THE RELATIONSHIP OF THE ATTRIBUTIONAL DIMENSIONS OF EMOTIONAL DIFFERENTIATION ON ATTRIBUTIONAL DIMENSIONS OF TECHNOLOGY READINESS FOR ORTHOTIC AND PROSTHETIC CLINICIANS

By

Gerald Elmer Stark

David W. Rausch
Professor
(Chair)

Elizabeth K. Crawford
Associate Professor
(Committee Member)

Ted L. Miller
Professor
(Committee Member)

Elizabeth R. O'Brien
Associate Professor
(Committee Member)

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ABSTRACT

Some individuals and groups seem to adopt emerging ideas and innovations more readily than others. Since any emerging innovation or technology inherently comes with a higher degree of uncertainty and risk, the group or individual must deal with the anxiety created by innovative behavior. Individuals who are less anxious and risk averse may tend to adopt innovations more easily than others. Within any social group, individuals can be classified into adopter categories based on their rate of adoption and capacity for risk and anxiety. Individuals who are more susceptible to anxiety in general, may seek the emotional scaffolding of their organizational group to support innovative behavior. This may be especially true in healthcare where contextual stress is heightened due to the emotional weight of decisions that greatly affect the well-being of others. Bowen Family Systems Theory has been used in family systems psychology to describe the systemic effects of group anxiety on the individual, an outcome referred to as differentiation. This study investigated if there was any relationship between emotional differentiation and technology readiness among allied health professionals. The Workplace Differentiation Inventory (WDI) and the Technology Readiness Index-2.0 (TRI-2.0) were the instruments used to measure both attributes. The statistical analysis explored the correlation and regression of the various sub-attributes of each measure as well as demographic attributes using a sample population derived from the orthotic and prosthetic allied healthcare profession.

DEDICATION

Although the dissertation experience is considered an individual achievement, it could not occur without the support, time, and encouragement of family, friends, colleagues, and mentors. Many people are responsible for contributing directly and indirectly to this work as well as providing inspiration and direction when overcoming personal challenges and limitations.

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LIST OF ABBREVIATIONS

ABC, American Board of Certification in Orthotics and Prosthetics

AFF, Affiliation

BOC, Board for Certification

CERT, Certification Level

CR, Change Readiness

DAS, Dyadic Adjustment Scale

DFFAM, Dynamic Five Forces Activation Model

DSI-R, Differentiation of Self Inventory – Revised

DSI, Differentiation of Self Inventory

EC, Emotional Cut-off

EI, Emotional Intelligence

ER, Emotional Reactivity

EXLK, Number of Internal Linkages

EXP, Years of Experience

FO, Interpersonal Fusion

G, Gender

GST, General Systems Theory

GSI, General Severity Index

HSCL, Hopkins Symptom Checklist

HTP, Number of high-tech patients per year

IRB, Institutional Review Board

JSS, Job Satisfaction Survey

SDS, Social Desirability Scale

SST, Self-Service Technology

STAI-T, State-Trait Anxiety Inventory

TAM, Technology Acceptance Model

TD, Technology Discomfort

TI, Technology Innovativeness

TO, Technology Optimism

TRI-2.0, Technology Readiness Index 2.0

TRI, Technology Readiness Index

TS, Technology Insecurity

TSA, Technology Self-Assessment

WDI, Workplace Differentiation Inventory

LIST OF SYMBOLS

α, Cronbach's alpha for reliability of correlation

B, coefficient of binomial distribution

F, cumulative distribution

n, number of units in sample

p, probability or significance of uncertainty

r, coefficient of reliability

t-value, t-test of distribution

CHAPTER I

INTRODUCTION

Any emerging idea or innovation inherently presents a degree of risk or uncertainty (Rogers, 2003). To lower that anxiety individuals may seek the support of their organizational group (Vishwanath, 2003). As a system of individuals who work together to achieve common goals through their social structure and assignment of tasks, organizational groups can act to support or inhibit an individual's innovative behavior (Plous, 1993; Rogers, 2003). One of the factors that may affect a group's ability to support innovative behavior is the level of thoughtfulness versus emotionality that exists within the group's relationships (Kahneman, 2011). Individuals and groups who are less anxious and risk adverse may adopt innovations more readily (Rogers, 2003). Conversely, groups who are more conflictual and antagonistic may not provide the emotional stability necessary to support individual innovative behavior (Vishwanath, 2003). This may be especially true in the stressful context of healthcare where clinical professionals must project a high degree of confidence when adopting emerging innovations (Beebe, 2009; Kable, 2012; Ray, 2010).

Background

An innovation is defined by Rogers (2003) as a concept, process, object, or design that is perceived as new or novel by an individual or group. Diffusion is the communication process by which an innovation is exchanged through various internal and external linkages among the

members of a social group (Rogers, 2003). Similar to individuals, some groups seem to have a greater capacity to evaluate and adopt innovations compared to others (Rogers, 2003). Innovative and successful groups show greater confidence and competency in the adoption of emerging ideas and technology (Rogers, 2003). These groups can tolerate the risk and uncertainty that potential innovations present through their organizational structure, processes, and interaction (Rogers, 2003; Schein, 2010).

The acceptance of any emerging idea or concept by a group can be challenging, even if it has significant advantages. Adoption of an innovation is the social decision process by which an individual or group decides to accept and fully integrate an innovation (Rogers, 2003). An innovation can be broadly considered as any novel concept, process, object, or design (Rogers, 2003). More specifically, an innovation is any emerging idea, product, philosophy, or practice that provides a solution for a set of needs or requirements (Rogers, 2003). Within this study, the term innovation will be used synonymously with a type of technology. A technology is broadly defined as any action that reduces the uncertainty concerning the relationships of cause and effect to achieve a desired outcome (Rogers, 2003). Hard technology is considered an emerging component, device, or tool, while soft technology is regarded as a thought, philosophy, or practice (Rogers, 2003). A hard technology may be the latest personal computing device, while a soft technology may be the applications programmed within the device (Rogers, 2003). Each innovation must be considered, assessed, and evaluated carefully to decide if resources should be dedicated to the concept. The innovation-decision process refers to the method by which an individual or group seeks to reduce uncertainty surrounding an innovation by gathering information and comparing the findings to other options (Rogers, 2003). It must be remembered that not all innovations will or should be accepted. The individual or group must make careful

and accurate decisions regarding which potential innovations will provide the most favorable outcome with respect to the resources required. It is often necessary to reject an innovation because it will not produce an adequate result. Rejection of the innovation is the non-acceptance of technology from the various choices available (Rogers, 2003).

The stepped sequence of the innovation-decision thought process weighs the advantages and disadvantages while determining the probability of success for each innovation (Rogers, 2003). Successful groups are able to thoughtfully balance and compare the various challenges and advantages of each innovation (Rogers, 2003). Communication is a critical step of the innovation-decision process where group members create, share, and assess information with one another in order to reach a collective consensus (Damanpour, 2001, 2006; Rogers, 2003; Schein, 2010; Vishwanath, 2003). The quality of each communication channel or social linkage can be measured using methods that examine how messages are passed from one individual to another and how they affect the group's overall ability to collectively communicate (Bandura, 2006; Burke, 2010, 2011; Grusec, 1992; Morgan, 2006; Mumby, 2013; Schein, 2010).

Adoption of Innovation in Groups

Since human social communication is a direct reflection of the relationship each member shares within the group, the accuracy and effectiveness of that communication is influenced greatly by the emotional tone of the message (Bradberry, 2009; Goleman, 1995, 2000, 2006; Petrides, 2001; Salovey, 2004). This tone can be transmitted using verbal, written, and non-verbal communication, including facial expressions, body language, and gestures (Goman, 2008; Kerr, 1988a). How the individuals interact with one another through verbal and non-verbal communication ultimately determines the performance and functionality of the group (Goleman,

2000; Morgan, 2006; Schein, 2010). One factor that influences the effectiveness of human relationships is the degree of negatively charged emotional conflicts that may exist within the group (Cavaiola, 2012; Comella, 1999b; Schein, 2010; Wiseman, 2007). If the individuals of the group are unable to communicate thoughtfully, due to a number of internal personal clashes, they may not be able to form a cohesive consensus (Schein, 2010). Depending on the level of emotional attachment to that group, an individual's behavior, attitudes, and decision processes can be greatly influenced (Morgan, 2006; Mumby, 2013; Schein, 2010). For example, an emotionally dependent sales representative who disagrees with the marketing plan based on his own statistical and observational evidence may remain silent to avoid any emotional disruption or reprisals within the group. A more emotionally independent sales representative may present that information, even if it causes disharmony and conflict, because it may ultimately save the company considerable time and money.

As the group attempts to negotiate the various conflicting opinions and find consensus about prospective innovations, it must tolerate a higher degree of uncertainty and destabilization (Rogers, 2003). The innovation-decision process represents a complex, abstract, and potentially disruptive form of group behavior. An organization that is no longer able to find consensus between its members may be limited in the ability to adopt emerging technology (Burke, 2010; Christensen, 2011; Rogers, 2003; Schein, 2010). Collectively, this may have a substantial overall effect on the group's ability to accurately assess emerging innovations and technology (Burke, 2011; Morgan, 2006; Schein, 2010).

The manner in which innovations are accepted by individuals and groups has been described and systemized with a number of universal processes (Dobni, 2008; Rogers, 2003; Vishwanath, 2003). The innovation-decision process usually happens in a time-ordered

progression of steps described as: knowledge, persuasion, decision, implementation, and confirmation (Rogers, 2003; Vishwanath, 2003). This decision process may occur with individuals, groups, organizations, and communities (Rogers, 2003). Of particular interest to this study is the decision phase where the group or individual can choose to adopt or reject the innovation.

The innovation decision is based on five factors described by Rogers (2003) as: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage refers to the degree an innovation is perceived to be better than the concept it replaces, which establishes the need with potential adopters (Rogers, 2003). For instance, an online bill paying system will only be adopted if it is sufficiently convenient and simple to use. Compatibility of the innovation is the level an innovation appears to be in alignment with the values, experiences, and needs of the individual or group (Rogers, 2003; Vishwanath, 2003).

The potential adopter must consider the risk and what contextual changes will be required for adoption of the innovation (Rogers, 2003). An innovation that is inconsistent with the prevailing social values and norms of the group may not be readily adopted or rejected. The complexity of the innovation may cause considerable distress and anxiety if the members of the social system have difficulty comprehending the usage of the technology (Rogers, 2003). As an example, a novel water irrigation system in a third world country may be beneficial, but it may usurp the authority of the local religious leaders who regulate water, resulting in social upheaval and conflict.

Later adopters of innovation, who are more anxious about technology, require an additional amount of confirmation with trialability and observability to increase confidence (Rogers, 2003). The trialability is the level to which an innovation may be experienced (Rogers,

2003). This is usually accomplished in a risk-free simulation within the context of the potential adopter to decrease overall uncertainty concerning the advantages and disadvantages of the innovation (Rogers, 2003). The degree to which the results of innovation can be seen and understood easily is referred to as observability (Rogers, 2003). Observability allows the potential adopter to experience the innovation first-hand and assess the implications to their context. If an innovation cannot be observed then it is perceived as more abstract and theoretical (Rogers, 2003).

Since they provide tangible verification of successful outcomes, trialability and observability are especially significant for individuals who are anxious and risk adverse (Rogers, 2003; Vishwanath, 2003). A tentative potential adopter often requires physical evidence of success rather than verbal or written abstract representations that require a higher degree of trust and confidence (Rogers, 2003). For instance, a farmer who is uncertain about a different type of fertilizer may need to see the yield of a test plot on his land before using it on his entire field. A less apprehensive potential adopter may base acceptance on more abstract statistical evidence.

Rejection of the innovation should not necessarily be considered an inherently negative event. Rejection and acceptance are equally important when considering prospective innovations at each stage of the innovation-decision process (Rogers, 2003). The attributes of the innovation-decision process must be evaluated and prioritized by the individual and group with respect to the advantages and disadvantages (Rogers, 2003). An innovation may provide moderate advantages initially, but be overly complex and incompatible with the group's long-term values and eventually be abandoned (Dobni, 2008; Rogers, 2003). This instance is referred to as discontinuance of the innovation and may be due to growing dissatisfaction with the use of an innovation or a favorable attitude toward another improvement (Rogers, 2003). An accounting

auditor may use a new computerized analysis tool to save time, only to find that it creates false alerts that require even more time to correct. He may abandon the innovation for another application that can be customized to ignore false warnings.

Diffusion of innovation in health care is crucial because of the constant demand for process improvement and technologic implementation (Rogers, 2003). If the clinical practitioner feels anxious regarding emerging technology, s/he may not adopt and implement it confidently (Beebe, 2009; Kable, 2012; Walczuch, 2004). This may have a direct influence on the person's ultimate acceptance of the process or product (Bandura, 2006). Since the adoption of technology is inherently risky and uncertain, an apprehensive health care group may have greater difficulty accepting and implementing novel technology (Beebe, 2009; Kable, 2012; Walczuch, 2004). An emotionally anxious group may not be able to assess the initial risks and advantages of innovations as well as a thoughtful and rational group (Garman, 2011, November/December; Kable, 2012; Lopez, 2014, November; Spector, 1985; Stimie, 2004; Vanderpool, 2013).

Individuals often encounter dissonance, or a sense of disequilibrium, when comparing their own opinions with those of the group (Rogers, 2003; Schein, 2010; Vishwanath, 2003). This can become especially difficult when the prevailing group's opinion significantly differs from the individual's perspective. The group can collectively act to apply pressure on the individual to conform, which increases prevalence of social groupthink (Mumby, 2013; Plous, 1993; Schein, 2010). Groupthink, the tendency to accept the prevailing consensus of the group without challenge, compromises the mental efficiency, reality testing, and judgment of the individual (Bandura, 2006; Plous, 1993).

When the forces of emotion, rather than rationality and thoughtfulness, dominate the relationships within the group, there is little opportunity for the individual to make a strong

contribution (Plous, 1993). The level of this emotional attachment and subsequent anxiety may have some effect on the ability of the individual to engage in the innovation-decision process independently within the group (Bandura, 2006; Mumby, 2013; Plous, 1993; Schein, 2010). For example, a physical therapist may be discouraged from implementing an innovative vacuum wound-healing technique because the group may be more comfortable with an established care protocol. Even if there are significant clinical benefits, the new process may require more time and effort from the group to learn the system.

Diffusion of innovation, in its most basic form, is a type of communication specifically concerned with introducing an emerging idea to the group (Bandura, 2006). More precisely, diffusion of innovation is a social process by which the group collectively addresses the anxiety associated with emerging technology by considering the inherent advantages, disadvantages, and risks (Rogers, 2003). This disequilibrium is offset by the advantages that the idea promises to bring as well as the capacity of the group to lower anxiety and thoughtfully consider the innovation (Bandura, 2006; Rogers, 2003; Schein, 2010). An example may be an academic department considering an innovative online curriculum. There may be intense disagreement between the group members who support the concept and others who oppose it. Some may feel that the online curriculum is needlessly expensive, and the quality of the educational experience will suffer. Others will propose that the program could reach a greater number of students and generate more revenue for the school. Neutral faculty members may not be opposed to the online course, but may experience a higher degree of internal anxiety with regard to changing the methodology of their own classes.

An argumentative and fractious group with a high degree of emotionality between the members may not have the capacity to address this risk and uncertainty. Since their

communication is typically confrontational and uncompromising, the impending departmental change intensifies their anxiety, and they have difficulty forming a consensus to adopt the innovation (Comella, 1999b; Kerr, 2007b; Rogers, 2003; Sagar, 2007). Each step of the innovation-decision process and subsequent implementation is fraught with conflicts, defensiveness, and infighting. A more thoughtful group, less emotional in their typical communications, may be able to establish the clear advantages of the new program while providing a forum for all group members to express their concerns. This group may present considerable differences of opinion, or even disharmony, but is able to consider and evaluate opposing viewpoints thoughtfully and rationally. As a result, this group is able to find greater degree of commonality to adopt the online program and even successfully adapt it to suit their unique context.

Innovativeness and Risk Aversion within Adopter Sub-Groups

Within any social system there are various sub-groups who adopt an innovation at different times based on relative innovativeness or receptiveness to emerging ideas (Rogers, 2003). The members of the group can be classified into consistent adopter categories based on their rate of adoption to an emerging innovation (Rogers, 2003). Group members tend to adopt at different points during the diffusion process. Some adopt innovation rapidly in the diffusion cycle, while others tend to wait until they have greater confidence as to the benefits of the technology. This cycle of adoption has been described with the bell-shaped adopter distribution curve, plotted as the population of a group adopts any technology as seen in Figure 1 (Rogers, 2003). The adopter categories can be delineated based on the point in time that they adopt an innovation after it has been introduced. The S-shaped curve behind the bell curve shows the rate

of adoption for the entire population. It starts slowly, rapidly increases, and then tapers off as the curve nears the total adoption by the group.

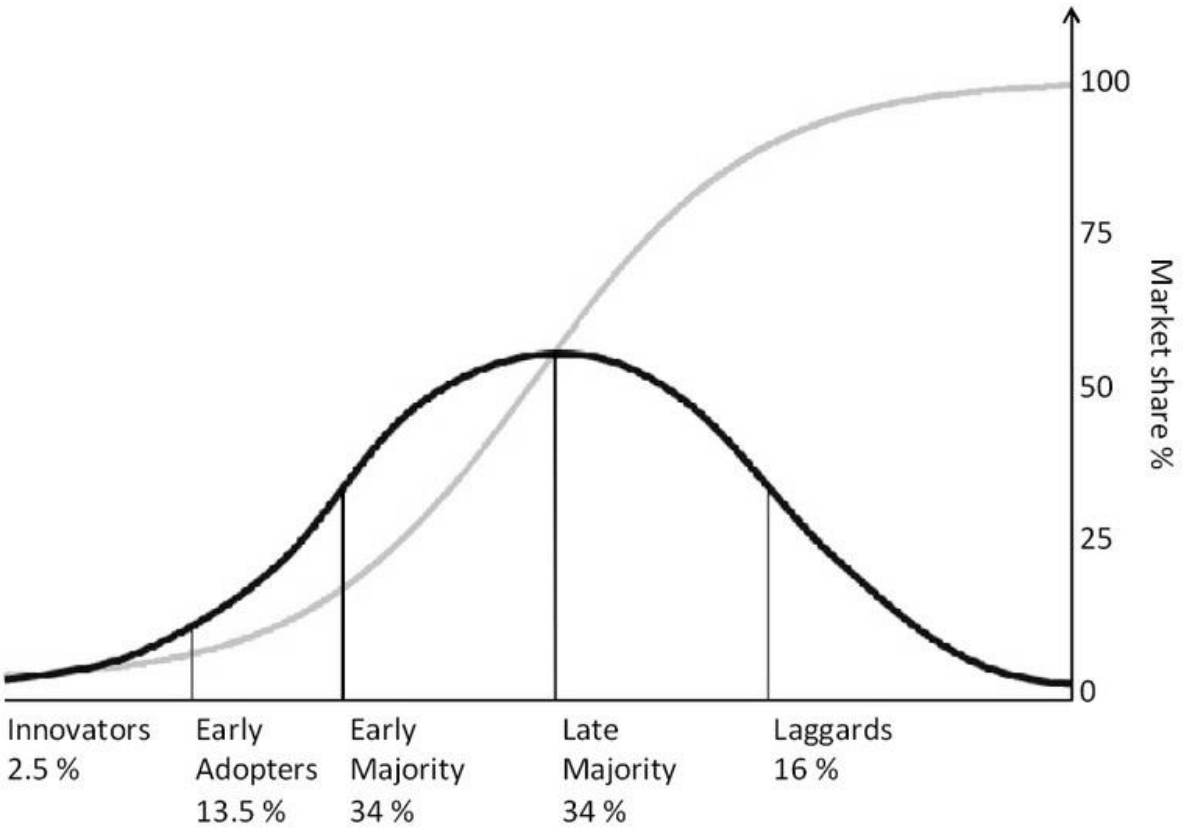

Figure 1 Diffusion of Adoption Distribution, S-Curve, and Subadopter Categories. From open source H. Hvassing, http://commons.wikimedia.org/wiki/File:Diffusion_of_ideas.svg, 2012, Oslo, Norway, based on E. Rogers, 1962, Diffusion of Innovations, *Free Press*, New York.

The different adopter categories can be established in a linear timeline from the first introduction of an innovation as innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). Innovators, who are characterized as venturesome with a constant obsession with innovation, are a relatively small population consisting of 2.5% of the group

(Rogers, 2003). They are comfortable with a high degree of uncertainty and will often seek the latest innovations since they become easily bored with the status quo of the group (Rogers, 2003; Vishwanath, 2003). Others in the population may describe innovators as daring, rash, or even risky since they appear to be attracted to every novel idea or fad (Rogers, 2003). Early adopters, a larger population at 13.5%, are considered opinion leaders within their local social group (Rogers, 2003). They are respected within their social networks for their thoughtful, yet pragmatic, innovation-decisions.

The early majority group is deliberate in their approach to innovation and constitutes 34% of the population (Rogers, 2003). Since their level of risk aversion is only slight, they may seek the opinions and experiences of others before trying novel technology. Once the innovators and early adopters have established the use of the innovation, the early majority group aids in the adoption to the broader population. The late majority, at 34% of the population, are skeptical towards technology and do not adopt innovation until they observe success in their local group (Rogers, 2003). The laggards are the most cautious and risk adverse group members in the diffusion process at 16% of the population (Rogers, 2003). They tend to be inherently suspicious of any innovation due to a greater sense of economic scarcity (Rogers, 2003). They may experience a higher degree of discontinuance for an innovation if social perception changes. Each subgroup seems to exhibit increasing levels of anxiety toward emerging technology that corresponds to their placement in the diffusion of innovation timeline. These differing levels of risk tolerance and innovativeness among the various subgroups seem to reflect the different levels of anxiety and functionality in the study of organizational systems including families and workgroups.

How these varying groups with different opinions regarding technology work together within one social system has the potential to cause a degree of emotional conflict and discord (Vishwanath, 2003). As the group attempts to arrive at a decision or consensus regarding the technology, the level of communication must have the capacity to tolerate a degree of disharmony (Kerr, 2007b; Schein, 2010). In a similar way family social groups must deal with the changing contextual perceptions of their environment and maintain their connection as a group (Bowen, 1978; Kerr, 2007b). Although family systems may not have the same level of intimacy and emotionality as work groups, they are often projections of the original family relationships (Hochschild, 2001). In many modern work settings this projection of work family is fostered by organizations to create a more cohesive and interconnected group (Burke, 2011). Also as the concept of family changes and exists in a state of flux, work families may provide more individual scaffolding and support than the at-home families (Hochschild, 2001). To understand diffusion of innovation, which has been described in part as a social communication process, it may be reasonable to apply the theories of family systems psychology.

Bowen Family Systems Theory and Diffusion of Innovation

Although Bowen Family Systems Theory and Diffusion of Innovation have not been linked in previous literature, there seems to be contained in both, similar descriptions of system-wide communication and behavior as well as characteristics of early adopters and differentiated individuals. This may be a result of the management of anxiety, risk, and uncertainty that form the foundation of both theories. Since innovations inherently present a greater amount of anxiety it may be reasonable to form the notion that individuals and groups that are able to manage anxiety in general may accept innovation more readily.

