among the abilities level. It was determined the abilities Perceive and Use are correlated with the associated Experiential Area as would be expected; however, they are not correlated with each other. Similarly, Manage and Understand abilities are correlated with the Strategic Area of EI, although they are not correlated to one another.

Table 8 outlines the descriptive statistics for the MSCEIT results. The mean score for team leaders in each of the four abilities were: 92.12 in the perceiving ability, 95.50 in the using ability, 95.23 in the understanding ability, and 102.38 in managing the ability.

**Table 8. Descriptive Statistics: MSCEIT**

| (N=26) | Min | Max | Mean | Std. Dev. | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Statistics | Std. Error | Statistics | Std. Error |
| **MSCEIT Total** | 69 | 111 | 91.58 | 11.632 | -.199 | .456 | -.911 | .887 |
| **Experiential** | 63 | 117 | 92.00 | 14.870 | .263 | .456 | -.513 | .887 |
| **Strategic** | 70 | 118 | 96.69 | 13.523 | -.299 | .456 | -.256 | .887 |
| **Perceive** | 61 | 123 | 92.12 | 15.355 | .224 | .456 | -.642 | .887 |
| **Use** | 73 | 120 | 95.50 | 15.430 | .000 | .456 | -1.169 | .887 |
| **Understand** | 73 | 130 | 95.23 | 14.009 | .522 | .456 | .010 | .887 |
| **Manage** | 71 | 146 | 102.38 | 16.886 | .128 | .456 | .970 | .887 |

 The MSCEIT data is considered moderately skewed left (-.199) as previously illustrated in Figure 3. The Kurtosis of the MSCEIT data would suggest platykurtic distributions (see Figure 4. Histogram Emotional Intelligence), which have fewer extreme values than predicted by the normal distribution. (https://www.investopedia.com/terms/p/platykurtic.asp)
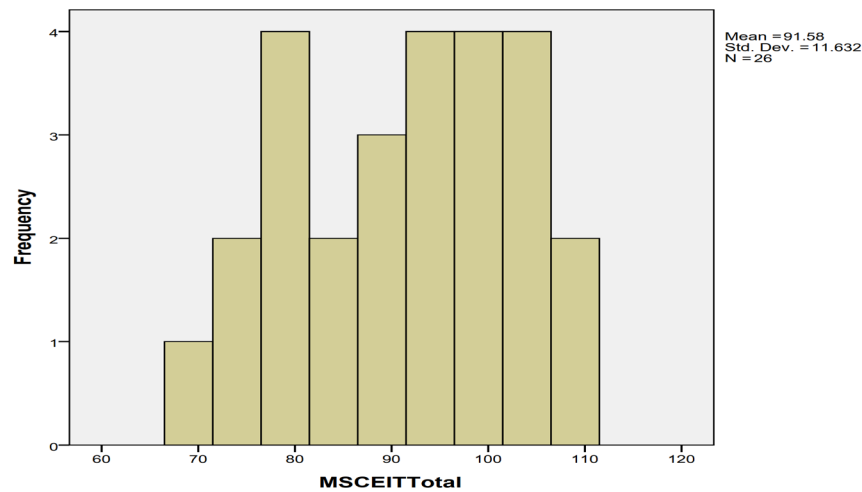


**Figure 3. Histogram Emotional Intelligence**

*Dependent Variable UWES*
The Utrecht Work Engagement Survey (UWES) measures work engagement of employees across three dimensions. All employees were invited to participate in the work engagement survey via email with a follow up email provided a week before survey close. Through a series of 17 survey questions, respondents identified their level of engagement per question to determine overall vigor, dedication, and absorption in their individual role. Team members voluntarily completed an electronic consent form and were then directed to anonymously complete the survey within their work environment. Team members manually identified their leader within the survey to provide the ability to link results with the leaders' MSCEIT scores.

In testing the UWES instrument with the sample data, the total UWES and the three dimensions vigor, dedication, and absorption were all highly correlated and yielded a high reliability of .913 Cronbach's alpha.

The Descriptive Statistics for the dependent variable are provided in Table 9. The mean UWES score across teams was 4.68 on a scale of 6.

**Table 9. Descriptive Statistics: UWES**

| (N=26) | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Statistics | Std. Error | Statistics | Std. Error |
| **Total UWES** | 3 | 6 | 4.68 | .543 | -1.267 | .456 | 3.036 | .887 |
| **Vigor** | 3 | 6 | 4.74 | .632 | -.455 | .456 | .985 | .887 |
| **Dedication** | 3 | 6 | 4.94 | .530 | -1.400 | .456 | 3.525 | .887 |
| **Absorption** | 3 | 6 | 4.52 | .643 | -.921 | .456 | 1.730 | .887 |

There was not a significant variability in responses and the sample was found to have a strong positive bias. The highest scoring question was 'I am proud of the work I do' which averaged 5.34 and is an attribute of dedication. The lowest scoring question, 'It is difficult to detach myself from my job' had an average score of 3.79 among respondents and is an attribute of absorption.