Bowen Family Systems Theory has been used to describe the systemic effects of anxiety within groups (Bowen, 1978; Kerr, 1988a). During the diffusion of innovation process, innovators and early adopters can cope with a greater degree of uncertainty due to their use of intergroup communication (Rogers, 2003). These adoption groups are typically less dogmatic and emotional in decision-making, which contributes to the perception that they make rational and intelligent decisions that involve a higher level of abstraction and uncertainty (Rogers, 2003).

Bowen Theory asserts that participants within the group have varying levels of susceptibility to group anxiety, referred to as level of differentiation. This increased differentiation and thoughtfulness may parallel the characteristics of innovator and early adopter categories in the diffusion of innovation (Rogers, 2003). Members with higher differentiation seem to have a greater resistance to emotional anxiety and are more thoughtful in their approach when making decisions, including assessments regarding innovation (Bowen, 1978; Kerr, 1988a). Differentiated individuals are also less emotionally motivated and seem to resemble the profile of early adopter. This could be due to their favorable attitude toward science and acquisition of information, resulting from a higher degree of social interconnectedness and communication (Rogers, 2003).

Learning groups with lower levels of collective anxiety can exchange information without the charged emotionality that hinders effective communication in lower performing groups (Burke, 2011; Kahneman, 2011; Schein, 2010; Senge, 2006). Groups with an increased undifferentiated ego mass, or centrally focused emotional togetherness, depend on their social group to dampen group anxiety (Bowen, 1978; Wiseman, 1999). An example may be the classroom setting where the peer relationships of students help ease individual anxiety during the learning process (Kohn, 1999; Richey, 2011). The student-to-student relationships, or horizontal

linkages, work to create a supportive social learning group, which lessens the hierarchal or vertical linkage with the instructor (Kohn, 1999; Richey, 2011; Rothwell, 2008; Roytek, 2010; Simms, 2008). However, the undifferentiated ego mass of a group binds the group together emotionally and diminishes the role of individual opinion (Bork, 2007; Bowen, 1978; Kerr, 2007a; Kerr, 1999a, 2007b; Miller, 2002). While promoting stabilization for more anxious members within the unit, this scaffolding may diminish individual and organizational creativity and contribute to a resistance to innovation (Bork, 2007; Bowen, 2014; Bowen, 1978; Kerr, 2007a; Kerr, 2007b, 1988a; Plous, 1993).

Other groups show a greater capacity to take on the uncertainty and risk associated with emerging innovations by encouraging greater member differentiation (Bork, 2007; Bowen, 1978; Kerr, 2007a; Kerr, 1999a, 2007b; Miller, 2002). If the central focus of the organization is to calm the collective anxiety through greater uniformity, the individual's contribution becomes devalued and the group loses its ability to respond creatively (Kahneman, 2011; Kerr, 1999a, 2007b; Mumby, 2013; Plous, 1993). Over time, the group may develop an increased resistance to innovation, which introduces a greater potential for disharmony and failure (Bandura, 2006; Burke, 2011; Schein, 2010). This results in an ossified system-wide resistance of the group toward technology, innovation, and change (Burke, 2011). If resistance stiffens to the point that invisible architecture or culture of the organization cannot respond to the demands of the environment, the group loses the ability to innovate or make decisions that initiate transformation (Burke, 2011; Schein, 2010). Organizational resistance arises when the group senses a loss of stability, greater risk, and uncertainty associated with system-wide change (Burke, 2011). Also, the leadership and structure of the group is challenged as it is deconstructed and recomposed to meet the demands as well as the objectives of the latest innovation (Burke, 2011).

Anxiety and Innovation within Health Care

In health care, the risks and advantages of emerging technology are dramatic since innovations concern themselves with the welfare of others. The risks to adopt or not adopt technology can literally be a matter of life and death, and the anxiety involved in the innovation-decision process can be high (Cain, 2002). Although the adoption of technology may seem to be an inherently positive practice, it may cause many unintended negative consequences. The biggest challenge for any group is to consider the various factors during the innovation-decision process and sift the positive innovations from the potentially negative ones. Successful groups and individuals are typically more selective, thoughtful, and accurate in their assessments of technology than unsuccessful groups (Damanpour, 2001, 2006; Erdogmus, 2011; Parasuraman, 2001; Rogers, 2003). For example, a more innovative medical clinic may choose to develop an original process and completely rework their layout for patient intake, vital signs testing, physician examination, and bill paying to decrease the wait time for the patient. A less innovative group may choose to renovate their existing facilities without changing the clinic layout because the staff is more familiar with the layout and it would be too difficult to change.

Health care professionals must make a number of innovation-adoption decisions regarding novel technology and care processes. For example, these processes may include new diagnosis protocols, dialysis procedures, wound care treatments, or orthopedic implants. Clinicians and staff often rely on the professional environment of their groups during the innovation-adoption decision to consider thoughtfully emerging health care technology. A supportive, thoughtful, and professional communication structure can provide a firmer foundation to process the uncertainty and risk of emerging health care technology (Beebe, 2009;

Cain, 2002). A group who engages in emotionally reactive communications may not be able to provide this foundational support (Beebe, 2009; Cain, 2002). An example would be the introduction of the latest kidney dialysis machine that promises longer times between dialysis for the patient, but requires a change with respect to the processes and products. A more innovative group is able to acknowledge the advantages to the patient, while accepting that it may take some time until they equal their current level of proficiency. A less innovative group may become defensively opposed to the new machine methods and argue that it will only add time to the dialysis process. This less innovative group may exhibit a greater resistance to alter their established methods to incorporate the emerging technology.

Statement of the Problem

The intent of this study was to examine whether a relationship exists between an individual's level of emotional differentiation and their technology readiness among a sample of orthotic and prosthetic healthcare clinicians. Although the concept of differentiation in Family Systems Theory has been recognized since the late 1950's to describe the qualitative capability and performance of family groups (Bowen, 1978), it has not been utilized to identify varying levels of adoption of innovation . This same systemic measure can be used to predict how organizations and groups may function when accepting emerging innovations or undergoing planned organizational change processes. Since the adoption of emerging technologies requires a higher level of group interaction, emotional differentiation between individuals may play a significant role overall.

Purpose of the Study

The purpose of this study was to determine if there were any correlations between the attributes of individual emotional differentiation and personal technology readiness with allied healthcare workers. For this study, emotional differentiation was defined by the three attributional sub-scores of the Work Differentiation Inventory (WDI) including emotional reactivity (ER), emotional cut-off (EC), and interpersonal fusion (FO) as classified by Cavaiola (2012). These attributes were individually compared with the four attributional sub-scores of the Technology Readiness Index 2.0 (TRI-2.0), which included: technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS) (Parasuraman, 2001, 2014).

A sample population of orthotic and prosthetic professionals was used within the study to investigate why some practitioners were more adept at providing complex orthopedic technology than others. The study also investigated any correlations of the overall composite scores of WDI and TRI-2.0 with eight demographic attributes of the participants, including gender, years of experience, certification level, technology self-assessment, number of high-tech patients, external linkages, internal linkages, and institutional affiliation. Ultimately, the goal of the study was to determine if higher emotional anxiety of an individual was related to the ability to implement emerging technology and processes.

The WDI was examined for its effectiveness in assessing individual and group differentiation. The study solicited a sample group from a total population of 5,700 orthotic and prosthetic clinicians using an email discussion board, with more than 4,000 current subscribers, and the anticipated participation of 100 clinicians. The main objective of the study was to

correlate the values found by the WDI and the TRI-2.0 to explore if any relationship existed between differentiation of self and technology readiness.

Research Questions and Related Hypotheses

The overarching research premise addresses whether varying levels of individual emotional differentiation are correlated to individual levels of technology readiness. The overarching research questions of the study were:

1) Are there one or more relationships between the sources of individual emotional anxiety identified by the WDI and the acceptance and adoption of emerging technology?
2) Are there one or more aspects of the WDI that can serve as predictive models of technology readiness for individuals or groups?
3) Are there one or more aspects of the TRI-2.0 that can serve as predictive models of workplace differentiation for individuals or groups?
4) Are there any differences based on demographic attributes of the sample population related to an individual's TRI-2.0 and WDI scores?

The corresponding hypotheses have been derived from the research questions addressing various attributes of individual emotional differentiation as well as technology readiness and can be stated as:

H_1) There will be a statistically significant relationship between one or more of the three attributes of workplace differentiation with any of the four attributes of technology readiness.

H_2) A statistically significant predictive relationship for the technology readiness score will be associated with one or more of the attributional measures of the Workplace Differentiation Inventory.

H_3) A statistically significant predictive relationship for the workplace differentiation score will be associated with one or more of the attributional measures of the Technology Readiness Index-2.0.

H_4) There will be a statistically significant correlation between one or more of the eight demographic attributes and the composite scores of differentiation of self and technology readiness.

Rationale for the Study

Upper limb prostheses are more technologically advanced compared to lower limb prostheses due to the higher functional demands of actively manipulating objects (Biddess, 2007; Burrough, 1985; Bush, 1990). This clinical need for active movement places an increased technologic demand on the prosthetist to provide a functional device (Biddess, 2007; Burrough, 1985; Bush, 1990). This higher technologic demand may have some effect on the acceptance of arm prostheses by the patients, which is much lower than other levels of involvement (Biddess, 2007; Burrough, 1985; Bush, 1990). Prosthetists have historically reported a wide range of prosthetic arm patient acceptance rates, which is defined as the full integration of the arm prosthesis in activities of daily living among various patient populations (Berger, 1958; Biddess, 2007; Burrough, 1985). Although prosthetic acceptance is usually measured in terms of hours of use, there is no minimum standard that has been determined for full acceptance of the arm prostheses (Biddess, 2007; Burrough, 1985; Bush, 1990). Consistent daily use has been

considered the nominal level of acceptance, although some references the minimum level of acceptance as 12 hours of daily use (Biddess, 2007; Brenner, 1992; Burrough, 1985; Malone, 1984). The varying amount of prosthetic acceptance from clinic-to-clinic suggests there could be contextual factors that contribute to the acceptance of these complex technologic devices.

Historically, upper limb prosthetic acceptance rates have shown little change since the 1950's, where a reported 35-75% measurement of acceptance of a prosthesis for varying levels of amputation was stated (Berger, 1958). In the past, these prosthetic devices were constructed of simple cable controls, mechanical locks, and metal hooks (Berger, 1958). Current designs utilize a much higher degree of technologic complexity in the form of electronic sensors, microprocessors, battery systems, connections, and motor drive systems (Biddess, 2007; Burrough, 1985; Bush, 1990). Although the technology of prosthetic devices has greatly increased, it has not positively influenced acceptance rates (Biddess, 2007; Burrough, 1985; Bush, 1990). Initial investigations by the author have shown that one of the contributing factors of low patient acceptance could be the level of internal system anxiety and emotionality of the prosthetist in response to more complex designs using electronic controls and computer programming (Stark, 2014a).

Since the average prosthetist sees only two to three of these patients per year, they are often anxious about these upper limb fittings because they are not as familiar with higher levels of technology and have not developed standard process protocols (Biddess, 2007; Stark, 2014a). In a similar way, many people must consult the owner's manual to change the clock in their car since this is done infrequently. As the occasional upper limb patient enters their office, the prosthetist must hurriedly seek reference material or clinical consultation to re-familiarize themselves with componentry, controls, and programming (Biddess, 2007; Stark, 2014a). The

prosthetist and patient form an emotionally intense dyadic relationship focused on the acceptance and confidence with the prosthesis. As a result, any apprehensiveness or lack of self-efficacy by the clinician is instantly transmitted to the patient as a loss of confidence in the technology (Biddess, 2007; Stark, 2014a). Often any challenges or difficulties encountered during the fitting may be projected on the prosthesis, rather than the methods of implementation (Biddess, 2007; Stark, 2014a). Just as a dentist may find it easier to find fault with a style of dental instrument than their own technique, the prosthetist may have a tendency to blame technology with which they are unfamiliar (Biddess, 2007; Stark, 2014a).

Along with amputation limb length, functionality, comfort, and cosmetic appearance, practitioner confidence and self-efficacy seem to be positive factors for patient acceptance (Biddess, 2007; Stark, 2014a). If the prosthetist is more confident and experienced with the fitting, implementation, and adjustment of the prosthesis as well as the possible challenges that may be encountered, the patient will also be more secure with the process. Furthermore, prosthetists who have a greater amount of clinical experience seem to exhibit a higher degree of patient acceptance of the prosthesis (Biddess, 2007; Burrough, 1985; Millstein, 1986). They have developed an informal conceptual learning process and have a greater understanding of the critical points of variance (Richey, 2011; Rothwell, 2008).

Many researchers have described innovators and early adopters in the diffusion of innovation as those who have a greater amount of risk tolerance or the ability to cope with a greater degree of uncertainty with respect to innovation (Bandura, 1993, 2006; Martins, 2009; Rogers, 2003; Ryan, 2010; Vishwanath, 2003; Wirth, 2008). Early adopters are typically thoughtful and rational, rather than guided by emotion, which helps them overcome any initial insecurity. Rogers (2003) indicates that they usually have a higher degree of formal education,

greater empathy, are less dogmatic, can deal with abstractions, have greater rationality, greater intelligence, are capable of coping with uncertainty, and have a favorable attitude toward science. They are typically less prone to the prevailing emotional mood and consensus of the group to make an individual adoption decision (Rogers, 2003).

During the innovation decision process, early adopters are able to make objective assessments regarding the relative advantage, compatibility, complexity, trialability, and observability of the innovation (Rogers, 2003). Relative advantage is the improvement the innovation brings over previous technology (Rogers, 2003). For instance, the latest smartphone may offer the advantages of faster connectivity, a brighter screen, and more applications as technologic improvements to attract new customers. Compatibility is the ease to which the emerging technology will be assimilated to the adoption unit (Rogers, 2003). A new method of growing rice may be introduced to eliminate famine, but the process must be compatible with the technology and resources that are available. Complexity is the relative perception of the difficulty in using the technology (Rogers, 2003). For example, a novel robotic surgical suite may be purchased for a small-town hospital, but if it is too complex to operate for any of the personnel, it may not be utilized fully. Observability is the extent to which the advantages of the innovation can be viewed (Rogers, 2003). For a health care group to accept a novel wound care product, they may wish to observe a number of successful results in a trial before implementing it as an accepted process.

A thoughtful adopter is able to make these assessments without the added burden of overly emotional or reactive thinking (Rogers, 2003). Thoughtfulness considers the broader implications of what Kahneman (2011) describes with the differences between System 1 and System 2 thinking. System 1 thinking is used more often and is the instinctive, emotional, and

biased method of thought used to make quick assessments. System 2 thinking is used less often, but is more thoughtful, unbiased, and rationally guided. An observer who is less encumbered with preconceived emotional bias may be able to engage in rational thought when considering a number of options.

The risk tolerance of prosthetists and orthotists may be tested when fitting components with greater technology due to higher rejection rates, greater expense, and fitting complexity. Early adopters in this population may have a comfort level with technologic risk since they are guided by a greater sense of rationality and achievement of higher functional goals for their patients (Cain, 2002). Later adopters have an inherently higher level of anxiety due to their perception of risk and uncertainty concerning surrounding potential innovations (Rogers, 2003). Innovative groups can act to help the individual to overcome this anxiety (Plous, 1993; Rogers, 2003). Individuals within supportive groups may be able to make creative innovation compared to those who suppress individual innovation (Cavaiola, 2012; Comella, 1999b; Maloney-Schara, 1999; Papero, 1999; Sagar, 2007). Non-innovative groups may act to suppress individual innovative contributions by mandating an increased amount of consensus and conformity to preserve homeostasis (Kerr, 2007b; Mumby, 2013; Plous, 1993; Rogers, 2003).

Although the study is designed to attempt to measure individual differentiation, a possible implication based on previous qualitative studies could be made in the contexts of private clinics, corporate clinics, institutions, and other workgroups (Bowen, 1978; Kerr, 1999a; Papero, 1999). Various aspects of group differentiation can be compared to those of technology readiness to potentially find greater links between the subgroups.

Theoretical Framework

The theoretical framework was based on the similarities of individuals with greater emotional differentiation (Bowen, 1978) as well as the characteristics of change agents and early adopters depicted by Rogers (1962, 2003). Within both groups, these individuals seem to function at a higher level and with a greater risk tolerance inherently necessary for adoption of innovation. If the attributes of emotional differentiation and technology readiness could be compared, it may be possible to develop a greater understanding of what elements contribute to overall innovation receptiveness.

Understanding what elements of the group are contributing to systemic anxiety may reveal the challenges and obstacles to optimal functioning. Bowen Family Systems theory is a natural systems theory that attempts to describe the role that systemic anxiety plays within any human family system and larger social system. It is considered a natural systems theory because of the assumption that individuals, groups, and societies have adapted to intrinsic and extrinsic challenges naturally. The adaptation to these challenges may result in a greater or lesser degree of functionality depending on the level of emotional anxiety that exists within the group.

A central tenant of Bowen Theory is the concept of emotional differentiation or the degree to which the individual resists the collective level of anxiety within the group (Bowen, 1978). Individuals with a greater amount of differentiation are able to maintain a higher degree of thoughtfulness with respect to their individual opinions, values, and behavior regardless of the prevailing attitudes and mood of the group (Bowen, 1978). The term differentiation was derived by Bowen from the description of the differentiated cell, which describes a biological unit that changes from one function to another (Bowen, 1978). This concept may also be applied to individuals who are more differentiated from the group and can function more independently.

Those who are less differentiated and more emotionally reactive are more deeply affected by general emotional anxiety of the social context (Bowen, 2014; Bowen, 1978; Comella, 1999a; Kerr, 1988b; Sagar, 2007).

Bowen Theory depicts anxiety as the automatic and reactive perception of a threat that exists as a primal energy formed in the primitive amygdala and brain stem (Bowen, 1978; Kerr, 1988a). Emotions and feelings such as frustration, sadness, happiness, or concern represent more evolved expressions found in the cognitive paleo-mammalian and neo cortex centers of the brain (Bowen, 1978; Kerr, 1988a). Bowen believed that evidence of this perception of threat existed in the very protoplasm of beings in the natural world and could be found in lower order animals (Bowen, 1978; Ferrera, 1999; Kerr, 1999b; Papero, 1990). This anxiety was then transmitted in social networks with negative effects to individual rational thought (Bowen, 1978; Kerr, 1988a). When considered in the context of the natural social system, Bowen felt this collective anxiety, or undifferentiated ego mass, worked to closely bind undifferentiated individuals to the group and also limited independent thought and functioning (Bowen, 1978; Kerr, 1988a).

Bowen Theory has its origins in the study and treatment of families exhibiting mental illness, but it may be applied to other social systems such as workgroups (Cavaiola, 2012; Comella, 1999b; Kerr, 2007a; Kerr, 2007b; Sagar, 2007). Since workplace relationships arise as projections of the relationships from the family of origin, supervisors and coworkers become surrogate parents and siblings respectively (Cavaiola, 2012; Hochschild, 2001). Bowen Theory may have relevance in describing systemic social behavior as applied within the work groups (Comella, 1999b; Kerr, 2007b; Miller, 2002). Although Bowen (1978) originally cautioned that work relationships are not as intense as family interactions, this may be changing in the modern workplace (Cavaiola, 2012; Hochschild, 2001). Attitudes toward work place relationships may

be shifting due to a variety of factors that influence the significance of modern life. Working adults spend most of their waking hours at their job and this trend is increasing (Amabile, 2011). Since employees often engage in more social interaction and validation at work than at home, work is supplanting the family as the source of the most meaningful social interactions (Cavaiola, 2012; Hochschild, 2001). Those who are more differentiated typically have better quality of relationships at home and at work (Cavaiola, 2012; Comella, 1999b; Kerr, 2007b). Descriptions of differentiated people who are less emotionally reactive, rational, thoughtful, tolerant of diverse opinions, and exhibit greater emotional self-control (Bowen, 1978; Kerr, 2007a; Kerr, 1999a, 2007b) seem to reflect many of the traits ascribed to leaders and innovators in the workplace (Burke, 2011; Northouse, 2010). These observations and findings would seem to support the notion of applying concepts of family systems therapy to workgroups.

The central theory of differentiation has had the most rigorous empirical support (Miller, 2004; Skowron, 2004b, 1998, 2003a, 2003b) among the number of other core concepts originally described by Bowen (1978; Kerr, 1999a, 2007b, 1988a). A number of subsequent instruments have been developed for the measurement of differentiation for comparison in a variety of contexts such as job satisfaction, performance, training, problem solving, gender differences, career choices, and others (Avery, 2011; Beebe, 2009; Cavaiola, 2012; Miller, 2004; Skowron, 2000, 2004b, 1998). The Workplace Differentiation Inventory (WDI) has been especially adapted from earlier instruments to measure individual differentiation within the work group context (Cavaiola, 2012). With these instruments, differentiation can be used as a parameter to evaluate the effectiveness of individuals within their work groups and their capacity to deal with extrinsic and intrinsic challenges (Cahill, 1999; Cavaiola, 2012; Comella, 1999b; Kerr, 1999a; Papero, 1999; Sagar, 2007; Sobel, 2007; Webb, 1999; Wiseman, 2007).

Diffusion of innovation is the process by which any innovation, as a novel process, thought, technique, or component, is adopted by an individual or social group (Rogers, 2003). Within the group, individuals tend to adopt the innovation at different times based on their perception of risk and uncertainty versus opportunity and advantage (Rogers, 2003). This innovation decision process consists of a series of choices by which the individual evaluates various factors and ultimately decides to adopt or reject the innovation (Rogers, 2003).

Members of a social group do not all adopt an innovation at the same time since the perception of risk and uncertainty is different for each individual during the innovation decision process (Rogers, 2003). Individuals can be classified into various adopter categories within the diffusion process timeline based on the point at which they decide to adopt the innovation (Rogers, 2003). Figure 1, shown earlier, illustrates this adoption process, which follows a characteristic bell-shaped distribution of adopters. The curve describes how diffusion of innovation begins with a small number of innovators, the larger general population, and the small number of remaining resistant adopters, until most of the group has adopted the innovation (Rogers, 2003). Understanding these differences of opinion toward innovation between these various groups helps to explain the rate of diffusion within the larger social group.

The measurement of these differing attitudes toward technology can be found in the area of technology readiness, which attempts to classify the different levels of anxiety displayed by potential adoptive groups in the diffusion of innovation (Rogers, 2003). Technology readiness refers to the individual's receptiveness and tendency to use an emerging technology (Liljander, 2006). The rationale for using technology readiness in this study is to understand if it is similar to a potential adopter's level of differentiation. Technology readiness also measures why early

adoptive groups have much less anxiety and typically exhibit a more accepting and thoughtful outlook when deciding on an emerging innovation.

The Technology Readiness Index (TRI) was developed by Parasuraman (2001) and was based on Rogers' (1962) earlier work of common individual attitudes toward adoption. It classified the perception of technology using four personality traits commonly found in the adoption of innovation as optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2001). Recently that instrument was updated to the Technology Readiness Index 2.0 (TRI-2.0) (Parasuraman, 2014). During the re-development of the TRI, the qualitative motivators for technology, such as freedom, control, mobility, and social connection, were defined (Parasuraman, 2014). In addition, the inhibitors for adoption of innovation, like loss of confidence, financial risk, cost, security/privacy, and dehumanization, were prioritized.

This conceptual framework forms the basis of the study, which was to examine the relationships between the attributional variables of group anxiety and performance in a non-experimental, associational, mixed-methods approach. The intent was to discover the existence of correlation present among clinical groups on varying degrees of anxiety and performance. The conceptual framework was founded on two main theories regarding the negative effect of system wide anxiety on human behavior while in contextual relationships.

Figure 2 illustrates the comparative relationship of the conceptual framework with the two main theories of Bowen Family Systems Theory and Diffusion of Innovation and how they are related to the instrumentation. Each of the attributional measures of the WDI and TRI-2.0 will be compared as well as the demographic attributions.

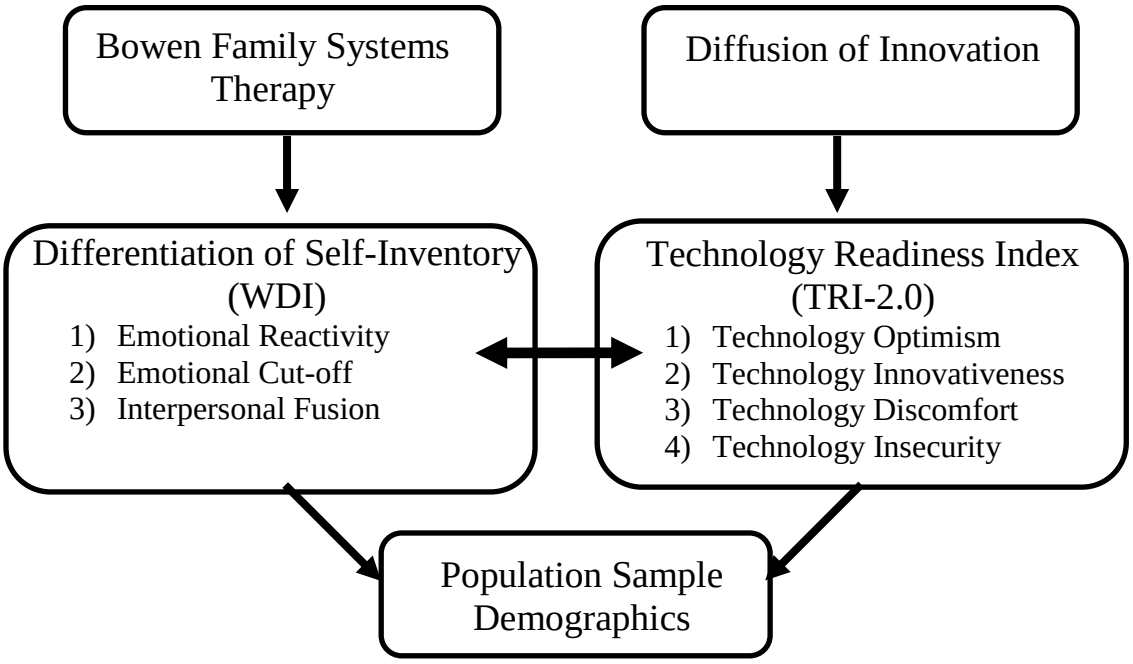

Figure 2 Conceptual Framework of the Study

Significance of the Study

Few resources are available that correlate the factors of systemic anxiety and emotionality with overall group performance. This discussion of the social influence on technology adoption could be extrapolated from this study of orthotists and prosthetists to the innovation efforts of health care organizations. Although clinical professionals may provide service for patients on a one-to-one basis, they depend on the support structure of other members on the clinical team as well as the support staff. For example, if a clinician attempts to use a more modern component she/he may need the technician to adopt new fabrication techniques, the billing coordinator to organize different supportive material, and the accountant to approve a greater amount of capital outlay. If the staff does not support the innovative behavior of the clinician, they could benignly place obstacles so that it is not successfully implemented. In this particular study, prosthetists and orthotists provide services to patients, but their level of

innovation may depend on the attitudes of innovation within their group. If the individual feels that their innovative attitudes and behavior are not supported, they may be more reluctant to bring these innovations to the group (Morris, 2011; Rogers, 2003). Using the previous example, if the support staff is not receptive to the new innovation and is unwilling to change their procedures or practices, emerging innovations will be met with resistance and delays. The lack of social differentiation with the group may have the effect of overvaluing consensus, as in groupthink, or may create overly emotional communications that decrease the amount of thoughtfulness when assessing risk (Kahneman, 2011; Plous, 1993) . Since diffusion of innovation appears to be highly dependent on the social interaction of the group, it would seem that the nature of the individual relationships would have some impact on the acceptance of innovation (Morris, 2011). Building a culture of innovation with a network-based and non-localized system focused on experimentation, depends on the ability of people to communicate, share, and promote their ideas in sometimes risky environments (Morris, 2011). Work systems that have a greater amount of emotional entanglement may be less able to support these complex and uncertain activities.

Although Bowen Theory incorporates a systems-based model for family and organizational systems, few studies are available that relate the effect of differentiation and reactivity to group performance (Bowen, 1978; Kerr, 2007b, 1988a). This study may be important within the areas of organizational psychology and communication since it examines the internal factors affecting technology readiness. Technology readiness not only applies to the adoption of technology, but also to transformational programs utilized for quality control such as Total Quality Management, Lean Manufacturing, and Six Sigma. If differentiation can be linked to technology readiness, it may be utilized to assess group capacity and tolerance for

transformational change programs (Mathews, 2009; Rivard, 2005). A group with a high degree of anxiety may not have a high degree of technological readiness for a radical change process, but may be able to negotiate a more moderate one (Ford, 2008; Stockport, 2000). Using the WDI and relating it to technology readiness may be significant for a facilitator to assess overall anxiety and adaptability of the group (Cavaiola, 2012).

If the attributes of the collective social anxiety can be identified, it may be possible to predict the ability of the group to make thoughtful assessments of technology. Collective social anxiety can be defined in the individual with the different attributes of emotional differentiation. The receptiveness to technology is defined as the technology readiness of the group to adopt technology. By examining the systemic professional context with the individual compared to readiness, it may be found that the attributes of emotional differentiation and technology readiness are linked in some way.

By assessing individual and group emotional differentiation, a potential change agent may be able to estimate what type, how much, and how rapidly technology can be adopted. This may help to explain why some groups and individuals are more flexible and receptive to adopting emerging technology as well as why so many planned change efforts fail (Burke, 2010). By assessing individual and group anxiety, the change agent could attempt to implement an organizational change program that would match the anxiety level of the group.

Definition of Terms

Ability to Work from the I-position – ability of an individual to understand and affect a change in a social relationship by taking greater emotional responsibility (Comella, 1999a).

Adaptiveness – the capacity of the individual and group to regulate their anxiety and emotional reactivity in order to maintain the emotional equilibrium in the group (Bowen, 1978; Kerr, 1988a; Titleman, 2014b).

Adoption of an Innovation – the social decision process by which a group decides to accept and fully integrate an innovation (Rogers, 2003).

Anxiety – the primal response of an organism to a threat that may be imminent, perceived, remote, or non-existent (Comella, 1999a).

Autopoiesis – a biological, mechanical, or social system that is capable of reproducing and maintaining itself (Burke, 2011).

Bowen Family Systems Theory – a natural systems theory based on the emotional exchanges with respect to eight major concepts: differentiation of self, triangulation, emotional reactivity, emotional cut-off, projection, fusion, working from the I-position, and multigenerational emotional projection (Bowen, 1978).

Chronic Anxiety – the perception of a threat over an indeterminate amount of time. Bowen Theory makes the argument that chronic anxiety limits the range of thoughtful and rational options considered in favor of more emotionally reactive choices and in this manner limits the functionality of the individual and group (Bowen, 1978; Comella, 1999a).

Differentiation – the ability to distinguish individual thoughts from emotional reactivity and maintain them in the presence of others who are emotionally reactive (Bowen, 1978; Kerr, 1988b; Skowron, 1998).

Diffusion – the communication process by which an innovation is exchanged through various internal and external linkages among the members of a social group (Rogers, 2003).

Emotion – the response of an individual to his/her environment as well as to others with whom the individual shares relationship (Comella, 1999a).

Emotional Cut-off – process of emotional distance as a result of excessive individual perception of emotionality resulting in greater relational distance, aloofness, and isolation with an exaggerated façade of independence (Bowen, 1978).

Emotional Fusion – a relationship of two or more people, characterized by an excessive amount of emotional interconnectedness. It exists when undifferentiated individuals are greatly affected by their collective emotionality. More differentiated individuals are able to maintain individual emotional boundaries and resist becoming enmeshed with one another (Bowen, 1978; Comella, 1999a).

Emotional Process – the method by which emotions may be transmitted between and among individuals who are members of a system (Comella, 1999a).

Emotional Reactivity – the level of emotional intensity or stability that the individual exhibits related to differentiation. A person with a high degree of emotional reactivity is less differentiated, while another with a lower degree of emotional response is regarded as more differentiated (Bowen, 1978; Kerr, 1988b).

Emotional Triangle – occurs when the anxiety between a two-person relationship becomes so intense that it is extended to a third party for emotional stabilization (Bowen, 1978; Comella, 1999a; Kerr, 1988a).

Hard Technology – a type of technology that is a physical component, device, or tool (Rogers, 2003).

Homeostasis – the tendency of the system to self-regulate a variety of factors to remain stable and constant (Bateson, 1972).

Innovation – a concept, process, object, or design that is perceived as new or novel by an individual or group (Rogers, 2003).

Innovation Decision Process – the process through which an individual gains knowledge, forms an attitude, makes a decision, and implements and confirms an emerging innovation (Rogers, 2003).

Interlocking Triangles – when the number of emotional triangles between various people within the group increases to a point where they become interconnected (Bowen, 1978; Comella, 1999a).

Levels of Emotional Differentiation – describes the different levels of differentiation in groups and individuals (Bowen, 1978; Comella, 1999a).

Negative Feedback Loop – a feedback loop that reduces or limits output activity of the group to regulate homeostasis, but may create a more static condition that resists adaptation (Bateson, 1972).

Organizational Group – a system of individuals who work together to achieve a common goal through their social structure and assignment of tasks (Rogers, 2003).

Positive Feedback Loop – a feedback loop that acts to increase or amplify system group output activity to maintain homeostasis; often at the risk of increasing instability (Bateson, 1972).

Soft Technology – a type of technology that is a non-physical thought, philosophy, or practice (Rogers, 2003).

Technology – an action that reduces the uncertainty of cause and effect relationships in achieving a desired outcome (Rogers, 2003).

Technology Discomfort – the sense of being overwhelmed and a need to control technology (Erdogmus, 2011).

Technology Innovativeness – the tendency to search for and adopt emerging technology (Erdogmus, 2011).

Technology Insecurity – the distrust of technology insecurity in general due to concerns of security and privacy (Erdogmus, 2011).

Technology Optimism – a belief that technology has the potential to increase our control, flexibility, and efficiency of our contexts (Erdogmus, 2011).

Technology Readiness – the tendency to use an emerging technology (Liljander, 2006).

Technology Readiness Index – measurement of the tendency of an individual to adopt emerging technology using four personality traits of technology optimism, technology innovativeness, technology discomfort, and technology insecurity (Parasuraman, 2001).

Triangling – processes of creating an emotional triangle where two people with intense emotional anxiety or fusion include a third party to ease emotional tension. This may apply to a single, multiple, or a network of triangles within the social system (Bowen, 1978; Comella, 1999a; Kerr, 1988b).

Undifferentiated Ego Mass – central emotional togetherness intended to dampen group anxiety (Bowen, 1978; Wiseman, 1999).

Methodological Assumptions

1) Accuracy of Self-Assessment - the internal validity of the assessment depended on honest evaluations of the participants. Each participant was expected to answer the questions independently and honestly. Although the participants were not experts in Emotional Differentiation or Technology Readiness, the assumption was be made that they were able to correctly self-assess the various attributional dimensions accurately.

2) Adequate Sample Size - an assumption was made that there was an adequate number of respondents to provide sufficient power for the study. It was expected that 100 participants would respond to the instrument, posted on an e-mail discussion board, from an overall population of 5,700 clinicians.
3) Absence of Serious Mental Pathology - another assumption was that the participants did not have a serious mental pathology or social dysfunction to prevent answering correctly. There was a possibility that some participants would present with a pathologic condition that may cause them to answer toward one end of the spectrum of responses. While the assessments did measure emotional reactivity and cut-off, they may not have been reflective of technology readiness when there are urgent matters that must be attended to such as an abusive work environment.
4) Working in Context of Workgroup - an environmental assumption was that the individuals were working within the context of an active working group that includes other employees. If a participant was working independently, the degree of reactivity would not have been reflected in their attitude toward technology readiness.
5) Baseline Professional Competency - there was an assumption that the respondents had basic competence in their vocational positions. Although the amount of experience each participant had varied, the assumption was that each respondent possessed a basic level of clinical competency. A clinical resident may not possess this basic level of competency while undergoing professional training. The resident's apparent anxiety may be related to professional development rather than contextual relationships in the adoption of technology.

Delimitations of the Study

Many of the delimitations within the study were related to the type of instruments that were utilized. In this case, the differentiation value was an abstraction of individual differentiation. Adoption of high technology, specific to the sample, was measured by assessing the adoption of premium products: elevated vacuum, microprocessor knees, upper limb prosthetics, stance control orthoses, and neurostimulation.

The sample was limited to practitioners in the orthotic and prosthetic profession, based on accessibility to the author. Only post-professional certificate holders were considered, excluding those in residency who did have experience implementing current technology. Only those who currently worked within a social group, as opposed to those who worked alone, were considered to determine the effect of social differentiation.

The Workplace Differentiation Inventory (WDI), originally derived from the Differentiation of Self Inventory (DSI), was chosen as the instrumentation with its specific application to the work context (Cavaiola, 2012). This was because the WDI has been shown to be a more robust predictor of workplace differentiation than the DSI when compared to job satisfaction and interpersonal stress (Cavaiola, 2012). For this study, primarily concerned with innovation in the healthcare workplace, highly personal questions of marital health, sibling interaction, relationships with parents, and family interaction found with the DSI would have been needlessly invasive (Cavaiola, 2012).

The 567 respondents in the original WDI study were at least 18 years old and had the same job for one-year prior (Cavaiola, 2012). The homogeneity of the sample can be questioned because it was not aligned geographically or in regards to ethnicity in comparison to the U.S.

census (Cavaiola, 2012). Also, there was a higher percentage of individuals working in private corporations and health care settings, which may be favorable with the application in this study.

Technology Readiness Index 2.0 (TRI -2.0) was condensed from the original Technology Readiness Index (TRI) from 36 items to 16 items by updating technology references and examining internal reliability of the various questions (Parasuraman, 2014). During the development of the TRI-2.0, the qualitative motivators for technology were defined such as freedom, control, mobility, and social connection (Parasuraman, 2014). The inhibitors for adoption for innovation like loss of confidence, financial risk, cost, security/privacy and dehumanization were prioritized. Factor analysis was able to reduce the number of questions based on those with the least amount of variance and strongest reliability (Parasuraman, 2014). In addition, there was a constraint to minimize the length of the overall survey to prevent respondent fatigue and increased prevalence of abandonment.

The quantitative analysis of the TRI-2.0 consisted of a mail and online survey with 354 respondents from a representative sample of 2,500 of randomly selected randomly selected addresses (Parasuraman, 2014). The median age was 56 years with 57% male with the mail survey and 47 years and 44% male for the online survey (Parasuraman, 2014). Parasuraman, et al raised questions whether education and occupation caused inherent differences in values or if those with greater education are more predisposed to have a favorable attitude toward technology (Parasuraman, 2014). Another concern was if technology readiness naturally declines with age as the data may suggest in the extant data (Parasuraman, 2014). Greater study was also suggested regarding the values, emotions, and genetic traits of the respondents that may affect TRI-2.0 values (Parasuraman, 2014).

Limitations of the Study

A significant limitation for both instruments was the accuracy of the individual outcomes, which may have limited the validity of scores. Bowen (1978) felt that comprehensive assessment of an individual's emotional differentiation would take a number of personal visits and interviews. A complete picture of the social work group context would have involved extensive analysis of the entire group, a procedure which was also beyond the scope of this study (Schein, 2010).

The participants were limited to individuals who elected to participate rather than the range of the broader population of prosthetics and orthotics as well as healthcare. The population itself was limited within the expansive scope of health care since it considered only a small portion of the orthopedic manufacturing segment. Also, the entire orthotic and prosthetic population was not represented since participation in the electronic discussion board was not mandatory. The survey was initially posted with Qualtrics and a notice on the professional OANDP-L ListServ. This may have been self-limiting due to the availability of clinicians to answer the survey.

Additionally, the sample population was derived from subscribers to the OANDP-L List Serve, which may have had characteristically different values with respect to technology than the larger prosthetic and orthotic population. As a result, adopter groups that do not readily adopt technology may not have been adequately represented in the sample. Those who participated with the professional discussion board may have inherently more favorable attitudes toward technology.

Although the results may be applicable to other allied health professions, they may not apply to populations outside of health care. The contextual attitudes, behaviors, and cultural

values may be different in other segments due to differing levels and types of anxiety. The outcomes of the study should not be applied to other areas without continued validation of that particular group.

An additional limitation is that individual perceptions of differentiation and technology are not normalized from a single datum of perception. The values of the individuals are subjective, as are their attitudes with respect to the actual adoption of technology. Those values are shaped from individual experiences and decisions that are not universal or consistent (Rogers, 2003).

Although the adoption of innovation was assessed with an individual technology readiness value, it may not have been reflective of the entire group. Group technology readiness would have been difficult to measure since some healthcare clinics serve different patient pathologies. Each of these contexts may be considerably different with various types of unique contextual stresses such as an emergency trauma unit versus a geriatric care facility.

Identification and Analysis of the Variables

The study investigated the possible relationship between emotional differentiation and technology readiness. The Workplace Differentiation Inventory (WDI), a 26-item, six-point Likert Scale, was used to measure the three subscales of emotional reactivity (ER), emotional cut-off (EC), and emotional fusion (EF) with others (Cavaiola, 2012). Technology readiness was measured using the Technology Readiness Index 2.0 (TRI-2.0), which is a 16-item, five-point Likert scale that measures four subscales: technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS) (Parasuraman, 2014).

The additional subscale analysis was derived from the WDI instrument, which attempted to measure the dimensions of emotional differentiation: emotional reactivity (ER), emotional cut-off (EC), and interpersonal fusion (FO). These three dimensions were interrelated with the four dimensions of technology measured by TRI-2.0: technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS).

The composite and subscores of the WDI and TRI-2.0 were then compared with the variables of gender (G), years of experience (Exp), certification level (Cert), technology self-assessment (TSA), number of high-tech patients per year (HTP), number of external linkages (ExLk), number of internal linkages (InLk), and affiliation (Aff). See Appendix A, Table 31 for variable analysis of the study.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to examine if an individual's differentiation of self may be related to their level of technology readiness. Topics discussed within this literature review involve clinical and organizational psychology as well as adoption of innovation and technology readiness. The hypotheses were developed to consider if groups with a higher amount of emotional differentiation and lower reactivity are receptive to innovation and exhibit greater technology readiness. A number of hypotheses can be derived to examine the effect of the attributional factors of differentiation on the attributes of technology readiness. This would not only include "hard technology" (Rogers, 2003, p. 27), such as componentry, equipment, or electronic devices, but also "soft technology" (Rogers, 2003, p. 27), which may be planned organizational change programs, thought processes, or methodology.

Literature from Bowen Family Systems Theory will be reviewed and used to describe the elements of individual and system anxiety (Bowen, 1978; Kerr, 1988b). Case studies relating Bowen Theory to concepts within organizational psychology and group performance in human and subhuman social groups will then be explored. Bowen Theory will be compared to the theoretical models of the widely known concepts of emotional intelligence. Diffusion of innovation will be discussed as it applies to the varying levels of anxiety among adopter groups associated with the risk of adopting emerging technologies. Literature that explores the effect of anxiety, emotionality, and social consensus will be related to the decision-making associated

with adoption of innovation. Qualitative literature describing the effect of organizational systems-based thinking on individual performance will be examined for similarities with the emotional systems described by Bowen (1978). Technology readiness will then be examined with the various measures that have been refined to describe the receptiveness of the social group to adopt technology.

Description of Bowen Theory

Bowen Family Systems Therapy is a classically based psychological theory, originally conceived by a clinical psychologist, Murray Bowen (1978). Bowen developed this systems-based approach to address the collective emotionality with the families of schizophrenic patients at the National Institute of Health in the mid to late 1950's (Bowen, 1978). This theory suggests that individuals and families have differing levels of emotional entanglement, which impact all levels of adult social interaction. Bowen's (1978) theory helped explain the profound effect that the collective network of family relationships has on individual attitudes, behavior, and functionality. This systems-based perspective describes the interdependence and mutual influence each relationship has within the social group. Bowen indicated that within the emotional system, each individual has varying levels of emotional differentiation, which describes the degree to which each participant is affected by the general anxiety of the social family or workgroup (Bowen, 1978).

In a healthy and more differentiated social group, the individual is encouraged and supported, while allowed to have separate opinions and viewpoints (Bowen, 1978; Kerr, 1988a). There is a greater capacity to tolerate disagreement since each individual's position is not threatened by the differences of another individual or the consensus of the group (Bowen, 1978;

Kerr, 1988a). There is a lower-level of reflexive emotional intensity, reaction, or personal entanglements in response to intrinsic or extrinsic stimuli (Bowen, 1978; Kerr, 1988a). As a result the system is more adaptive to changing conditions (Bowen, 1978; Kerr, 1988a). When chronic anxiety and stress increases, the group can adapt and maintain a more consistent level of functioning (Bowen, 1978; Kerr, 1988a; Titleman, 2014b). In Bowen Theory, adaptiveness is the capacity of the individual and group to regulate their anxiety and emotional reactivity in order to maintain the emotional equilibrium in the group (Bowen, 1978; Kerr, 1988a; Titleman, 2014b).

Considered a natural systems theory, Bowen Theory attempts to describe how groups, such as families and societies adapt to external and internal challenges naturally. Bowen had been greatly influenced by the evolutionary process of natural selection as an adaptation to the contextual environment (Bowen, 1978). Rather than ascribe the attributes of mechanical or biological system models, natural systems theory attempts to find commonality in social groups as they exhibit physical, cognitive, behavioral, or social symptoms related to efforts to adapt to perceived challenges.

Bowen was one of the first theorists to systematize the concept of differentiation within the framework of family systems (Bowen, 1978; Bowen, 1987). Although he described systems as naturally occurring, his conceptualization was rooted in classic psychoanalytic and developmental thought that first described it as individuation or separation (Bowen, 1987; Freud, 1958; Licht, 2006). Classic psychoanalysis by Freud (1958) proposed an internal separation process termed intrapsychic individuation. This individuation represented a renewed Oedipal conflict where adolescents would move beyond unconscious parental models and identify with personal friends and close relationships (Freud, 1958; Licht, 2006). Object relations theorists, who believed that individuals form their reaction to others and situations during infancy, viewed

this intrapsychic psychological separation as the process by which internal parental object representations were superseded by the need for independence and a unique identity (Blos, 1979; Licht, 2006; Mahler, 1968).

Mahler (1968) identified the stages of the primal individuation process in infants where the child moves away from physical and psychological dependence on the mother. Her studies showed a physical movement away from the mother as well as psychological separation when presented with object representations of the mother (Mahler, 1968). This was further developed by Erickson's theory of ego development where an adolescent's search for identity triggers internal psychological re-evaluation and distancing from the family (Erickson, 1968, 1980). Bowen (1978) proposed that the distancing or individuation, as described by Erickson, is an interpersonal process that occurs within the family whereby the individual develops autonomy. This developing autonomy may be impeded, permitted, or facilitated by the contextual family relationships and emotional stability (Bowen, 1978; Bowen, 1987; Bray, 1984, 1987; Kerr, 1988a).