It can be determined that the UWES data is considered moderately skewed (-1.267) as discussed previously in this chapter; however, the Kurtosis indicates a normal distribution (3.036) as presented in Figure 5.
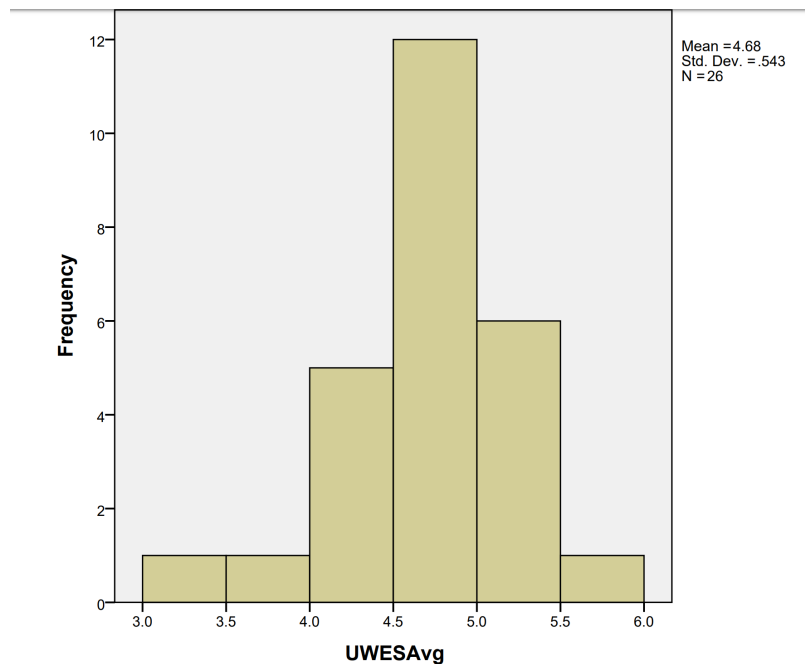


**Figure 4. Histogram for Work Engagement**

*Quantitative Data Analysis*

The MSCEIT assessment generated EI ability scores in the domains of perceive, use, understand, and manage emotions. The UWES survey produced scores for team members in areas of vigor, dedication, and absorption.

The study focused on the associations between these variables, MSCEIT as the independent variable and UWES as the dependent variable, with consideration of controlling for demographic variables highlighted under the demographics section of this chapter.

*Statistical Analysis of Hypothesized Research Questions*

The resulting data from the instruments were analyzed utilizing a one-tail Pearson's $r$ correlation to determine the degree of relationship between the defined variables. Both individual level scores and aggregate level data were used, resulting in a significant correlation between the team leaders' overall emotional intelligence score and team members' work engagement score. Significant correlations were also found in two of the three subscales of work engagement as outlined in Table 10.

**Table 10. Correlations**

| *(N=26)* | UWES Total | Vigor | Dedication | Absorption |
|---|---|---|---|---|
| **MSCEIT Total** | .353* | .480** | .330* | .318 |
| **Experiential** | .058 | .098 | .103 | .080 |
| **Strategic** | .438* | .536** | .387* | .341* |
| **Perceive** | .106 | .187 | .134 | .131 |
| **Use** | -.069 | -.145 | -.039 | -.071 |
| **Understand** | .447* | .504** | .425* | .394* |
| **Manage** | .115 | .219 | .065 | .001 |
| **Team Size** | .059 | -.015 | .068 | .060 |
| **Tenure** *(N=107)* | .103 | | | |

*\*\* Correlation is significant at the 0.01 level (1-tailed).*
*\* Correlation is significant at the 0.05 level (1-tailed).*

*Tests of Hypotheses*

Table 11 provides an overview of the hypotheses tested and their correlation results.