In a series of papers examining the treatment of schizophrenic children, Bowen (1978) noticed that direct treatment of the patient met with varying results. However, when he addressed the psychological needs of the mother, there were consistent positive outcomes with the child (Bowen, 1978). Bowen felt this success was due to the treatment of systemic anxiety formed through symbiotic relationship patterns established within the contextual family group (Bowen, 1978). As a result of this early success, Bowen felt that by careful analysis of the social system and the role of each individual, he could define patterns and sources of anxiety. Once the sources of anxiety were identified, he could treat those problematic relationships to achieve greater

system functionality. In many cases the most troublesome relationships in the system were not directly associated with the individual who exhibited psychological symptoms (Bowen, 1978).

As his work progressed, Bowen identified several clinical artifacts that could help assess the capacity of family groups to absorb systemic anxiety. These artifacts were eventually codified within Bowen Family Systems Theory as being eight core concepts: (a) emotional system process (b) role of chronic anxiety, (c) prevalence of relationship triangles, (d) scale of differentiation, (e) multigenerational emotional process, (f) emotional fusion, (g) relationship cut-off, and (h) societal emotional process (Bowen, 1978; Comella, 1999a; Kerr, 1988a).

Since Bowen Theory was primarily based on clinical observation rather than empirical study, it did not initially present a cohesive body of experimental behavioral support. Bowen resisted measurement using behavioral science approaches since he did not consider the results as objective and reliable as that of the biological sciences (Bowen, 1978; Kerr, 1988b; Titleman, 2014b). Subsequent studies investigated the intrapsychic and interpersonal components of the theory. The intrapsychic component referred to the ability to distinguish between emotions, act rather than react, maintaining individuality while in relationships, and sense of personal responsibility (de Carbonel, 2007; Licht, 2006; Skowron, 2004b). The interpersonal component pertained to the ability to manage anxiety and feel comfortable within close relationships that had a greater potential for conflict (Skowron, 2003b). People who were more emotionally reactive had greater difficulty managing their own individuality while maintaining relationships with others. Conversely, people who were less emotionally reactive could regulate their responses and think more clearly, even when confronted with the emotional response of other individuals or the group (Skowron, 2004a, 2004b).

Bowen believed emotion and anxiety were innate forces that were transmitted within human social contexts. These forces have the potential to communicate alarm and caution, but also inhibit the adaptability of the group to changing internal and external contexts. An emotion is defined as the response of an individual to their environment as well as others with whom the individual shares a relationship (Bowen, 1978; Comella, 1999a; Kerr, 2007a; Kerr, 1988a). The emotional process is the method by which emotions were transmitted between individuals as members of a natural living system (Comella, 1999a). In its most elemental form, anxiety is the apprehensive response of an individual to a threat that is real or imagined (Kerr, 1988a). Chronic anxiety is the long term perception of a threat that may exist over an indeterminate amount of time (Comella, 1999a). Bowen Theory makes the argument that chronic anxiety limited the number and range of thoughtful responses and actions that were available to the individual or group (Comella, 1999b).

Emotional reactivity referred to the level of emotional intensity or anxiety that the individual exhibits (Bowen, 1978). A person with a high degree of emotional reactivity easily succumbs to the general emotionality of their environment. Someone with a lower degree of emotional reactivity is able to maintain a higher amount of thoughtfulness and rationality even when the group in general exhibited heightened emotion. When the unresolved emotional interaction between two or more individuals becomes heightened to a point where the state of one profoundly affects another, it is identified as a fusion, or a relationship, with an excessive amount of interconnectedness (Bowen, 1978).

Bowen classified the different levels of individual emotional reactivity as levels of differentiation, derived from the term differentiated cell in evolutionary biology (Bowen, 1978). A differentiated cell is one that provided a unique biological function from those in its immediate

environment (Bowen, 1978). Those individuals identified with low levels of differentiation are typically less flexible and adaptable to change, and more emotionally reactive with those within their immediate group (Bowen, 1978). Less differentiated people are easily stressed in social contexts to the point of dysfunction, and it is difficult for them to recover from highly emotional states. Those with higher levels of differentiation are less reactive and have a greater relative separation between emotional and intellectual functioning. This allows them to be more flexible, adaptable, and independent of the emotionality within their context (Bowen, 1978). Since they are more autonomous in their individual emotional stance, the differentiated individual is able to be more intimate within relationships because they do not sacrifice a sense of themselves to appease the needs of others (Hurst, 1996).

Fusion represents a low-level on the differentiation scale, where undifferentiated relationships are so enmeshed that the independent intellect of the participants is compromised by a higher degree of social emotionality and anxiety. Individuals in a fusion relationship are said to have overlapping emotional boundaries where an emotional effect on one person causes an immediate subsequent response in another, often unconsciously (Bowen, 1978; Kerr, 1988b). Fusion could proliferate within a group so that a number of relationships could be tightly bound emotionally, thus transmitting anxiety instantly within its network. In families with greater differentiation, these individual emotional boundaries are clearly defined. The individuals are not burdened with the collective anxiety of the group and can pursue greater amounts of independence in their thoughts and opinions (Bowen, 1978).

Another principle identified by Bowen was the concept of triangles. A triangle occurs when the anxiety and emotionality between a two-person relationship becomes so intense that it extends to incorporate a third party to stabilize the emotional tension. Emotional tension is

created when the individuals are no longer able to express their individual opinions and thoughts in a rational manner. Other individuals in the group may repeat this process to create a complex array of interlocking triangles of emotionality and anxiety. This occurs when the anxiety of a dyadic relationship increases to point that a third party is incorporated, or "triangled in" the relationship, to reduce the tension. Triangling is the processes of creating an emotional triangle where two people with intense emotional anxiety or fusion include a third party to ease emotional tension (Bowen, 1978; Comella, 1999a; Kerr, 1988b).

When a triangle is created the anxiety between the original two people relationship decreases, but increases the anxiety with the third person. Often the third party exhibits a higher level of anxiety and emotional reactivity as a result, but the tension within the original relationship remains unresolved. Bowen found that it was very common to have multiple interlocking triangles within the system that creates an emotionally complex, enmeshed, and fused structure that inhibits individual differentiation and functioning (Bowen, 1978).

If the tension within the systems became overly intense, the individual will engage in emotional cut-off, where they voluntarily distance themselves from the groups to escape the complex array of triangles and fusion relationships. While the degree of emotionality would subside over time, the source of the anxiety will remain. Although people who chose emotional cut-off as an anxiety-lowering tactic describe a higher sense of autonomy, they remain emotionally connected to the group (Bowen, 1978). Bowen indicated that cut-off relationships remained frozen since there was no progress with respect to defining the emotional boundaries within the social context. Bowen suggested that a person who runs away from the relationships of his family was as emotionally dependent as the one who never left home (Bowen, 1978).

Bowen concluded differentiated groups exhibited fewer number of triangles because the participants were able to address each other directly as individuals (Bowen, 1978). Bowen Theory discusses a number of common elements and concepts that pertain to human social systems. The differentiated individuals are able to state their opinions freely by speaking from the I-position more often. Taking the I-position meant that a participant can calmly state convictions and beliefs without repercussion as well as listen to the criticism of others without reacting emotionally (Bowen, 1978). They do not refer to the collective "we," but rather the singular "I," as an individual since they are generally engaged in fewer number of fusion relationships in a triangled structure (Skowron, 2003a).

For example, a differentiated person will utilize responsible I-position statements, such as "This is what I think or believe" and "This is what I will do or not do," without projecting one's own values or beliefs on others (Bowen, 1978; Kerr, 1988a; Titleman, 2014b). Responsible I-position statements assume the responsibility for one's own happiness and comfort rather than blaming or holding others accountable for that happiness (Bowen, 1978; Kerr, 1988a; Titleman, 2014b). This is opposed to the irresponsible I-position statements, which places demands on others such as "I want, or deserve, or this is my privilege." (Bowen, 1978; Kerr, 1988a; Titleman, 2014b). The scaffolding of differentiated relationships that includes individuals using the I-position provides a positive result for less differentiated relationships engaged in fusion or triangling (Norlin, 1999; Skowron, 2004b). Bowen indicated this resulted in greater overall function with greater synthesis rather than disharmony and dysfunction within the group (Bowen, 1978).

Differentiation is the varying level of resistance of the individual to the collective emotional anxiety of the group. Individuals with a higher degree of differentiation have a greater

amount of resistance to the prevailing emotional tone of the group, while those who are less differentiated were sensitive to the emotional context of the group. Differentiation also represents the ability to maintain more thoughtful and individual opinions rather than adopting the prevailing emotionally-driven consensus of the group context (Skowron, 1998).

From his clinical work, Bowen felt individuals had differing levels of emotional sensitivity or differentiation. As a result, he developed a qualitative assessment to compare these relative levels of individual differentiation he termed the Scale of Differentiation. Originally conceived by Murray Bowen (1978), the Scale of Differentiation uses a qualitative assessment measure indicating various levels of differentiation. The subjective-comparative measure created by Bowen used a scale of 0-100. Those at 0-10 exhibited little or no differentiation and are typically regarded as schizophrenics with little or no resistance to environmental anxiety (Bowen, 1978). Their perception of self and group is so low that their perception of reality becomes compromised. Other patients with a qualitative differentiation score of 10-25 show highly addictive tendencies toward drug and alcohol use (Bowen, 1978). Patients with a score of 25-35 develop a degree of privately held thoughts, but quickly conform to prevailing group differentiation level since they still have a poorly defined sense of self (Bowen, 1978). Individuals with a score of 35-40 create a pseudo-self that was largely constructed from the social interactions (Bowen, 1978). Those at 40-50 represent a majority of the population who demonstrate a budding ability to define themselves but present neurotic tendencies at low-levels of stress (Bowen, 1978). People with a score at 50-60 formulate individual thoughts easily but hesitate to express themselves when in a group (Bowen, 1978).

Those with a higher level of differentiation represent a much smaller population similar to innovators and early adopters in the general population. Individuals with a score over 60 have

a greater ability to indicate their individual choice and had less anxiety when expressing it, but can still succumb to significant pressure and stress (Bowen, 1978). Those over 70 are goal oriented individuals that maintain their perspectives in a variety of settings while preserving a calm demeanor without reacting to highly charged emotionality (Bowen, 1978). Bowen described people at a highly differentiated 85-95 level as extremely rare and perhaps only theoretically existed for the purpose of the scale (Bowen, 1978). They are able to respect the identity of others in virtually all cases and are able to define relational responsibilities without succumbing to emotional pull. They are realistic and tolerant of differences and do not engage in polarizing and charged debates. They can easily communicate and define individual opinions independently of the emotional climate (Bowen, 1978).

The value of this qualitative assessment of differentiation served to indicate that people have widely differing levels of differentiation. This also suggests that the susceptibility of each participant to group anxiety and pressures vary greatly, which may affect their ability to think and perform independently of the group. Those with a lower level of differentiation are much more likely to yield to the collective values toward innovation rather than maintain their individual opinions. Just as early adopters, group members with a higher level of differentiation are much more likely to resist the emotional pull of the group and retain their individual opinions regarding innovation.

Other Forms of Family Systems Theory

Salvador Minuchin (1987) developed Structural Family Therapy in the early 1970's a model that also examined the relationships between the family members and subsets. He constructed an intergenerational genogram that charted hierarchal power dynamics and

boundaries (Ferber, 1972; Minuchin, 1987). Minuchin believed that family structure underpins the patterns of interaction (Johnson, 1989). A family who became enmeshed or disengaged is a result of dysfunctional social rules that manifest themselves as symptomatically accepted behavior (Johnson, 1989; Minuchin, 1987). Like Bowen, Minuchin encouraged individuals to establish strong boundaries without sacrificing openness to interaction with others. He differed from Bowen Family Systems in that he believed the therapist should actively disrupt dysfunctional relationships rather than acting as an dispassionate observer (Ferber, 1972; Minuchin, 1987). Minuchin proposed that the therapist should assume a leadership role using techniques, such as intensity, enactment, unbalancing, complementarity, and reframing, to re-form these accepted rules. Using his interactive systems-based approach he examined the social causes and treatment of anorexia nervosa (Ferber, 1972; Johnson, 1989). He maintained that the therapist should feel more connected and spontaneous with the family even at the risk of introducing subjective bias. He felt that re-establishing leadership was essential in his work with families challenged by poverty, racism, and discrimination in urban settings (Ferber, 1972; Johnson, 1989).

Virginia Satir (Satir, 1987), a contemporary of Bowen, developed Experiential Family Therapy. As a therapist, she believed in more intimate and direct contact with the patients than the observational position described in Bowen Theory. She advocated the use of interaction and touch to promote family growth (Satir, 1987). Satir pioneered the practice of family sculpting, which involved physically placing the family in different positions to become more aware of their feelings and methods of communication (Satir, 1987). Assessing the communication within the family system was a central aspect to Satir's approach (Ferber, 1972). During therapy, Satir would attempt to imprint different methods of communication for the group (Ferber, 1972; Satir,

1987). Bowen and Satir both indicated the presence of the emotional communication triangle between the child and parents (Ferber, 1972). The identified patient is a representation of the dysfunctional relationship as the individual distorted self-growth to alleviate family pain (Wolman, 1983). She also classified non-verbal communication within the group as blaming, placating, super-reasonable, and irrelevant stances (Satir, 1987). Satir thought that each member of the group had a responsibility to manage their personal behavior that was focused on group values (Satir, 1987).

Nathan Ackerman (1958, 1966, 1970) was trained as a classical child psychoanalyst and applied the psychodynamic approach to family therapy, which attempted to blend psychotherapy with systems theory (Wolman, 1983). As had Bowen, Satir, and Minuchin, Ackerman proposed the concept of the family being a social and emotional unit as well as the child serving as the emotional scapegoat (Minuchin, 1987).

However, Ackerman also emphasized the role of intergenerational ties and interlocking pathologies in communication (Ackerman, 1966, 1970; Wolman, 1983). He felt that the family evolved though a number of developmental stages and examined the ways the social context affects family dynamics (Wolman, 1983) in his study of coal miners in the 1930's (Guerin, 1984). Similar to Satir, Ackerman concentrated on all forms of communication, including non-verbal gestures, that provided insight to contradictory subconscious messaging (Ferber, 1972). He was known for intentionally raising anxiety during intense family interviews to elicit any defensiveness or emotional responses as opposed to Bowen's more detached observational approach (Ferber, 1972; Guerin, 1984). Unlike Bowen, Ackerman focused on non-schizophrenic families who did not exhibit outward pathologies (Wolman, 1983).

A systems-based description of social group interaction was not an original concept. Gregory Bateson, a social anthropologist, described social systems within a discipline termed Cybernetics that was originally used by Plato to describe the governance of people (Bateson, 1972). Cybernetics is a multidisciplinary approach that applied general systems theory to mechanical, physical, biological, cognitive, and social systems (Bateson, 1972). In short, Cybernetics studies how networks or systems generate some change within the intrinsic or extrinsic context that, in turn, provide feedback to change the original system (Bateson, 1972). Homeostasis is defined within Cybernetics as the tendency of the system to self-regulate a variety of factors to remain stable and constant (Bateson, 1972). Just as a machine that depends on self-regulating feedback loop to keep the system running at a constant rate, or a state of homeostasis, social groups depend on feedback loops to maintain stability.

These feedback loops provide a signal to the system to run, amplify, or calm group activity (Bateson, 1972). A positive-feedback loop acts to increase or amplify system output activity to maintain homeostasis at the risk of increasing instability. Conversely a negative-feedback loop reduces or limits output activity to regulate homeostasis, but may create a more static condition that resists adaptation (Bateson, 1972). The use of feedback loops in Cybernetics has many applications in electronic control theory and computer science that directly applies the concept of homeostasis as the tendency to preserve current operating conditions. Although the concepts of homeostasis and feedback loops can be applied to social networks, Bowen Theory was based on natural rather than general systems theory (Bowen, 1978). Natural systems theory studies how social networks spontaneously adapt to their environment and attempted to avoid the limitations of observer bias by applying artificial control models to social systems (Bateson, 1972; Morgan, 2006).

Organizational Psychology and Bowen Theory

Maslow (1998) represents one of the few psychologists found frequently in the literature of both clinical and Industrial/Organizational Psychology. His exploration of self-actualization and peak performance moved beyond theoretical models and explored processes used by individuals in organizations (Maslow, 1998). His later work in humanistic management termed Eupsychian Psychology emphasized team decision-making, personal fulfillment, and organizational productivity, moved beyond individual self-actualization and examined self-actualization within the contextual work group (de Carbonel, 2007; Maslow, 1998). Through the effects and relationships of the group, Maslow felt the individual is able to self-actualize more readily and permanently. Similar to how Maslow moved from the domain of psychopathology to Industrial/Organizational applications, Bowen contemplated application to broader organizational groups. However he did not explore the relationships as fully and completely as Maslow (1998).

Although there is little empirical evidence in regard to the application of differentiation within Industrial/Organizational Psychology or technology readiness, differentiation has been utilized to examine job performance and satisfaction (de Carbonel, 2007; Skowron, 1998). A number of observational case studies applying Bowen Theory to groups and organizational groups were compiled in two references *The emotional side of organizations* (Comella, 1999c) and *Understanding organizations: Applications of Bowen family systems theory* (Sagar, 2007). Bowen Theory has been used as a qualitative clinical psychological technique to develop a systemic treatment for psychological pathologies, but very few empirical studies have been applied in the organizational setting. Most of the organizational literature using Bowen Theory consists of a number of qualitative case studies that described the role of differentiation of self,

reactivity, triangulation, and multigenerational transmission process (Comella, 1999a; Sagar, 2007).

Bowen Family Systems Theory has shown some promise when applied to work organizations because of its emphasis on human social systems (Comella, 1999b; Sagar, 2007). Organizational psychologists have found its systems approach useful when analyzing the functionality and nature of human groups and organizations (Miller, 2002). Bowen Theory has also been applied to other social groups outside of the family because of its emphasis on human-social communication systems. It has been used to understand how collective anxiety may influence various behaviors of the individual (Comella, 1999b; Papero, 1999; Sagar, 2007; Wiseman, 1999, 2007). Caution has been raised that any comparison between work and family groups might be limited since professional organizations do not present the same level of intensity and intimacy of family structures (Sagar, 2007). However modern work relationships may be taking on a more important role in modern life as they often provide more consistency, validation, and intimacy than family relationships (Hochschild, 2001).

Emotions and anxiety can also be transmitted between individuals throughout the broader organizational culture. Anxiety is the response of the organism to a threat, which may be perceived or real (Bowen, 1978). Bowen characterized anxiety as different from higher order emotions or feelings such as sadness, happiness, worry, or excitement (Bowen, 1978). He and his protégés felt anxiety is part of the very protoplasm of living creatures to insure survival and avoid threats. Several studies examined the effects of social anxiety in lower order animals such as insects, apes, and birds (Bowen, 1978; Ferrera, 1999; Kerr, 1999b; Papero, 1990). Although anxiety may act as an alarm to avoid eminent danger, it is different from excitement, which creates a positive experience (Bowen, 1978). Bowen felt anxiety is a primal energy associated

with the basic sense of threat and avoidance (Bowen, 1978). Chronic anxiety can be detrimental since it limits the range of thoughtful and creative responses to perceived threats by individuals and groups. In short "stress makes people stupid" (Goleman, 1995, p. 149) since it lowers the functioning of individuals and collective social systems to the lower levels of emotional and reactive thought (Kahneman, 2011).

When anxiety becomes overly intense between two people at work or in a family, the relationship will incorporate another coworker within the triangle to relieve the tension. Although the original triangle for individuals is formed within their nuclear family, the same response may be transferred to relationships at the workplace. Once a complex array of interlocking triangles is formed, emotional anxiety may be transmitted throughout the workplace instantly. Each individual may differ in his or her emotional response, described by the scale of differentiation. The individual may seek similar levels of differentiation in other professional relationships for comfort sharing issues to relieve anxiety, which is termed the "family projection process" (Bowen, 1978, p. 477). As a result of this collective anxiety some individuals or positions may exhibit pathological symptoms that may result in poor performance or especially high turnover (Bork, 2007; Cahill, 1999; Christensen, 2007; Comella, 1999b; Kerr, 2007b; Maloney-Schara, 1999; Meyer, 2007; Webb, 1999; Wiseman, 2007)

Comella (1999b) described how elements of Bowen Theory could be applied to work relationships which may be influenced by sibling birth order, hierarchal structure, and other factors developed within the individual's family of origin. Comella (1999b) indicated that just as in families, the anxiety within these work groups could become so great that participants may choose to cut-off from the organizational group and quit. Initially, there may be relief of anxiety to the system and individual, but ultimately the relationships remain frozen. The position may be

subject to continual turnover since the next employee will be subject to the same treatment. In addition, the individual may remain bound to a sense of unresolved conflict that may manifest itself in their next position. Comella (1999a) indicated that the relationship of the individual could be extrapolated to the greater societal emotional process of the organization, describing the variations of individual performance in groups. Hochschild (2001) asserted that with the breakdown of family support systems many current employees are projecting the image of family to co-workers and supervisors who become surrogate siblings and parents respectively.

Kerr (1999b) gave examples of chimpanzee groups that adopted innovations of food washing and relates them to the nature of families who adapt to change. He argued that our societal organizations and groups could be viewed as extensions of our original families. This influence of the family model on organizational structure has also been noted by organizational psychologists (Burke, 2011; Morgan, 2006; Schein, 2010). Kerr suggested that the health of the social group affects the ability of the individual to tolerate anxiety (Kerr, 1999a). This level of differentiation is necessary so the individual may act more independently within the group.

Bader (1999) discussed three organizational models from Taylor's Scientific Management (1913), Lewin's Action Research (1946), and Bowen Family Therapy (1978). He compared each principle in terms of theory, knowledge, model, posture of consultant, problem orientation, client focus, activities, and outcome. Bader (1999) indicated that Lewin's open and organic approach viewed the system in terms of internal and external factors while Family Systems Therapy took a more personal view of the internal relationships. Many organizational theories create abstract theoretical models that are applied to describe optimal ways of functioning. Through the use of relationship diagrams, Bowen Theory describes how the actual relationships within the group were formed as a result of internal and external challenges.

Skowron (1998) first developed and validated the Differentiation of Self Inventory (DSI) to measure individual emotional differentiation. Bowen resisted programmatic measurement of differentiation because he felt that the results could be misconstrued. The self-report instrument was designed for adults age 25 and older and tested four attributes: emotional reactivity, emotional cut-off, emotional fusion, and working from the I-position. This instrument was derived from Kerr and Bowen's (1988a) description of the Differentiation of Self Scale (DSS), which consisted of three factors: separation of thinking and feeling, emotional maturity, and emotional autonomy. However, these items reflected only interpersonal components of differentiation and ignored quality of the relationships with spouse or partner at home (Kerr, 1988a).

Wiseman (1999) provided three axioms regarding emotionality in groups where participants are functioning at an automatic rather than thoughtful level. She also suggested practices that increased the ability to manage the self with greater differentiation and thoughtfulness. Wiseman (1999) mentioned the paradox of the differentiated individual to remain connected to the group while still being able to maintain emotional independence. Wiseman (1999) went on to indicate that the continuous compromise of self and group consensus is made difficult by an anxious system's demand for affiliation and togetherness. This is represented by the influence of the Fordist culture that has forced greater specialization and dependence of the employee on the group rather than individualization of the craftsman (Mumby, 2013).

Fordism, named after Henry Ford who pioneered the modern assembly line, can be characterized by a highly bureaucratic and hierarchal organizational structure with a clear chain of rigidly defined roles and centralized decision-making (Mumby, 2013). Most individual jobs

are intentionally broken down into the most basic and elemental components for unskilled and semi-skilled workers (Mumby, 2013). Employees are only asked to provide the labor necessary for the job that is defined for them; no more and no less. The intent is to create an engineered culture that produces a large volume of standardized products with little variation in exchange for a relatively stable work environment (Mumby, 2013). In this culture the force of togetherness and conformance is quite high and deviation from the norm is viewed as potentially disruptive to the system (Mumby, 2013).

A Post-Fordist organization has a more flexible organizational structure with decentralized decision-making (Mumby, 2013). A Post-Fordist organization involves the use of work teams, outside subcontracting, and part time and temporary employees to take advantage of the talents of the workforce available (Mumby, 2013). This organization employs flexible production systems to allow for quick retooling and adaptation to changing market conditions (Mumby, 2013). As a result this approach has a greater application in limited production runs and specialized niche markets (Mumby, 2013). However the cost of this dynamic organizational structure is an increasingly unstable and insecure guarantee of employment (Mumby, 2013). This has had the effect of blurring the distinction between work and home life. Not only is the employee asked for a greater personal commitment to the organization, they are expected to contribute personal resources and home time to increase profitability and remain respected among peers (Mumby, 2013). Also organizations provide family services, medical facilities, and seminars to bring family life to work (Mumby, 2013).

This approach to engineering a work culture can have direct effects on the perception of stability to the individual, family, and communities. Comella (1999b) reflected on the effects of the emotional process and found anxiety to be especially heightened during times of

organizational re-engineering and reinvention during planned organizational change. Hochschild (2001) indicated that companies nurture this image of a work family in order to create a sense of affiliation by using personal incentives, rewards, and validations of effort. Often these clearly defined and tangible acknowledgements provide more positive feedback than what is available from the individual's family (Hochschild, 2001). As a result many employees begin to regard their social relationships as surrogate family members (Hochschild, 2001). This may create a large of amount of dissonance when there are organizational changes, surrogate family members are laid off, or given new assignments (Cavaiola, 2012; Hochschild, 2001; Mumby, 2013). As a result the modern employee may now view work relationships to be as intense and intimate as family relationships (Hochschild, 2001). Although the impetus for change at work may be positive, the disruptions and the emotionality it causes may limit the ability of the group to fully understand and participate thoughtfully. To receive approval and respect among the work family, the individual may work longer hours and devote more personal time and attention even at the expense of their families (Hochschild, 2001). Organizations are complicit in this portrayal of work-as-family to draw the individual more closely to the emotional consensus of the group for greater profitability (Hochschild, 2001; Mumby, 2013).

Other organizational psychologists have noted the negative effects of group pressure on the ability of the group to recognize environmental phenomena accurately and make thoughtful decisions (Burke, 2011; Morgan, 2006; Mumby, 2013; Schein, 2010; Senge, 2006). Comella (1999b) described the concept that managing anxiety presents challenges to each person in the organization, particularly to those in key functioning in leadership positions. The contagious nature of anxiety, through fusion-relationships and interlocking triangles, could be represented

by Burke's (2011) description of the ossification of communication channels in hierarchal leadership structures.

Papero (1999) described the relationship of individual and group anxiety as a variable that affects both individuals and organization as a whole. He compared the societal responses of neo-mammalian primate groups involving aggression, conflict, postural bluffing, and dominance displays as similar responses to anxiety in human groups. In a similar way, he indicated that groups can increase the capacity for anxiety and individual differentiation by eliminating hierarchal power roles and establishing better communication with various factions described by cultural islands (Schein, 2010). Cultural islands are constructed discussion contexts where occupational and authoritative rules may be suspended for direct communication about sensitive organizational issues such as trust, efficiency, discipline, and strategy (Schein, 2010). By suspending the anxiety that may normally surround status and position of employees, a clearer perspective may be conveyed across all cultural subgroups.

In her dissertation, de Carbonel (2007) attempted to demonstrate a correlation between the four subsets of the Differentiation of Self Inventory (DSI-R) (Skowron, 1998) and Job Satisfaction Survey (JSS) (Spector, 1985). The findings indicated that the only significant relationship existed between the DSI-R attribute of emotional reactivity and job satisfaction; the other possible correlations proved insignificant. Gender was found to have no significance in the variance for either the DSI-R or the JSS scores. Emotional reactivity, as the ability to control one's emotions, seems to be most significant in job satisfaction. However, emotional reactivity is dependent on differentiation, which showed no significance to JSS.

Cavaiola (2012) further examined the relationship of differentiation of self in the workplace to work stress and satisfaction. He indicated that women and older workers reported

greater overall job satisfaction. He also reported that workers tended to project family conflicts into work, which affected work relationships. He developed Workplace Differentiation Inventory (WDI) from the DSI-R (Skowron, 1998) to be specifically used as an instrument to be applied to workplace relationships. The Workplace Differentiation Inventory was developed to assess an individual's level of differentiation from work. The WDI was intended to be a better predictor of interpersonal work stress and job satisfaction (Cavaiola, 2012).

Emotional Intelligence and Bowen Theory

Emotional Intelligence (EI) is a theory proposed by organizational and social psychologists who suggest the ability to perceive, understand, and manage the emotions of one's self and others can help guide thinking and behavior (Salovey, 2005). The three main models of EI are the ability model, trait model, and mixed model. The ability model, developed by Salovey (2005), examined the ability of the individual to process emotional information in the social environment. The trait model described by Petrides (2001) compared the self-perceived abilities and behavioral dispositions with respect to individual emotional management. The mixed model, popularized by Goleman (1995, 2000), integrated a variety of abilities and traits as contributors to an individual's overall Emotional Intelligence makeup.

Emotional Intelligence deals with the ability to monitor, discriminate, and manage one's own emotional state as well as those of others (Goleman, 1995). Proponents of Emotional Intelligence thought that this emotional information could help guide thinking and behavior especially in social settings. Goleman's model of Emotional Intelligence is comprised of the four abilities of perceiving, understanding, using, and managing emotions. Perceiving emotion involves the ability to detect and differentiate emotions in multiple forms of verbal and visual

conscious and unconscious communication. Understanding emotion is the ability to delineate between the variations of emotions and the underlying messages they convey. Using emotion refers to the ability to modulate and utilize the advantages of various emotions to the appropriate task. Managing emotion pertains to the ability to self-regulate and direct the emotions of others to achieve the intended goals of the individual and/or the group (Salovey, 2005).

Psychologists have used Bowen Theory and Emotional Intelligence to describe how multiple forms of social communication can instantly trigger lower-order mammalian fight or flight brain activity from the more thoughtful neo-cortex to the more reactive limbic system and amygdala of the brain (Goleman, 1995; Kerr, 1999b). Both theories suggest that anxiety may be directly triggered from experience in the formation of social contact, such as within the family or early friendships. Both theories also explore how emotion can be triggered and transferred in social primate contexts (Goleman, 1995; Kerr, 1999b).

In Bowen Theory this instantaneous response to emotion is referred to as reactivity, and the resistance to the effect of social anxiety is defined as differentiation. Bowen Theory identifies this resistance to contextual emotion as a trait, positing that an individual can only minimally change their position on the scale of differentiation (Bowen, 1978). However, Emotional Intelligence indicates that resistance to emotional mood is an ability that can be developed. Although there are a number of similarities, only a few references refer to both Bowen Theory and Emotional Intelligence (McGoldrick, 2001). This could be related to inherent differences among the researchers in EI and Bowen Theory. A majority of Bowen Theory experts are comprised of medical psychologists and practitioners who use the theory as a therapeutic model in the clinical context. EI has found a greater audience within Industrial/Organizational

Psychology community where individual and group optimization is the goal rather than pathologic treatment.

Bowen Theory and Emotional Intelligence provide techniques to examine the emotional state of others, but differ as to the role of the emotional practitioner. Emotional Intelligence emphasizes the use of empathy, or the ability to perceive the subjective experience of another person (Goleman, 1995). Bowen Theory suggests that emotion can be used and managed to convey a greater dimension of communication. Experts within Bowen Theory differ and emphasize the need of the consultant and participant to act as a dispassionate observer of the contextual emotion of the group (Comella, 1999b; Fox, 1999; Papero, 1999; Wiseman, 1999, 2007). The emotionally aware individual or consultant must strictly monitor their own contribution to the group's systemic anxiety to avoid inadvertent or iatrogenic effects (Bader, 1999; Ball, 1999; Fox, 1999; Olson, 1999; Wiseman, 1999). In his research, Bowen (1978) attempted to provide greater detail in its examination of the root causes of anxiety and searches for clues in the family of origin, sibling position, or other relationships in the social system that are unrelated to the individual. This is done through a number of relationship diagrams and historical genograms used to trace present social linkages and patterns of behavior in the past.

Both theories examine the use of emotion to convey the appropriate level of concern to the contextual situation, but differ with respect to the nature of the response. Emotional Intelligence suggests that emotional messages can be used to convey a greater contextual awareness. Bowen Theory is much more cautious to avoid any emotional triggers. Rather than actively utilizing emotion to convey the appropriate message, Bowen Theory suggests various techniques to lower systemic emotional anxiety of the group. It specifically looks for causes of emotion and anxiety that may lie outside the immediate relationship or person exhibiting anxiety

(Bowen, 1978; Kerr, 1988b). In effect, EI views the recognition and use of emotional processes as a tool for understanding and adjusting group functionality, whereas Bowen Theory interprets emotionality as a possible source for anxiety that inhibits rationality and function.

Bowen Theory emphasizes an objective third-person understanding of the social anxiety, while Emotional Intelligence attempts to actively engage emotional practice (Bowen, 1978; Kerr, 1988a; Salovey, 2005). Differentiation in Emotional Intelligence is the ability to distinguish between the subtle differences in emotion and derive the appropriate response (Goleman, 1995). Bowen Theory suggests that too much emotionality within the system is detrimental and should be calmed to make the system more thoughtful and resilient to the sources of anxiety (Bowen, 1978; Kerr, 1988a; Papero, 1999). It warns that emotional messages, even from the therapist, might affect the relationships with others in the group context (Bader, 1999; Ball, 1999; Fox, 1999; Wiseman, 1999). This is not to infer that all groups should be harmonious, but rather differences of opinion can exist and be expressed in a non-emotional and thoughtful way (Papero, 1999).

Many of the same traits of emotional control found in Bowen Theory seem to describe innovators and early adopters in diffusion of innovation rather than the emotionality of EI (Bowen, 1978; Kerr, 1988a; Rogers, 2003). While both EI and Bowen Theory suggest a high degree of emotional introspection, identification, delayed gratification, and self-examination, Bowen Theory has historically placed a higher emphasis on regulation and emotional control (Bowen, 1978). The principles outlined in Bowen Theory utilize metaphors of boundaries and barriers to the undifferentiated ego mass to maintain a greater sense of individual self (Bowen, 1978). Bowen Theory encouraged the individual to seek those people who present the greatest emotional challenges within families of origin to practice this preservation of boundaries and self.

However this must be a consistent, intentional, and long-term practice since most people unconsciously tend to naturally gravitate toward the properties of their position within the social system (Bowen, 1978; Kerr, 1988a; Titleman, 2014b). Bowen Theory seemed to be critical of the use of emotionality to convey messages that Emotional Intelligence employs. Emotional Intelligence emphasizes a greater degree of empathy to increase the emotional awareness of the group.

Bowen Family Systems Theory was derived from the individual treatment for mental pathologies, but evolved to examine the systemic effect of the sociological system on the individual. Paradoxically, Emotional Intelligence developed from the inherently systemic perspectives of Organizational/Industrial Psychology, but ultimately focused on the perspective of the individual on the system. This evolution seems to have affected the development of the instruments used to measure effects within each theory (Bowen, 1978; Goleman, 1995; Kerr, 1988a).

Bowen Theory utilizes a more quantifiable measure of a behavior than a subjective trait. Bowen initially resisted a quantitative measure of differentiation because he felt that differentiation was vulnerable to misinterpretation when applied by untrained individuals toward themselves and to others (Sagar, 2007). Subsequently, a number of individuals have attempted to refine the measurement of differentiation of self. Within Emotional Intelligence, differentiation is defined as the ability to identify the spectrum of emotions as well as the intensity that is appropriate for the context. However, the main area of measurement has been the effect of emotionality on Intelligence Quotient (IQ) scores. This has been somewhat conjectural since it is difficult to make a definitive correlation due to a variety of environmental factors (Locke, 2005). Critics of Emotional Intelligence have suggested that guiding one's own thinking and actions do

not depict a form of intelligence, but rather a form of introspection. While regulation of emotion seems to have benefitted communication within organizations, the use of emotional practices do not seem to be correlated to increased performance or intelligence measures (Locke, 2005).

Measurement of Differentiation of Self

Bowen resisted quantitative measure of differentiation, since he felt it took many hours of observational study and evaluation to assess properly. However, he did employ a simple qualitative measure of differentiation called the Scale of Differentiation to place some subjective value on the various individuals in the social system.

Many subsequent theorists have concentrated on the development and application of instruments to assess differentiation. Kear (1978), with the Differentiation of Self Scale, considered three factors: separation of thinking and feeling, emotional maturity, and emotional autonomy. Although theorists have attempted to create a measure that quantifies differentiation, the overall complexity of the construct has made this a difficult task. McCollum (1986, 1991) described emotional cut-off and attempted to measure the degree to which respondents manage their emotional attachment to each parent, but ignored cut-off with other relationships. Hovestadt (1985), with the Family of Origin Scale, and Bray (1984), with the Personal Authority in the Family System Questionnaire, used retrospective perceptions of the family of origin, but ignored the importance of current relationships. None of these early instruments attempted to find cross-correlation between the components of differentiation or evaluated the intrapsychic aspects of the individual.

Skowron (1998) developed and validated the 43-question, six-point Likert scale Differentiation of Self Index (DSI) based on three independent validation studies. The initial

instrument was based on definitions, descriptions, and examples from Bowen (1978) and his colleagues (Kerr, 1988a; Nichols, 1984, 1998; Papero, 1990). A list of 96 items was derived that represented differentiation of self, based on the ability to discern between thinking and feeling as well as the capacity to balance intimacy and autonomy within group relationships (Skowron, 1998). The first study was to compare the initial form of the DSI to the established State Trait Anxiety Inventory (STAI-T). Surveys with both instruments were sent to 313 participants who completed the original 96-item DSI as well as the 20-item STAI-T specifically addressing specific traits (Skowron, 1998). Four factors were identified using Eigen values derived from factor analysis as emotional reactivity, taking the I-position, reactive distancing, and fusion with parents. Internal consistencies were high and internal correlations were low to moderate (Skowron, 1998). Using the four factors and factor analysis of the DSI composite score the DSI was modified and condensed (Skowron, 1998). However, additional comparative validation was needed for the instrument with two additional studies comparing DSI with other social acceptance instruments.

The second study by Skowron (1998) in the development of the DSI evaluated the newly developed measure with the Social Desirability Scale (SDS). This study consisted of 169 participants who took a 78-item revised DSI that evaluated the correlation of each question with respect to the four main subscales of emotional reactivity, I-position, emotional cut-off, and fusion with others. This instrument was correlated with the Social Desirability Scale (SDS), a 33-item, true-false self-report measure (Crowne, 1964). Subscale to full scale correlations were moderate to high, with intercorrelations among the subscales low to moderate. Also, correlations between the DSI and SDS were negligible to moderate. Internal consistency of the DSI remained high to very high. Based on these findings, the DSI was further reduced to 43-items.

The third study to validate the revised DSI (Skowron, 1998) was intended to further evaluate the revised DSI based on the relationship between differentiation of self, psychological symptoms of anxiety, and marital satisfaction. A total of 127 participants took the DSI, the Hopkins Symptom Checklist (HSCL) with the General Severity Index (GSI) as assessment of general psychological symptomology (Derogatis, 1974, 1975), and the Dyadic Adjustment Scale (DAS) for the 91 married participants (Spanier, 1976). Correlations among the four traits were negligible to moderate. Gender was shown to be significant with women reporting relatively more emotional reactivity than men (Skowron, 1998). Although younger people reported greater difficulties with fusion, the examination of specific educational level, marital status, and parental status did not produce any other correlations. Examination of the t-tests showed emotional reactivity and emotional cut-off made significant and unique contributions of the four main traits.

A 15-year review by Miller (2004) examined a number of studies for empirical validity of the underlying concepts of Bowen Theory. The review showed statistical support for the relationship between low differentiation and chronic anxiety, marital satisfaction, and psychological distress (Miller, 2004). These relationships were statistically significant and consistent across various statistical measures and correlations (Miller, 2004). However other assumptions regarding equal differentiation among married couples, effects of sibling order, and triangulation were not supported (Miller, 2004; Skowron, 2014). The review indicated that more research and support is needed as to the effect of family system anxiety on children, multigenerational transmission, cross-cultural, and gender differences (Miller, 2004; Skowron, 2014). Additional criticism as to validation of the clinical effectiveness of Bowen theory as well as multivariate statistical methods was also suggested (Miller, 2004).

The Workplace Differentiation Inventory (WDI) (Cavaiola, 2012) was developed for the work environment, since it differs from the nature of family relationships. Cavaiola's (2012) study confirmed that individuals who are highly differentiated experience less job-related interpersonal stress compared to those who are less differentiated. It also supported some gender differences with females, indicating lower levels of differentiation and higher levels of Emotional Reactivity and Fusion, which lends support to earlier findings by Skowron (1998).

The DSI application was used as the basis for the development of the WDI showed a Cronbach's alpha of $\alpha = .816$ overall, and internally $\alpha = .86$ for emotional reactivity, $\alpha = .84$ for emotional cut-off, and $\alpha = .84$ for fusion (Cavaiola, 2012). Speaking from the I-position was not included within the original study hypothesis because it was not regarded as relevant as the other three subscales from the DSI. The distribution of the subjects' employment, who were all over 18 years old and were from the following segments (Cavaiola, 2012):

- 16% (91) from healthcare
- 11% (60) from private corporations
- 8% (44) from small private business
- 8% (47) from privately owned business
- 7% (41) from teaching/education
- 6% (33) from finance
- 5% (29) who were self-employed
- 5% (29) government employees,
- 4% (21) college employees,
- 2% (12) municipal employees
- 1% (7) legal professionals

- 26% (151) classified from other professions

A positive correlation was observed with each corresponding subscale of the WDI with the DSI. Correlated individuals who score higher on the reactivity, cut-off, and fusion of the WDI would also score higher on the reactivity, cut-off, and fusion of the DSI (Cavaiola, 2012). A statistically significant positive correlation was found for all subscales at $p = .53$ for emotional reactivity, $p = .33$ for emotional cut-off, and $p = .20$ for fusion. The WDI was thought to be a more robust predictor of workplace differentiation than the DSI when compared to job satisfaction and interpersonal stress (Cavaiola, 2012). A statistically significant relationship was found with the WDI as a predictor of job satisfaction while the DSI was not (Cavaiola, 2012). A statistically significant negative correlation was found between workplace differentiation, but a weaker negative correlation was found with self-differentiation and job satisfaction (Cavaiola, 2012). Using a multiple regression analysis, a statistically significant relationship was found between job satisfaction and the subscale correlations of the WDI of emotional cut-off, emotional reactivity, and fusion using a multiple regression analysis (Cavaiola, 2012). Of the attributes only emotional cut-off was found to be a statistically significant predictor of job satisfaction and emotional reactivity and was negatively correlated with job satisfaction (Cavaiola, 2012).

Additionally, the WDI and DSI were compared with respect to interpersonal stress and a statistically significant difference was found with the DSI and WDI, which indicated that individuals who are highly differentiated experienced less coworker or supervisor conflict (Cavaiola, 2012). A MANOVA test was conducted to compare DSI subscales of emotional reactivity, emotional cut-off, and fusion with individuals who reported coworker or supervisor conflict and those who did not (Cavaiola, 2012). A statistically significant relationship was found

with emotional cut-off and coworker or supervisor conflict, but no statistically significant difference was found for emotional reactivity and fusion (Cavaiola, 2012). The MANOVA test with the WDI subscales of emotional reactivity, emotional cut-off, and fusion also showed a statistical significant difference in emotional reactivity (Cavaiola, 2012)

Diffusion of Innovation and Emotional Differentiation

In Rogers' (1962) seminal work, *Diffusion of Innovations,* he described adoption as a process of the social communication. He defined diffusion as a form of social change that redefines the structure and function of the social group (Rogers, 1962, 2003). Since the adoption of innovation is thought of as a social event, one conclusion may be that the condition or quality of the social structure might have some effect on the readiness of the group to adopt emerging technology. If diffusion is a process by which the innovation is communicated by members of a social system (Rogers, 1962, 2003), it may be reasoned that the nature and conditions of the communication channels may have an even greater effect on adoption capacity and rate of acceptance. Although differentiation, defined by Bowen Theory, is not a direct measurement of organizational performance, it could be used to indicate the group's social health and anxiety tolerance.

The collective differentiation of the group may also serve to indicate the capacity of the group to tolerate individual and innovative thinking. Groups with a collectively high level of differentiation may tolerate independent and innovative thinking since there is a lower level of emotional response toward individual autonomy. Groups with a lower degree of collective differentiation may not tolerate more independent and innovative thinking since it has the potential to challenge group cultural values (Schein, 2010).

Rogers (2003) indicated that social structure is created with a patterned arrangement that provides a construct and stability to human behavior. However, he also indicated that system effects influence the structure and/or composition of a system on the behavior of the members of the system. Plous (1993) suggested that there are a variety of social influences that have direct effects on the individual such as conformity, groupthink, group bias, and social loafing. Even when choices to adopt or reject an innovation are made by an individual independent of the group, the individual's decision may be a reflection of the norms of the system and interpersonal networks rather than individual choices.

The group can paradoxically function to provide the individual with scaffolding and support while inhibiting individual thought. This contradictory phenomena, described as double-bind theory (Bateson, 1956; Visser, 2003) causes irresolvable communication issues within families and work groups (Gibney, 2006; Haley, 1963). The double-bind theory asserts that an individual or group can create a communication structure in which messages seem to contradict one another resulting in confusion with other group members. In Family Systems Therapy this can be a serious condition, especially among emotional groups, that may result in a prevalence of schizophrenia (Gibney, 2006; Haley, 1963). An organizational example may be a mission statement that expresses team involvement, but only acts on directives from top management. Innovation and creativity can be said to an espoused value, but in reality, culture may value conformity and consensus. This alignment or misalignment of the espoused values and cultural values has been considered by organizational psychologists as critical in their assessment of organizational health and performance (Schein, 2010).

Description of Innovation Adoption

Rogers (2003) specified that social groups influence the individual's decision to adopt during the persuasion and decision stage. Since all innovations present inherent risk and uncertainty, an individual may seek greater social scaffolding to support their innovation decision (Rogers, 2003). As an individual considers the adoption decision, they seek confirmation from the aggregate group opinion to reduce the overall uncertainty about an innovation's possible consequences (Rogers, 2003). Each individual has a differing amount of anxiety and uncertainty regarding innovation in general. If the social reinforcement and scaffolding are not present due to a dysfunctional group, it may be reasonable to assume that innovation brought by the individual to the group may not be accepted.