**Table 11. Hypotheses and Results**

| | Hypothesis | Results | Supported? |
|---|---|---|---|
| H1 | High emotional intelligence in a leader results in a positive correlation with the overall work engagement of virtual team members. | $(r(26) = .353, p=.038)$ | Yes |
| H2 | High emotional intelligence in a leader results in a positive correlation with the vigor of virtual team members. | $(r(26) = .480, p=.007)$ | Yes |
| H3 | High emotional intelligence in a leader results in a positive correlation with the dedication of virtual team members. | $(r(26) = .330, p=.0499)$ | Yes |
| H4 | High emotional intelligence in a leader results in a positive correlation with the absorption of virtual team members. | $(r(26) = .318, p=.057)$ | No |

Further analysis was conducted to investigate the relationship between the four abilities of emotional intelligence (perceive, use, understand, and manage) and the work engagement of the team members. Of the emotional intelligence abilities, Understand was significantly correlated to work engagement ($r(26) = .447$, $p = .011$) at all dimensions (total UWES, vigor, dedication, and absorption), while the remaining three abilities Perceive ($r(26) = .106$, $p = .303$), Use ($r(26) = -.069$, $p = .369$), and Manage ($r(26) = .115$, $p = .288$) were found to not be significant in relation to the virtual team members work engagement. Demographic attributes of team size and tenure when tested individually with work engagement were determined to not be significant contributors to the overall work engagement scores.

Regression analysis was conducted to control for demographic attributes, gender, age, and team size. In the model, team size was controlled for to determine how emotional intelligence impacts work engagement above and beyond the size of the team. Table 12 below indicates there is not a significant relationship between emotional intelligence and work engagement after controlling for team size ($\beta=.369$, $p=.084$). This would indicate team size has the propensity to influence how the emotional intelligence of a leader influences work engagement within the virtual environment.

**Table 12. Coefficients Model 1**

| Variable Name | Standard Coefficients Beta | t | P |
|---|---|---|---|
| Team Size | -.051 | -.252 | .803 |
| MSCEIT Total | .369 | 1.806 | .084 |

a. Dependent Variable: UWES Average

Next, gender was controlled for to determine how emotional intelligence impacts work engagement above and beyond gender. Table 13 below indicates there is not a significant relationship between emotional intelligence and work engagement after controlling for gender ($\beta$=.320, p=.123).

**Table 13. Coefficients Model 2**

| Variable Name | Standard Coefficients Beta | t | P |
|---|---|---|---|
| Gender | .154 | .773 | .448 |
| MSCEIT Total | .320 | 1.606 | .123 |

a. Dependent Variable: UWES Average

Lastly, age was controlled for to determine how emotional intelligence impacts work engagement above and beyond the age of respondents. Table 14 below indicates there is not a significant relationship between emotional intelligence and work engagement after controlling for age ($\beta$=.282, p=.175).

**Table 14. Coefficients Model 3**

| Variable Name | Standard Coefficients Beta | t | P |
|---|---|---|---|
| Age | -.270 | -1.343 | .194 |
| MSCEIT Total | .282 | 1.403 | .175 |

a. Dependent Variable: UWES Average

Given vigor was the most significantly correlated work engagement element, the researchers were curious if the demographic elements would influence the relationship similarly using vigor as the dependent variable. Accordingly, a regression analysis using the highest significantly correlated work engagement dimension of vigor, controlling for the demographic attributes of age, gender, and team size. MSCEIT remained highly correlated with vigor after controlling for gender ($\beta$=.460, p=.021) and team size ($\beta$=.533, p=.009). Age continued to be an influencing factor whereby MSCEIT was not significantly correlated ($\beta$=.360, p=.071) with the vigor dimension of work engagement after controlling for age. However, the EI area of Strategic remained highly correlated with the vigor dimension of work engagement after controlling for age ($\beta$=.400, p=.047), although the understand ability was not significantly correlated with vigor after controlling for age ($\beta$=.343, p=.097).

Figure 6 illustrates the influencing components of the emotional intelligence of virtual leaders on the work engagement attributes of virtual team members discussed above.
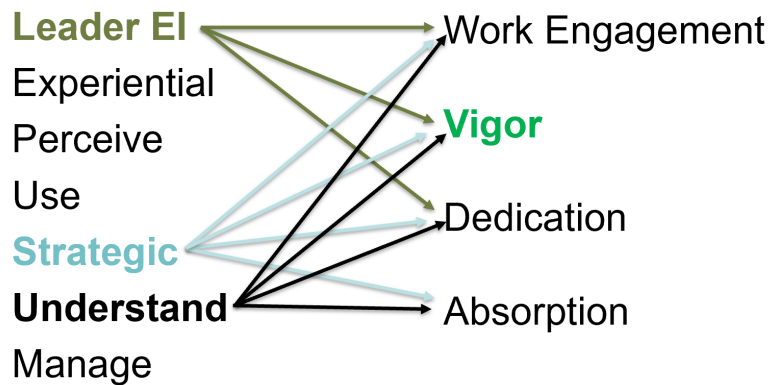


**Figure 5. Correlational attributes of virtual leaders' emotional intelligence**

The analysis of the various attributes of emotional intelligence revealed that the Strategic Area of EI was significantly correlated with all dimensions of work engagement. This was primarily driven by the ability of Understand within the EI framework, whereas no significant correlations were found with the Manage ability or the Experiential area of EI.