Adoption Group Characteristics

Rogers (2003) indicated that within diffusion there are a number of adopter categories who are engaged at different times as the innovation is considered. As the first group in the diffusion process, innovators were seen as having wider social networks whose members provide confidence and help them cope with a higher degree of uncertainty about an innovation. Their group dynamics were free of the anxiety found in subsequent adoption groups. Innovators could be considered as rash, daring, and even risky in their approach, but were able to handle the increased anxiety of adoption because they were less inhibited by individual and social anxiety found in other groups. Bowen Theory indicates that those with a high level of differentiation in the 85-90 range constitute a very small number of the population (Bowen, 1978), which corresponds to the estimated 2.5% of innovators (Rogers, 2003).

Early adopters were more readily integrated into their local social system than innovators and made judicious innovation decisions through an initial trial before recommending them to others (Rogers, 2003). Early majority groups were deliberate in their readiness for adoption since their acceptance of risk was lower than that of innovators. In the larger social system, they provide interconnectedness with the other groups who adopt the innovation later in the diffusion process. The estimated population of early adopters at 13.5% (Rogers, 2003) is larger than the innovator group, but still a minority among the group, which again is similar to Bowen's estimation of minority groups in the 50-75 range of the differentiation scale.

The late majority adopters are skeptical and cautious, but constitute the larger population of adopters. Their overall dissonance with emerging innovation mitigates their need to change. Rogers indicated that competition and extrinsic pressure of peers is often responsible to motivate adoption among these more apprehensive groups. By nature, this represents a less differentiated group since they rely almost exclusively on the opinions of others. Finally, laggards are the last group to adopt technology and exhibit the lowest amount of readiness. They rely almost exclusively on their local relationships and are inherently suspicions of innovation and change agents.

Differentiated people shared many of the same traits as early adopters of technology, which are independent of age or education. Early adopters of technology typically have greater empathy, are less dogmatic, possess the ability to deal with abstractions, and have greater intelligence and rationality than later adopter groups. They have higher personal aspirations, can cope with a greater amount of uncertainty, and have a more favorable attitude toward change. Early adopter groups showed greater local and cross regional social interconnectedness and did

not often exhibit cut-off. Many of these same traits were also found with emotionally differentiated individuals (Bowen, 1978).

Social Communication in the Diffusion Process

Rogers (2003) acknowledged the importance of social communication and indicated that the nature of networks must be understood to evaluate the diffusion process. In communication network analysis, the patterns and flow of communication structure and differentiated elements were described and evaluated (Rogers, 2003). This is very similar to the practice of diagramming the interpersonal relationships in Bowen Theory. Rogers considered the quality of the communication between individuals with the term "communication proximity," or the degree to which two individuals in a network have personal communication networks that overlap (Rogers, 2003, p. 314). This would seem to be akin to the concept of establishment of emotional boundaries to formulate individual opinions found in Bowen Theory (Bowen, 1978; Kerr, 1988a). Rogers (2003) suggested that interlocking personal networks, consisting of a set of individuals, should be open so there is a greater exchange of information with the environment. Bowen indicated that a system enmeshed in interlocking triangles and fusion is less adaptable to the environment around them (Bowen, 1978). Rogers specified that a less anxious social relationship allowed a greater amount of information flow within the group. He suggested that social learning and modeling occurred so the interpersonal communication could help drive the diffusion process.

If early adopters as change agents are more emotionally differentiated and rationally guided, they may act to facilitate change acceptance and readiness of the group. According to Rogers (2003), early adopters utilized a greater number of social linkages, empathy, non-

judgment, thoughtfulness, and analysis to stabilize the adoption effort and prevent reactive discontinuance. For diffusion to continue beyond the innovators and early adopters to the greater majority, it is important that the change agents are seen as trustworthy and credible to the other adoption groups. This is done by maintaining connections among the groups even as the anxiety of the group increased (Rogers, 2003).

Damanpour (2006) investigated the multidimensional nature of adoption of innovation in organizations and the influence of the various factors within each stage of adoption. The context of organizations was seen to influence to adoption of technologies, which were distilled to three main phases of adoption: initiation, adoption, and implementation. The hypotheses were linked to the positive effects of urbanization, negative effect of unemployment, and negative effect of complexity in the environment. Overall, the results confirmed expectations that characteristics of the external environment, organization, and top managers accounted for unique variation in the initiation, adoptions decision, and implementation of an innovation.

Two Types of Cognitive Thinking Influenced by Emotion

In his book, *Thinking Fast and Slow*, Kahneman (2011) outlined the interplay between two modes of thought that each individual utilizes. The fast, impulsive, and emotionally-guided thinking that provides a majority of our immediate thoughts was classified as "System 1 Thinking" (Kahneman, 2011, p. 25). The contemplative, more rational, but slower cognitive process that is utilized more sparingly was classified as "System 2 Thinking" (Kahneman, 2011, p. 25). Kahneman explained how many of our thoughts are guided by the automatic and continuously active System 1 Thinking, and System 2 is only employed when additional monitoring or correction is needed:

> The division of labor between System 1 and System 2 is highly efficient: it minimizes effort and optimizes performance. The arrangement works well most of the time because System 1 is generally very good at what it does: its models of familiar situations are accurate, its short-term predications usually accurate as well, and its initial reactions to challenges are swift and generally appropriate. System 1 has biases, however, systematic errors that it is prone to make in specified circumstances. (Kahneman, 2011, p. 25)

Anxiety and emotionality are attributes that bring additional pressure to this cognitive arrangement, especially to System 1 Thinking. When undergoing cognitive strain, a person is less likely to be open to new ideas. Kahneman (2011) indicated that when a subject is anxious they may be more vigilant and suspicious, but be less comfortable, intuitive, and creative. However, a person who is less anxious begins to loosen the control of System 2 to become more intuitive and creative, but perhaps less vigilant and prone to logical errors. In general individuals who are more anxious and sensitive to the emotional context around them (Harrison, 2014), are more susceptible to the emotionally impulsive and biased System 1 thinking.

The affect heuristic is a method by which people make judgments and decisions by consulting their emotions surrounding liking, hating, or feeling (Kahneman, 2011). In a study by Slovic (2002), individuals were surveyed about various technologies, including water fluoridations, chemical plants, food preservatives, and cars. The findings indicated a high negative correlation between the level of benefit and the level of risk (Kahneman, 2011). When the respondents expressed favorable attitudes toward a technology, they inflated the benefits and lowered the risks. However, when they disliked a technology they could only think of disadvantages and had few advantages listed.

In certain instances, such as witnessing death and destruction, emotions create increased vividness, or mental images that dramatically increase the degree of anxiety and distress. This is reinforced by media attention and frequent conversations where values can become overly

weighted to affect overall decision-making. People who are particularly vivid and emotional in their decision-making, undergo increased cognitive strain that contributes to overweighting risk when compared to others who have greater cognitive ease (Kahneman, 2011).

Emotions can serve to engage greater activity of the group or individual, but may inhibit greater contemplation and rationality. Kahneman (2011) indicated that emotional reactivity may be rapid, but is often biased and incorrect with its assumptions. However, greater skill with System 1 thinking can develop with greater time and training. Kahneman (2011) advocated the thoughtful application of heuristics and statistical algorithms that support human thought by detecting weakly valid cues and provide greater accuracy. Bowen Theory also provided a variety of heuristics to maintain boundaries of self, speaking from the I-position, active listening, evaluation of behavior and language, and acting as an observer in emotional situations (Bowen, 1978). Statistical algorithms are not subject to emotion and bias of System 1 Thinking, but they may not be readily available in the immediate social situation (Kahneman, 2011). The use of an algorithm can help to guard against the tendency to create a perception that is formed from a previous experience or association that may be unrelated. Anxious and emotional System 1 thinking may rapidly develop relationships of dependence (correlation), or result (causation) that simply do not exist (Kahneman, 2011).

Bowen (1978) also refers to similar dyadic structure, which he termed the pseudo-self and the solid-self, which seem similar to System 1 and System 2 respectively (Bowen, 1978; Titleman, 2014a). The pseudo-self, like System 1, is the dominant, but emotionally constructed self that is altered and changed by the emotional pressure of the group (Bowen, 1978; Titleman, 2014a). The pseudo-self is constantly responding, overreaching, and reacting impulsively to the anxiety and demands of the group (Bowen, 1978; Titleman, 2014a). It is associated with much

lower levels of individual differentiation and often yields to the prevailing emotional tone and biases of the social group (Bowen, 1978; Titleman, 2014a). A person who is influenced by the pseudo-self is often unaware of the discrepancies between his or her individual beliefs and those of others in the social system (Bowen, 1978; Titleman, 2014a).

The solid-self, like System 2, is much more differentiated and made up of defined individual beliefs, convictions, and principles. It is stable, but adaptable to pressures of anxiety within the social group (Bowen, 1978; Titleman, 2014a). A person who embodies the sold-self can calmly stand against the pull of togetherness that may pressure the individual to take on the beliefs, values, or behaviors that run counter to the individual's (Bowen, 1978; Titleman, 2014a). Since the solid-self is very consistent and constant, modifications can only occur through continual and deliberate discipline to mitigate the effects of the pseudo-self (Bowen, 1978; Titleman, 2014a). More differentiated individuals tend to employ their solid-self more commonly than those who are less differentiated and influenced by the anxiety of the social group (Bowen, 1978; Titleman, 2014a).

Systems Based Group Processes

The systems view of groups found in Family Systems therapy has had a parallel in the qualitative organizational analysis of Lewin (1946), Argyris (1974, 1978), Schön (1971, 1983), and Senge (2006). Lewin (1946), a social psychologist, suggested that there were dialectical external forces of resistance with respect to system optimization and transformation. He felt that these opposing forces acted to hold the system in a state of dynamic equilibrium (Lewin, 1946, 1951; Morgan, 2006). Lewin suggested that any transformational change process should include

"unfreezing" the established equilibrium then "refreezing" the new equilibrium state (Lewin, 1951; Morgan, 2006).

Argyris (1974, 1978) and Schön (1971, 1983), organizational psychologists from Harvard and MIT respectively, applied principles of feedback loops from Cybernetics to characterize frameworks of systems based learning as single and double-loops. They proposed that single-loops acted to detect and correct system errors compared to established operating norms, whereas double-loops examined if the operating norms were appropriate (Argyris, 1974, 1978; Schön, 1983). They also showed that when members of the group feel threatened during dynamic change they engaged in defensive routines to protect themselves and colleagues (Argyris, 1974, 1978; Morgan, 2006; Schön, 1983). Argyris and Schön felt that this collective resistance to innovation was systemic and universal among a variety of social settings and cultures (Argyris, 1974, 1978; Morgan, 2006; Schön, 1983).

Based on this earlier work, Senge (2006) further described businesses and other human organizations as groups who are linked by invisible structures matrices of interrelated actions, which may take a number of years to recognize. Senge (2003) referred to structural conflict, which is the tension created by the opposite forces within a system that simultaneously pull the group toward a goal or innovation but also anchor it to previous beliefs. This internal structural conflict could be another term for the undifferentiated ego mass in Bowen Theory that explained how systemic forces within the group might keep it from adapting. This implies the internal push and pull of togetherness versus individualism within an organization creating intrinsic dissonance with the group member. Applying general systems theory to social interaction within Cybernetics, Bateson (1972) refers to the pull to maintain the equilibrium of the group as homeostasis. He also describes positive feedback loops as those actions that amplify system

output to maintain equilibrium, while negative feedback loops act to dampen system activity to maintain balance (Bateson, 1972).

While the context may have the potential to be a resource for the individual, the group can serve to inhibit the risk-taking of the adopter when considering adoption of innovations. The group can help to balance and stabilize the action of the individual or possibly inhibit growth (Mumby, 2013; Plous, 1993). A healthy group finds balance and equilibrium with respect to resources and output. However, it may be the intrinsic nature of the systematic, individual-to-group relationship that can become fragmented in time (Kerr, 1988a). When this occurs, accurate information is not communicated easily from individuals to the group to develop the proper response.

Senge (2006) briefly touched on the concept of emotional tension that erodes personal goals, as the individual gradually compromises his/her personal objectives to maintain the consensus and the shared mission of the group. He referred to the role of emotionality as the dynamics of emotional tension that existed at all levels of human activity, which contributed to conformity and poor organizational performance. In Senge's (2006) model, each individual can take a number of stances toward technology from commitment, enrollment, genuine compliance, formal compliance, grudging compliance, noncompliance, and apathy. However, very little was discussed as to how individual behavior was influenced by the collective anxiety and attitudes within the group. A participant may be viewed as non-compliant, but this may be due to the systemic emotion anxiety, triangling, and fusion within the group.

Differentiation was implied when Senge (2006) referred to the importance of reflection, deep aspiration, inquiry, patience, and leadership, which are required during any change effort. People with a lower degree of emotional reactivity are freer to face new challenges individually

if they are not enmeshed in the reactivity of the group. In larger and dynamic systems, it is paramount that group communication remains strong with each participant so the group can stay connected to the stakeholders. Emotional cut-off from the group becomes detrimental to the performance of both the individual and larger social system.

However, there are differences between the systems approaches of Natural Systems Theory, Family Systems Theory and General Systems Theory. Family Systems Theory brands itself as a natural systems theory since it is based on human families and organizations that are naturally occurring rather than General Systems Theory (GST) (Kerr, 1988a). Bowen Theory assumed that human social systems formed naturally without artificial intervention. Bowen originally suggested that the family systems formed and operated in a way that was derived from the context or social environment rather than design. General Systems Theory evolved from the assumption that mathematical models derived from the physical sciences could be applied to behavioral and social sciences. It emphasized the common characteristics, interrelatedness, and interdependence of things and social groups, but applied artificial models from the physical sciences rather than study structures who autopoietically constructed themselves to fit their context (Burke, 2011; Mumby, 2013). The term autopoiesis, or self-making, refers to a biological, mechanical, or social system that is capable of reproducing and maintaining itself (Burke, 2011). In this case it refers to a social system that has self-adapted to the environmental conditions, albeit flawed, to maintain the greatest amount of homeostasis (Burke, 2011).

Technology Readiness

Technology readiness was defined as the mental readiness to accept emerging technologies (Liljander, 2006). It evolved from the original theories of the Diffusion of

Innovation described by Rogers (2003) with the innovation decision process. It consists of four main dimensions regarding technology: innovativeness, optimism, discomfort, and insecurity (Liljander, 2006). Measuring the technology readiness of a group helped to assess the attitude, probability of adoption, and response of the users toward the technology.

Technology readiness refers to the individual's receptiveness and tendency to use a emerging technology (Liljander, 2006). The technology readiness index (TRI), originally developed by Parasuraman (2001), is based on common individual attitudes toward adoption of innovation described by (Rogers, 1962). The TRI examined the propensity to adopt the innovation rather than the self-perception of competency. It classified the perception of technology using four personality traits found to be common in the adoption as optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2001). Technology optimism is the degree of hope that the innovation will provide greater control, flexibility, and efficiency for the individual. When a new smartphone is purchased there is a degree of optimism or hope at the time of purchase that the device will answer the needs of the user (Parasuraman, 2001).

Technology innovativeness is the tendency of the individual to be the first to use the technology. More innovative adopters seek and adopt the latest technology first, such as on-line stock trading or a personal 3-D printer, before less adoptive individuals (Parasuraman, 2001). Discomfort is the degree to which the individual feels a loss of control or being overwhelmed by the innovation. A passenger may choose to print paper airline tickets rather than use electronic options because they are concerned about the availability of the information when they board the plane (Parasuraman, 2001). Insecurity is the relative distrust of the technology due to lack of confidence, security, or privacy issues. Some people may still feel uncomfortable with automatic

bill pay options because they are concerned with the possibility of billing mistakes and direct access to their bank accounts from unknown entities (Parasuraman, 2001).

Although measurement of technology readiness has been more widely used, it has undergone a number of iterations that attempt to balance the influences of the group and the individual. The Technology Acceptance Model (TAM) originally utilized three variables: perceived usefulness, perceived ease of use, and behavioral intention to use (Erdogmus, 2011). The term Change Readiness (CR) is used to describe the components of individual activation, social activation, structural activation, resource activation, and environmental action change (Mathews, 2009). Technology readiness has been defined as the level of individual mental readiness to accept emerging technologies (Damanpour, 2001; Erdogmus, 2011; Liljander, 2006; Parasuraman, 2001). The Technology Readiness Index (TRI) added the four attributional subsets of optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2014).

In 2014 the Technology Readiness Index 2.0 (TRI-2.0) was condensed from 36 items to 16 items by updating technology references and examining internal reliability of the various questions (Parasuraman, 2014). During the re-development of the TRI, the qualitative motivators for technology were discussed such as freedom, control, mobility, and social connection. Also the inhibitors for adoption for innovation like loss of confidence, financial risk, cost, security/privacy and dehumanization were also prioritized. Factor analysis was able to reduce the number of questions based on those with the least amount of variance and strongest reliability (Parasuraman, 2014)

An exploratory phase of the TRI-2.0 development consisted of a week-long interactive forum of 61 prescreened respondents to obtain information the motivators and inhibitors of the adoption of emerging technology as well as the traits that differentiate the different adoption

groups during diffusion (Parasuraman, 2014). The research phase produced 317 individual comments that were mapped to the four original attributes and refined further to 16 items (Parasuraman, 2014). The earlier and refined instrument was sent to representative sample of 2,500 US households and 354 were returned. An additional online survey rendered 524 responses (Parasuraman, 2014). The general data structure of the TRI was assessed using the principle components with Varimax Rotation of the factor loadings as well as a scree plot of Eigenvalues for different components affirmed by a four-factor solution (Parasuraman, 2014). The original 45 items presented Cronbach's alphas of .68-.90 (Parasuraman, 2014).

A second factor analysis was conducted on 36 items from the TRI, and the scree plot confirmed a four-factor structure mirroring the four original attributes (Parasuraman, 2014). The reliability coefficients were comparatively equal at .77-.86 for TRI-2.0 and .74-.81 for TRI (Parasuraman, 2014). After several more rounds of assessment of convergent and discriminant validity using confirmatory factor analysis, a 16-item list was generated (Parasuraman, 2014). The final 16 items consisted of 11 original questions from the TRI but with 5 new items (Parasuraman, 2014). The four factor solution explained 61% of the variance across 16 items with Cronbach's alphas at $\alpha = .70$ for technology discomfort, $\alpha = .71$ for technology insecurity, $\alpha = .80$ for technology optimism, and $\alpha = .83$ for technology innovativeness (Parasuraman, 2014). A confirmatory factor analysis of the proposed items was conducted using goodness of fit index = .920, comparative fit index = .942, and a root mean square residual = .065 (Parasuraman, 2014).

While a number of studies examined the effect of anxiety and stress on individual job performance and effectiveness (Avery, 2011; Bhagat, 1992, June; Brooks, 2003; Byron, 2011; Ekvall, 1997; Motowidlo, 1986; Ng, 2009, September; Pintrich, 1990; Srivastava, 2011;

Staikovic, 1998; Vanderpool, 2013; Voyer, 1997), very little has been published regarding the direct contextual effect on technology readiness. Schulte (2006) examined research indicating that individual-level climate perceptions and organizational climate are related to job satisfaction. A cross-level analysis of hierarchal linear models indicated that perceptions of climate accounted for a large percentage of variance in individual satisfaction using survey data from the 10-item Minnesota Satisfaction Questionnaire (Weiss, 1967). The results supported the hypotheses that unit-level climate accounted for significant variance in individual satisfaction. The results suggested that contextual-social domains were important for understanding individual responses, attitudes, and perceptions. Schulte (2006) then stated:

> A person is influenced in his or her affective responses by the shared perceptions of those with whom he or she interacts, even if he or she does not fully share their perceptions. Because organizational climate was conceptualized as a system of interrelated climates, it is the 'Gestalt' of the system that appears to be related to individual satisfaction above and beyond individual perceptions of climate. (p. 665)

Liljander (2006) studied technology readiness in the adoption of self-service technologies for airline check-in for a European airline. Initially, six customers were interviewed following an interaction with a Self-Service Technology (SST) kiosk for an airline check-in. The participants were asked to answer a shortened version of the Technology Readiness Index (TRI). Support for the positive effect of TRI with customer attitudes toward SST's was shown. However, TRI explained only a small variance of other dependent variables of quality. No support was found for TRI to distinguish SST adopters from non-adopters and only weak support was found for the dimensions of optimism and innovativeness. Discomfort and insecurity could not be validated as independent dimensions. Insecurity of the customer appeared to be associated with perceived risk of the technology, and the author then asked if optimism could be separated from the concept of relative advantage.

Mathews (2009) discussed the Dynamic Five Forces Activation Model (DFFAM) that outlined the individual and organizational measures of change management acceptance. These Five Forces included individual activation, social activation, structural activation, resource activation, and environmental activation. Individual activation referred to how an individual acts to develop and evolve their baseline level of activity to a higher degree performance and capability (Mathews, 2009). He implied that individual activation depends on cognitive processes, involving abstract conceptualization of intelligence involving complex reasoning processes and abstract formulations. This form of practical intelligence provided leadership for the successful social adaptation to the demands and constraints of the environment (Mathews, 2009).

Social activation plays a direct role in activation when change participants work together within an interactive and supportive atmosphere (Mathews, 2009). Matthews spoke of the restraining forces of change realization that can inhibit the capacity to recognize and respond to change. One of these inhibiting factors is social/organizational conflict that prevents the adaptive organizational processes resulting from incompatible interests within work relations.

Summary of the Literature Review

The purpose of this study was to examine if an individual's differentiation of self could be related to level of technology readiness. The two main foundations of the study, Diffusion of Innovation Theory and Bowen Theory, were described with respect to the similarity of traits found with early adopters of technology and those who exhibit a higher level of emotional differentiation (Bowen, 1978; Rogers, 2003). The intent was to show support from the literature of a possible link between emotional differentiation and innovative behavior. Additional

supportive literature was found in application of systems theory in social, clinical, and organizational settings (Bateson, 1956; Schein, 2010; Senge, 2006). Also supportive literature was explored with respect to the effect of emotional versus rational thinking as well as the influence group dynamics on individual thought (Kahneman, 2011; Plous, 1993).

Bowen Family Systems Theory was discussed as away to describe the varying sensitivities and susceptibility of individuals to the systemic emotional anxiety of social groups (Bowen, 1978; Comella, 1999b; Kerr, 1988b; Sagar, 2007). The concept of differentiation describes the resistance of the individual to prevailing emotional anxiety of the group (Bowen, 1978; Kerr, 1988b). The scale of differentiation, first proposed by Bowen (1978) then later refined by Kerr (1988a), Kear (1978), McCollum (1991), Hovestadt (1985), Bray (1987), Skowron (1998), and Cavaiola (2012), showed instrumentation that could measure differentiation, which has been shown to have the more empirical support than other concepts described by Bowen Theory (Miller, 2004). Skowron (1998) developed and attempted to cross-validate the Differentiation of Self Index using the State-Trait Anxiety Inventory, Social Desirability Scale, Hopkins Symptom Checklist, General Severity Index, and Dyadic Adjustment Scale. The Workplace Differentiation Inventory was then derived for specific application of differentiation of self within the workplace (Cavaiola, 2012).

Similar literature of self-actualization and systems based literature in Industrial/Organizational Psychology were found (Maslow, 1998; Mumby, 2013; Schein, 2010; Senge, 2006). These references show similar support for the effect of group dynamics on individual behavior (Maslow, 1998; Mumby, 2013; Schein, 2010; Senge, 2006). Emotional intelligence is a concept that has more widespread popularity in the area of Industrial/Organizational psychology (Goleman, 1995; Petrides, 2001; Salovey, 2004). While it

shares commonality with Bowen Theory with regard to emotional management, lower-order brain emotionality, and empathy, it differs with respect to maintenance of observer objectivity, use of emotional response, and measurement of differentiation rather than IQ (Chreniss, 2014).

The role of social interaction in the diffusion of innovation described by Rogers (2003) was also described within the social effects of conformity, groupthink, bias, and social loafing (Kahneman, 2011; Plous, 1993). The resulting dissonance of the individual while attempting to find consensus within the group is also found in concepts of double-bind theory and homeostasis found in Double-Bind Theory and Cybernetics (Bateson, 1956). The nature of the communication within the group is also important to communicate the complex abstractions of innovation.

The similarities of early adopters of innovation and more highly differentiated was discussed (Bowen, 1978; Rogers, 2003). Some of those traits include greater amount of social interaction, capacity for risk, and the ability to manage the uncertainty and anxiety of innovation (Bowen, 1978; Rogers, 2003). Like early adopters of innovation, those with greater differentiation are described as being more rational, less dogmatic, and less anxious (Bowen, 1978; Rogers, 2003). Also innovativeness and differentiation are independent of age and educational level (Bowen, 1978; Rogers, 2003). This same emphasis of rational rather than emotional thought is reflected in the types of thinking described (Kahneman, 2011; Plous, 1993; Slovic, 2002). Those who are more rational are able to manage their emotional response and utilize heuristically based thought to make abstract assessments (Kahneman, 2011; Plous, 1993; Slovic, 2002). Those who are compromised by emotion, vividness, or their own associational bias are unable to make these more rational choices (Kahneman, 2011; Plous, 1993; Slovic, 2002).

Finally, the concept of the mental readiness to accept emerging technologies was discussed with the four dimensions of technology readiness: technology innovativeness, technology optimism, technology discomfort, and technology insecurity (Erdogmus, 2011; Liljander, 2006; Parasuraman, 2001). This concept helped describe the tendency to adopt or reject emerging technology by the individual (Mathews, 2009). The evolution of the measure forms the Technology Acceptance Model (Greenhalgh, 2005), Change Readiness score (Mathews, 2009), and the Technology Readiness Index (Parasuraman, 2001) that culminated in the Technology Readiness Index 2.0 (Parasuraman, 2014). The intent of this discussion was to provide the support for the notion of similar traits between emotional differentiation and early adoption of innovation. The synthesis in the narrative was to illustrate the cross-disciplinary description of systemic group effects on individual innovative behaviors in clinical systems based psychology, Industrial/Organizational psychology, and Diffusion of Innovation. Another goal was to connect the effect of emotionally reactive versus more rational thought on abstract comprehension with the influence of the group context. All of these factors serve to support the thought that it may be reasonable to seek a corresponding measurement for behavioral measures emotional differentiation and technology readiness.

CHAPTER III

METHODOLOGY

Research Design

The intent of this study was to examine if there was any relationship between an individual's differentiation of self and level of technology readiness. The level of differentiation within the work context was compared to innovation technology readiness. The approach was designed to discover and explore any relationships between the independent variable of emotional differentiation and the dependent variable of technology readiness. This study construct was a non-experimental, associational design using an electronic survey comparing emotional differentiation, as measured by the Workplace Differentiation Inventory (WDI), and technology readiness as measured by the Technology Readiness Index 2.0 (TRI-2.0).

The independent variable of emotional differentiation was measured with the attributes of emotional reactivity, interpersonal fusion, and emotional cut-off. The dependent variable of technology readiness was measured with the attributes of technology optimism, technology innovativeness, technology discomfort, and technology insecurity. These attributes were compared to eight demographic attributes of gender, years of experience, certification, technology assessment, and number of high-tech patients per year number of external linkages, number of internal linkages, and institutional affiliation. These demographic attributes were derived from differences between differentiation values with gender and experience in previous studies (Cavaiola, 2012; Goff, 2010; Kim-Appel, 2007; Miller, 2004; Skowron, 2000, 2004b,

1998, 2003a). The certification, technology assessment, and high-tech patients were found to be relevant in earlier investigations by the author with respect to innovation within orthotics and prosthetics (Stark, 2011; Stark, 2014a, 2014b). The relationships between the attributional variables were then explored by finding the strength of the correlation and possible predictive values using regression analysis.

The methodological framework of this study was to discover any correlation between each of the attributional subsets of emotional differentiation and technology readiness. Each of the three attributes of Workplace Differentiation Inventory (WDI) (Cavaiola, 2012) were evaluated for a possible relationship with the four attributes of the Technology Readiness Index 2.0 (TRI-2.0) (Parasuraman, 2001, 2014). Although a variety of correlations was represented in the framework, it was thought that only a few of the linkages would show any strength between the subsets. Each subset of the WDI was compared to the scoring of the TRI-2.0. The linkages depicted in the framework represented each of the hypotheses.

The composite values of the WDI and the TRI-2.0 will be disaggregated with the demographic variables of:

- gender
- experience
- certification level
- technology acceptance level self-assessment
- number of high-tech patients seen
- number of external linkages
- number of internal linkages
- institutional affiliation

These demographic variables were compared to the attributional variables of the WDI and TRI-2.0 if the statistical evidence allows (Cavaiola, 2012; Parasuraman, 2014). This was done to examine any relationships between these eight descriptors and the overall differentiation of self and technology readiness. This allowed additional comparisons to be made between the demographics and the attributes, if needed.

This research was intended to examine if a relationship existed between individual emotional differentiation and technology readiness. The WDI and the TRI-2.0 instruments were standardized with sufficiently high levels of validity and reliability (Cavaiola, 2012; Parasuraman, 2014). Both have been tested for the presence of multicolinearity and no significant amount was found (Cavaiola, 2012; Parasuraman, 2014). The study also sought any significant relationships between the aggregated scores of differentiation and technology readiness with the demographic variables of the participants.

Population and Sample

The population consisted of adult practitioners in the allied health profession of orthotics and prosthetics who have certifications from the American Board of Certification (ABC) or Board for Certification (BOC) as prosthetists, orthotists, and prosthetist/orthotists. The current population is approximately 5,700 allied health care practitioners (Miller, 2013). Residents and students were excluded from the population, as well as pedorthists, assistants, technicians, and fitters, since they did not provide componentry recommendations in their scope of practice. Pedorthists are allied medical professionals who fit foot orthotics. Orthotic and prosthetic assistants, technicians, and fitters are personnel who assist in the measurement, fabrication, and delivery of prosthetic and orthotic devices respectively.

The sample was comprised of professionally licensed participants who voluntarily participated in the online survey created using Qualtrics, a third-party survey authoring and administration web based survey tool. A link was made available by the researcher and sent to all subscribers of the OANDP-L ListServ, a moderated orthotic and prosthetic e-mail discussion group with over 4,000 current subscribers (Prusakowski, 2014). The number of subscribers to the OANDP-L ListServ differs from the total population of clinicians since they are not required to subscribe to the electronic forum. Participants were asked to identify themselves as orthotic and/or prosthetic practitioners and provide their years of experience, as well as other demographic data. Using Slovin's Formula with a confidence interval of 90% and a margin of error of .10, the minimum threshold for the sample size was calculated to be n = 98 (Ariola, 2007). Although this sample size may be of sufficient power for the attributional variables directly connected to orthotic and prosthetic healthcare professionals found with technology readiness, differentiation of self, certification type, internal/external linkages, and number of high tech patients per year, it would be inadequate for the broader attributional variables of gender and years of experience.

Data Collection

After the WDI and TRI-2.0 instruments and demographic questions were created on Qualtrics, the survey-link was provided in a request for participation message distributed to the OANDP-L ListServ. The link connected the participants to the online survey. During the sign-in process, each participant was asked to indicate their informed consent regarding privacy, confidentiality, and data usage by checking a permission click box. All potential participants had the option to opt out of the study or discontinue the survey at any time. The survey design

incorporated the two surveys as well as eight demographic questions into one instrument. The survey was taken independently from a remote location with an Internet connection.

To preserve the confidentiality of each submission, the survey was encoded with a number created by the third-party survey software. All survey data was kept confidential with encrypted data files and/or password protected computer file. The study design was submitted to the University of Tennessee at Chattanooga's institutional review board (IRB) prior to implementation to ensure all necessary protocols and safeguards were in place to protect the confidentiality and welfare of participants. A risk-benefit analysis was performed at the time of proposal to assess the ethical nature, methodology, and level of informed consent.

Instrumentation

The survey included the 26-item WDI, 16-item TRI-2.0, and eight demographic questions for a total of 50 questions. An average completion time for the combined survey was to take no more than 10 minutes since it consists of a number of five and six point Likert ratings. The eight demographic questions of gender, experience, certification level, technology acceptance level self-assessment, number of high-tech patients seen, number of external linkages, number of internal linkages, and institutional affiliation was compared to the composite values of the WDI and the TRI-2.0 simultaneously with Pearson's coefficients. This was done to examine any relationships between these eight descriptors and the overall differentiation of self and technology readiness. This allowed additional comparisons to be made between the demographics and the subscale attributes, if needed.

Workplace Differentiation Inventory

The Workplace Differentiation Inventory (WDI) is a 26-item, six-point Likert Scale instrument with three subscales of emotional reactivity, emotional cut-off, and fusion with others (Cavaiola, 2012). It was derived from an earlier instrument, the Differentiation of Self-Inventory (DSI) (Skowron, 1998). The Workplace Differentiation Inventory (WDI) was developed for specific application within the workplace context (Cavaiola, 2012). The emotional reactivity (ER) portion has eight items, emotional cut-off (EC) has six items, and fusion with others (FO) has 11 items (Cavaiola, 2012). Overall the WDI measure had a Cronbach's alpha score of $\alpha = .76$, with component scores of Emotional Reactivity $\alpha = .69$, Emotional Cut-off $\alpha = .67$, Fusion with Others $\alpha = .62$ (Cavaiola, 2012).

Technology Readiness Index 2.0

The Technology Readiness Index 2.0 (TRI-2.0) is a 16-item, five-point Likert Scale instrument that has four-subscales. Technology optimism (TO) has four items, technology innovativeness (TI) has four items, technology discomfort (TD) has four items, and technology insecurity (TS) has nine items. Reliability is measured with Cronbach's alpha as $\alpha = .90$ for optimism, $\alpha = .88$ for innovativeness, $\alpha = .68$ for discomfort, and $\alpha = .86$ for insecurity (Parasuraman, 2001, 2014).

Statistical Analysis

The anticipated sample size was estimated by the researcher to be approximately 100-160 from the total population of 5,700 certified orthotic and prosthetic practitioners based on previous electronic surveys by the researcher (Miller, 2013, p. 2; Stark, 2011; Stark, 2014b). The

minimum sample size for multiple regression analysis using Green's principle for the overall model with three predictors was 74 participants, and the test for the effect of the individual predictors required a sample of 107 (Field, 2009; Green, 1991). Slovin's Formula indicated a minimum threshold for the sample size to be n = 98 with a confidence interval of 90%, but to achieve 95% would require n = 352 (Field, 2009). Survey results were collected, attributional and demographic scores were coded, and the composite WDI and TRI-2.0 were calculated.

The attributes of WDI were represented by emotional reactivity (ER), interpersonal fusion (FO), and emotional cut-off (EC). The attributes of the TRI-2.0 were denoted by the attributes of technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS). The TRI-2.0 and WDI as well as their attributes were compared using the means and standard deviations with the demographic attributional variables represented by gender (G), years of experience (EXP), technology self-assessment (TSA), and professional certification (CERT). This information was to reference other sample groups from earlier survey samples with respect to distribution and sample sizes to check the reliability of the study sample. The internal linkages (INLK), external linkages (EXLK), and high tech patients per year (HTP) were used as internal checks of validity for the technology self-assessment (TSA) of the categories of novice, intermediate, expert, and specialist. For example if the respondent classified themselves as an expert, but did not show a higher number of linkages or high tech patients, the self-assessment would be called into question.

To analyze the first research question regarding whether the significant relationships between emotional differentiation and technology readiness existed, 2-tailed Pearson's correlation analysis was used between the composite scores Workplace Differentiation Inventory, Technology Readiness Index 2.0, and each of the attributes. This correlation analysis included an

evaluation of the relationship between WDI and TRI-2.0 as well as technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS). The TRI-2.0 will be then be compared with emotional reactivity (ER), interpersonal fusion (FO), and emotional cut-off (EC). Each of these attributes were then correlated to find any significant relationships between them.

Since the scale for the WDI and TRI-2.0 and the attributes were different, each of the variables was converted to z-scores in preparation for regression analysis. To answer the second research question whether there were any significant predictive relationships between the attributes of workplace differentiation and technology readiness, a multiple regression analysis was utilized. The multiple regression analysis was conducted with the WDI as the independent predictor variable and the TRI-2.0 as the dependent outcome variable. In this case the effect of the independent predictor variables of WDI, emotional reactivity (ER), interpersonal fusion (FO), and emotional cut-off (EC) was analyzed with respect to each of the dependent outcome variables of TRI-2.0, technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS). Each of the attributes were introduced with the composite measures and eliminated in a step-by-step manner using the beta coefficients and level of significance p-values to determine which combination of factors produced the highest predictive relationships. The regression analysis was examined for multicolinearity within the predictor variables of workplace differentiation to determine if there was any significant overall effect on the model.

Research question three reversed the relationship of question two, and asked if there were any significant predictive relationships with the TRI-2.0 as the independent predictor variable and WDI as the dependent outcome variable. Again, multiple regression analyses were used in a

step-by-step method process of elimination to find the relationships the highest significantly predictive relationships. The beta coefficients and p-values were considered with each regression analysis to determine the strength and significance of each factor. The highest level of significance relationships were then plotted using a scatter plot with the line of regression for each factor.

To address research question four to determine if there are any significant differences of the mean between the demographic attributional variables and the composite scores of the WDI and the TRI-2.0, ANOVA analysis between the various demographic groups was performed. Each test included a check for homogeneity among the groups to insure they were comparable. Certification level, self-assessed proficiency, years of experience, and office affiliation were analyzed using ANOVA since there were three or more exclusive groups. Group categories with less than 10 respondents were either dropped from the ANOVA or placed together in a combined other classification to assure an adequate number.

Summary

This experimental methodology provided an outline to study if there was any correlation between an individual's workplace emotional differentiation and technology readiness using the Workplace Differentiation Inventory (WDI) and Technology Readiness Index-2.0 (TRI-2.0). The WDI was derived from other instruments that measured the nature and degree of emotional differentiation within human social systems, but applied it within the context of the workplace. The TRI-2.0 is a measure of an individual's attitudes and degree of acceptance of emerging technology within the diffusion of innovations social process.

The general hypotheses involved determining if there was a correlation and a predictive statistical relationship between individual workplace differentiation and technology readiness as

well as the demographic attributes of the participant. The implication may be that those who are more emotionally differentiated at the workplace may have a higher potential to adopt emerging technology in the form of componentry, processes, or planned transformational change programs. This may provide additional information for those who are making recommendations for organizational change. The population and sample was limited to allied health professionals who provide prosthetic and orthotic patient services, but could be extrapolated to other areas of healthcare. Since emotional anxiety in healthcare may be heightened due to the human impact of decision-making, it may reveal additional factors not apparent in more emotionally moderate contexts.

Principal limitations involved the ability of the subjects to assess their own level of differentiation and technology readiness. The measures of individual perceptions of emotional differentiation and technology readiness greatly depended on the abilities of the sample population using the online survey. It was anticipated that this study would lead to other applications of family systems theory with organizational psychology groups as well as additional research as related to the effect of groups on individual innovation.

CHAPTER IV

RESULTS

The purpose of this study was to examine whether there is a relationship between differentiation of self and level of technology readiness. Differentiation of self and technology readiness at the workplace were measured among certified individuals in orthotics and prosthetics utilizing the Workplace Differentiation Inventory (WDI) and Technology Readiness Index-2.0 (TRI-2.0) respectively (See Appendix B).

More specifically, the intent of the study was to examine the potential relationships between the WDI and TRI-2.0 as well as the subattributes of both instruments. The analysis was completed to find if any relationships existed between the WDI and TRI-2.0 with respect to the demographic attributes of gender (G), years of experience (EXP), professional certification (CERT), technology self-assessment (TSA), number of high-tech patients per year (HTP), number of external linkages (EXLK), number of internal linkages (INLK), and professional affiliation (AFF).

The significance of the independent predictor variables of the WDI was analyzed with the dependent outcome variables of the TRI-2.0. The independent predictor variables of the WDI included emotional reactivity (ER), fusion with others (FO), and emotional cut-off (EC). emotional reactivity (ER) refers to the degree an individual is affected or threatened by the emotional state of others (Cavaiola, 2012). Fusion with others (FO) attempts to measure the individual's ability to maintain an independent opinion by resisting the emotional entanglement

of the group (Cavaiola, 2012). The degree to which the individual maintains a relationship with those who steadfastly disagree with her/him is represented by emotional cut-off (EC).

The relationships of these subattributes were analyzed for significance with the dependent outcome variables of TRI-2.0. Technology optimism (TO) refers to a generally positive view of technology and a belief that it offers increased control, flexibility, and efficiency (Parasuraman, 2014). The tendency of the individual to be a technologic pioneer and thought leader was measured by technology innovativeness (TI) as previously described (Parasuraman, 2014). Technology discomfort (TD) portrayed the lack of control over technology and the feeling of being overwhelmed (Parasuraman, 2014). Finally, Technology insecurity (TS) described the level of distrust and skepticism concerning technology regarding its ability to work properly without harmful results (Parasuraman, 2014). The means of the various groups were compared, and then multiple Pearson's correlation and regression analyses were performed with the subattributes, composite scores, and demographic variables to discover any possible significant relationships.

The survey results were examined with the various demographic distributions and averages. Following each research question, the composite averages of the TRI-2.0 and WDI were compared among the demographic groups as well as with the attributional variables. The statistical tests, correlation, analysis of variance, and regression analyses followed each of the original research questions to determine statistically relevant and predictive relationships among the composite, attributional, and demographic variables. Multiple regression analyses were performed to progressively refine the significance of each variable to the predictive relationships. To examine possible differences between the mean WDI and TRI-2.0 among the demographic groups ANOVA was used.

Survey Administration

The survey, which included the eight demographic questions as well as the WDI and TRI 2.0 (see Appendix B), was made available with a link and invitation on the OANDP-L professional discussion list server. The survey was posted on Qualtrics from August 18, 2015 until August 31, 2015, and after the original invitation, there were three more reminders at the third, sixth, and fourteenth days with total elicited responses from 230 respondents (see Figure 3).

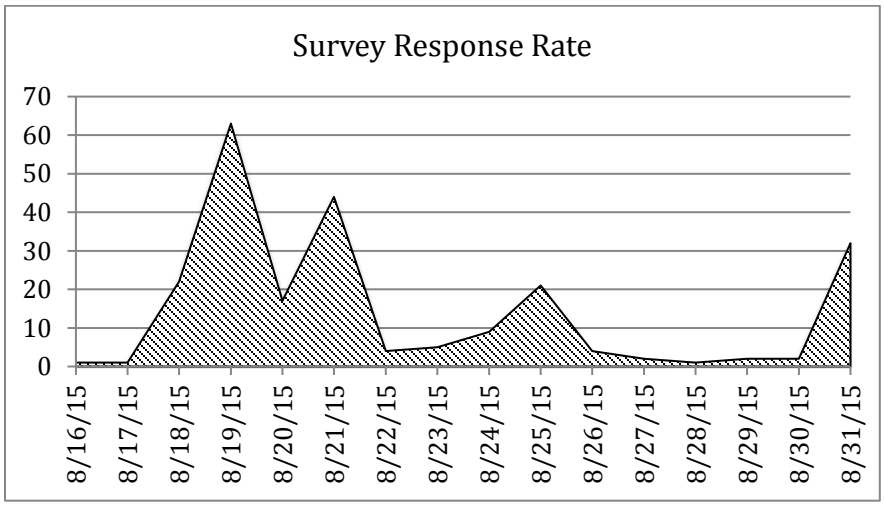

Figure 3 Survey Response Rate from 8/16/15 until 8/31/15

The invitation e-mail for the self-assessment requested that each respondent be certified and work within a social context. Respondents were advised that there were no right or wrong answers and that they should answer the questions as they felt at that time. The average completion time was 12.5 minutes. After the informed consent there was an overall dropout of 82 (37%) respondents with 148 (n = 148) completing the survey, satisfying the Solvin's formula for a minimum threshold of n = 98 for 90% confidence (see Figure 4). All dropouts occurred

during the informed consent process after the potential respondent declined to participate in the survey. Of the 148 respondents, 23 provided additional comments regarding the survey. For a complete list of comments, see Appendix C.

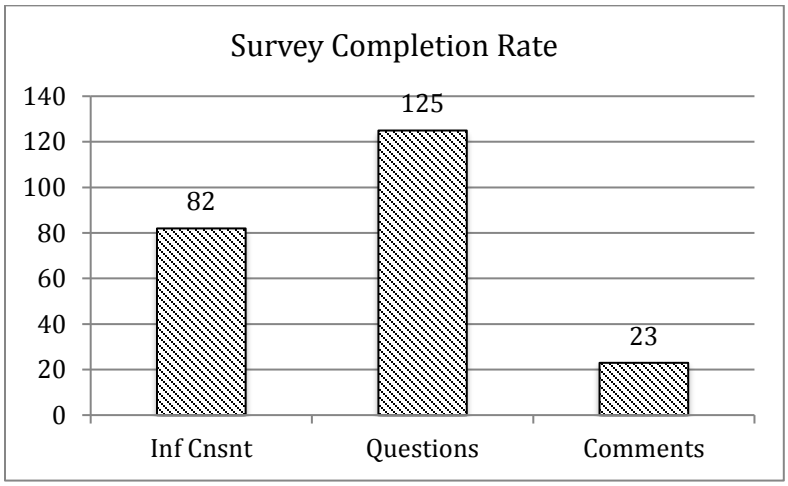

Figure 4 Survey Completion Rate shows where respondents dropped out of the Survey. There were 82 respondents who dropped out at the informed consent, 125 who completed all the questions and 23 who entered additional comments for a total of 148 respondents.

Sample Population and Demographics

The gender distribution of the 148 respondents who completed the survey was 116 (78%) male and 32 (22%) were female (see Figure 5). These percentages were compared to a recent orthotic and prosthetic salary survey of 354 respondents with 77% male and 23% female respondents (Hochnadel, 2015) and found to be similar (see Figure 6). The practice analysis from the American Board of Certification (ABC) with 1,401 respondents (Carter, 2015) also showed a similar distribution delineated between orthotists and prosthetists (see Figure 7).