## Conclusions

The foundation of current emotional intelligence theory is the ability to perceive emotions. However, being able to perceive emotions through facial expressions and body language can be a limitation within a virtual environment. While technology does enable video conferencing to visually connect when not face to face, the organization sampled within this study did not use this technological capability and relied heavily on email and instant messaging as their primary forms of communication. Within the MSCEIT assessment tool, emotional perception is based on facial expression and visual environmental pictures which does not occur frequently in virtual environments, or at the very least, within the virtual sample used within this exploration. Upon conducting development sessions with the individual leader's regarding their emotional intelligence results, most conveyed they rarely spoke to their team members or peers outside of short emails or instant messenger.

While generally a desire for more personal connectivity with team members was conveyed, the benefit of conference calls or video conferences was not considered of high enough importance to implement this available technology into their day to day communication mediums. The perceive ability within this sample size was below the general population average and resulted in the overall emotional intelligence competency skewing left of the general population mean as illustrated in Figure 3. This could indicate a need for further exploration to discover how best to identify this ability within a virtual context. Furthermore, it would be advantageous to investigate if there are more effective means to evaluate the ability to perceive emotion within a textual context.

The Strategic area of emotional intelligence, more specifically the understand ability, was the most significantly correlated ability within the data sample, indicating the ability to understand emotions and interpreting the varying degrees of emotions has a higher relevance in the virtual environment. The ability to understand is also the most cognitive ability within the emotional intelligence framework. While there are varying degrees of findings regarding the impact of age on emotional intelligence, some studies have discovered emotional intelligence theory increases with age.[27] This would coincide with the ideation that as we get older we gain wisdom and understanding through the various experiences along life's journey. In this particular study, over 50% of the leaders, as well as team members sampled indicated they were over the age of 40. This might account for the impact the demographic of age had on the overall correlation of variables. Given the narrow focus of this study, it is impossible to determine without further investigation the cause and effect of the variables.

Overall, given the findings within the study, the authors submit that the emotional intelligence of the leader impacts aspects of work engagement within the virtual environment. Cabello et. al. findings hold true within the virtual environment such that age remains an influencing factor of emotional intelligence.[83] Although, the authors would posit the application of emotional intelligence, as it is applied within the co-located environment, is different within the virtual ecosystem. As data from the indicated, the Strategic area of emotional intelligence is the most significant influencing factor within the virtual environment. The experiential side of emotional intelligence was found to not be an influencing factor of work engagement in the virtual setting. This is likely a result of the inability to perceive emotions through body language, facial expressions, and tonality within the virtual structure. Specifically, the ability to perceive emotions within a textual communication requires different and nuanced skills to accurately determine the emotional inferences of the communication of which the current instrument, MSCEIT, does not test. Conducting research to understand how to assess and develop this ability would further the findings within this study.

Moreover, understanding the varying degrees of emotions plays a considerable role in engaging virtual team members. The authors would theorize this highly cognitive ability of emotional intelligence has a key affect within the textual environment of the virtual ecosystem. Although, this theory would need to be investigated further to uncover what specific actions leaders perform to display this ability that influences work engagement.

The findings of this study only begin to scratch the surface of the impact of leadership within a virtual environment and indicate the need for further exploration of the attributes needed both in virtual leadership and virtual work engagement. As organizations venture into operating in virtual environments, additional insight into the catalyst of work engagement in a virtual ecosystem is critical. In Gallup's *State of the American Workplace*, it is estimated actively disengaged workers cost the United States approximately $483 to $605 billion annually in lost productivity.[84] As the number of employees working remotely, as well as, the number of employees who desire to work remotely continues to increase, it becomes paramount to grasp the key attributes needed to lead a healthy, productive, and engaged virtual workforce.

## Limitations

As a result of the relatively limited team sizes of virtual workgroups across corporations and in an effort to mitigate variables, such as, industry and cultural differences, one organization was selected as the subject group. Despite the precaution to mitigate variables, the results of the study experienced limitations due to the length of time involved to complete the study, number of individuals who opted to participate in the study, organizational restructuring including acquisitions and departmental transitions, in addition to a relatively small population size overall. An extenuating challenge within the sampled organization emerged as a result of one group being acquired from a small firm integrating operations and workforce shortly before assessing engagement of workforce. The timing of the acquisition could have potentially influenced engagement results for the impacted group. This particular group was analyzed separately by the researcher to determine data validity prior to incorporating in the overall results.

## Ethical Assurances

The researchers had no previous relations to the organization being sampled, limiting any preconceived view of the company and its members. The authors have no financial interests in the company studied and received no sponsored funding for the research.

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