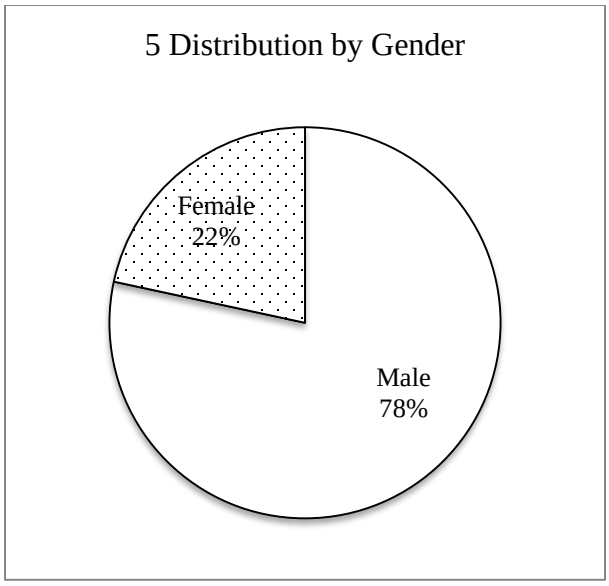

Figure 5 Gender distribution of the Study

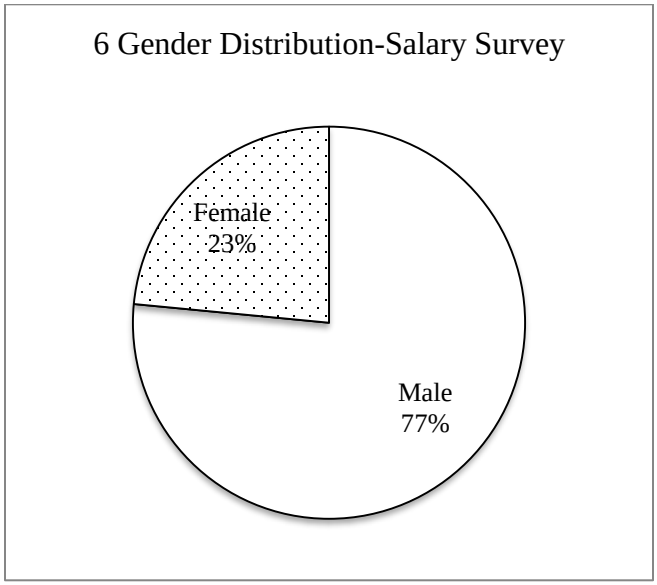

Figure 6 Comparative Gender Distribution with Salary Survey

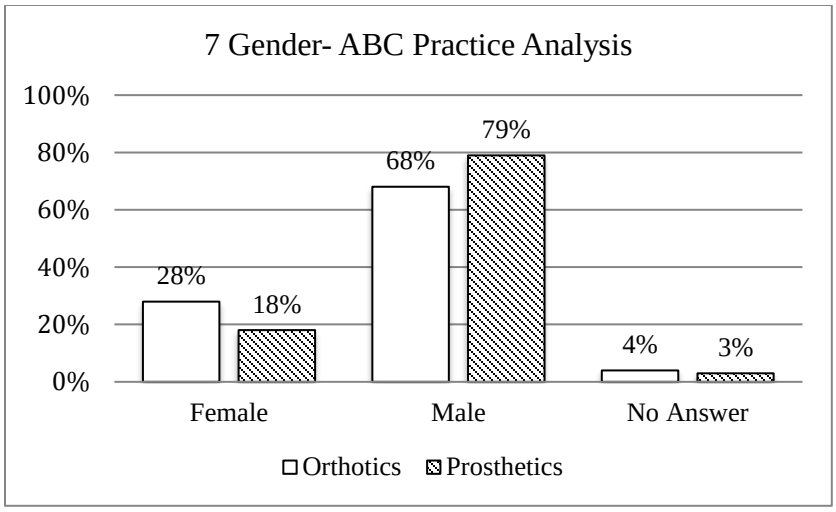

Figure 7 Comparative Gender Distribution with ABC Practice Analysis

The mean number of years of experience was 20.9, standard deviation (STD) 11.24 years with a minimum of two and a maximum of 46 (see Figure 8). This represented a slightly more experienced group than reported by ABC (Carter, 2015) in a recent practice analysis survey (see Figure 9). The current sample for this study had a greater proportion of practitioners with 30 or more years of experience compared to the practice analysis survey.

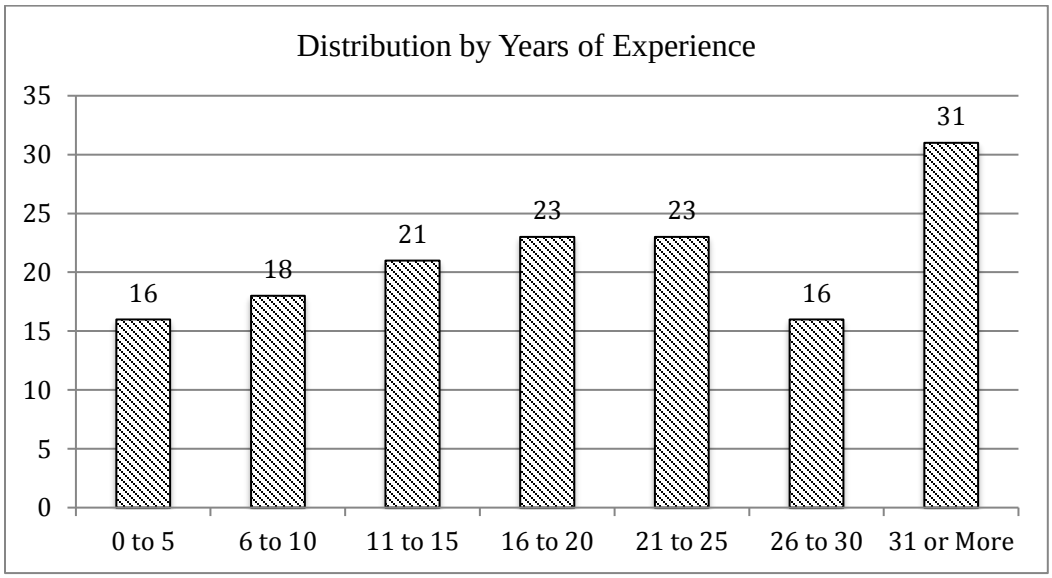

Figure 8 Distribution in the Study by Years of Experience

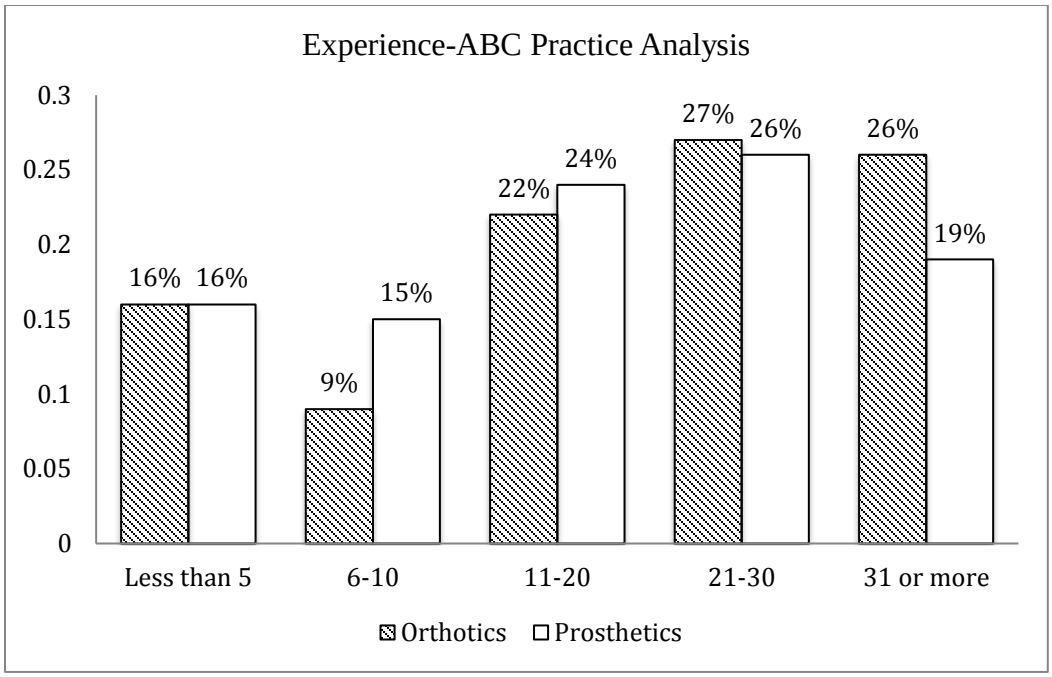

Figure 9 Comparative Distribution by Years of Experience with ABC Practice Analysis

When self-assessing their level of Technology Self-Assessment (TSA), 48 (32%) respondents indicated they were specialists, 65 (44%) were experts, 34 (23%) were intermediates, and only one (<1%) identified as a novice (see Figure 10). Neither the recent salary survey nor the practice analysis included any assessment regarding self-assessed proficiency (Carter, 2015; Hochnadel, 2015). In comparison to an earlier survey by the author with 149 respondents concerning upper limb prosthetic competency (Stark, 2014b), the sample group in the study indicated greater numbers of self-assessed experts and specialists (see Figure 11).

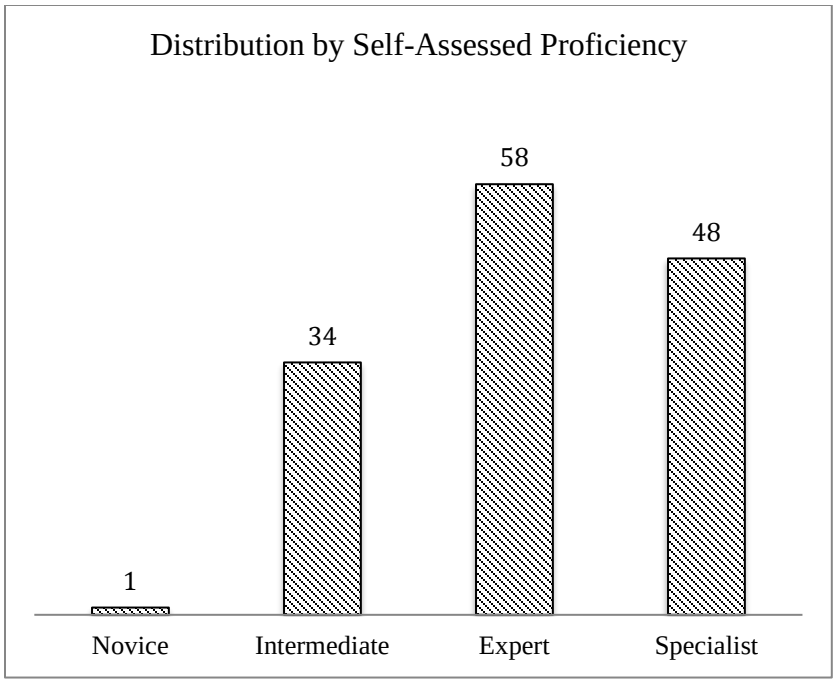

Figure 10 Distribution of the Study by Self-Assessed Proficiency

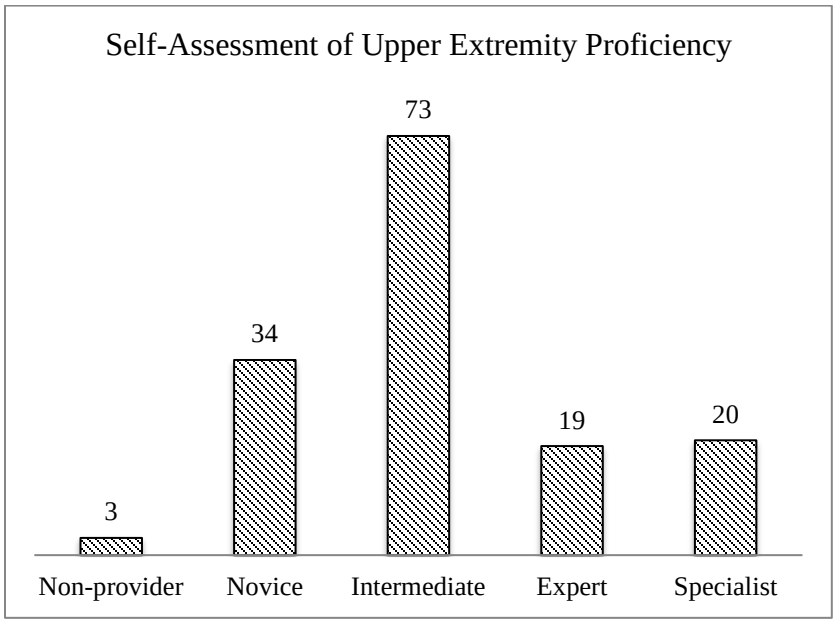

Figure 11 Comparative Distribution of Respondents by Self-Assessed Proficiency with Upper Extremity Proficiency Survey

In terms of the office affiliation (AFF), 83 (56%) of the respondents were from private clinics, 32 (22%) were from corporate offices, 17 (11%) were from hospital/rehabilitation settings, two (1.4%) were from an institutional clinic, and 14 (9.5 %) were from other settings not listed, such as self-employed or as a consultant (see Figure 12). A comparative distribution with the office affiliation for the ABC practice analysis revealed different classifications (Carter, 2015). The private clinical setting followed by corporate ownership was the predominant office affiliation for both samples (see Figure 13).

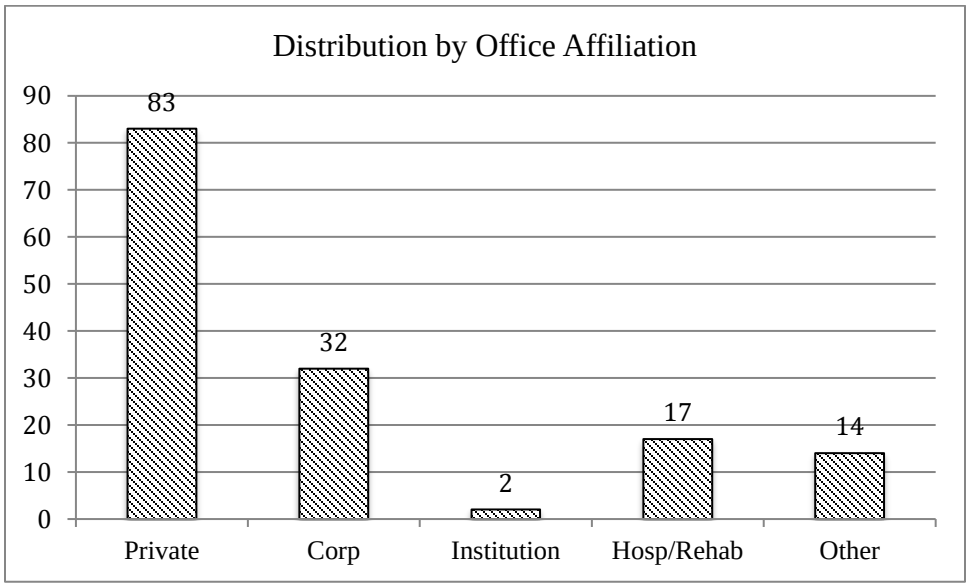

Figure 12 Distribution by Office Affiliation for the Study

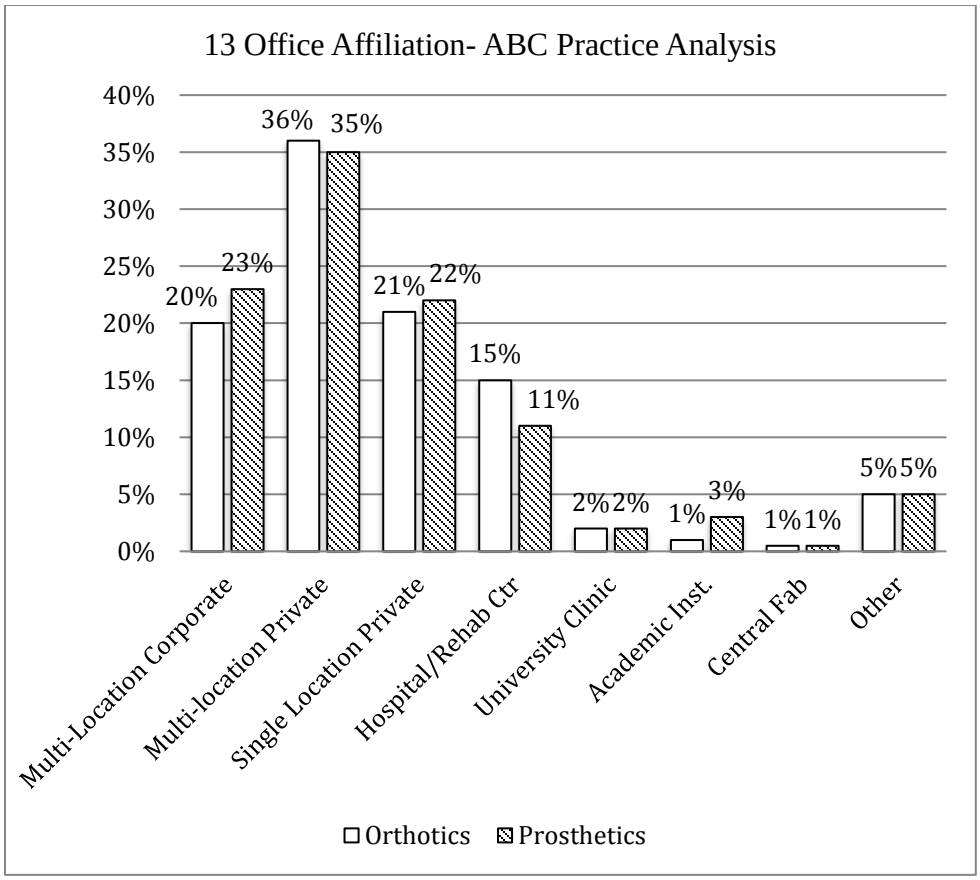

Figure 13 Distribution of Office Affiliation from ABC Practice Analysis

With respect to certification level (CERT), 69 (47%) were certified by ABC as prosthetists-orthotists (CPO), 38 (26%) were certified prosthetists (CP) only, and 22 (15%) were orthotists (CO) only. From the Board for Certification, nine (6.1%) were prosthetists (BOCP), one (.6%) was an orthotist (BOCO), and three (2.1%) were prosthetist-orthotists (BOCPO). Other certifications included certified orthotic assistants at one (.6%), prosthetic assistants at two (1.4%), prosthetic-orthotic assistants at one (.6%), and orthotic fitters at five (3.4%).

Other certifications that included licenses, degrees, fellowships, and certifications in technical fabrication and physical therapy contributed 19 (13%) to the overall distribution (see Figure 14). The respondents could click multiple certifications with 125 respondents choosing at

least one certification and 23 selecting more than one certification for a total of 170 certification entries. Although all the designations do not correspond exactly, the recent salary survey (Hochnadel, 2015) shows similar distributions with CPO, CP, and CO's representing the majority of the respondents (see Figure 15).

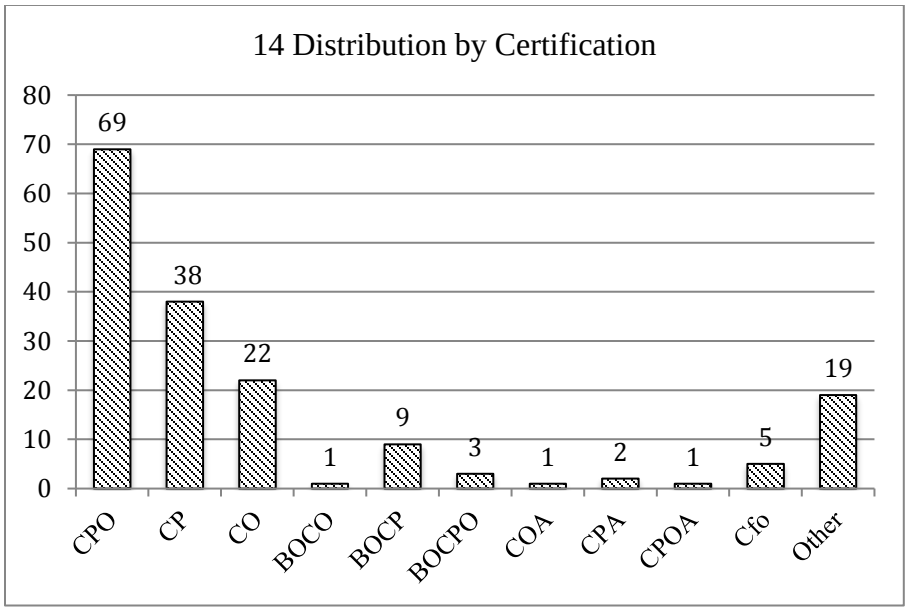

Figure 14 Distribution by Certification for the Study

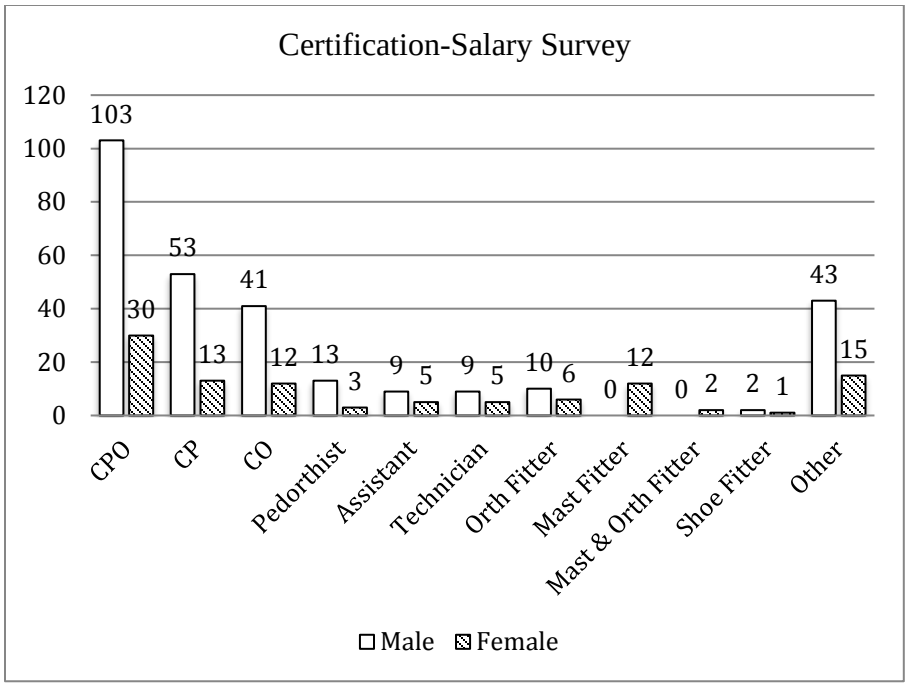

Figure 15 Comparative Distribution of Respondents by Certification Level with Salary Survey

Research Question #1

Are there one or more relationships between the sources of individual emotional anxiety identified by the WDI and the acceptance and adoption of emerging technology? To identify any significant relationships, a correlation analysis was performed with the composite scores of the WDI, TRI-2.0, and attributional variables. Examining the Pearson's two-tailed correlation with the composite measures showed a significant relationship (Field, 2009) between the WDI and the TRI-2.0 of $r = .583$, p (two-tailed) < 0.01 (see Table 1). The z-scores of the WDI and TRI-2.0 were compared with a scatter plot with the WDI as the independent predictor variable on the x-axis and the TRI-2.0 as the dependent outcome variable on the y-axis. After the plots of each respondent were generated, the line of regression was plotted with a slope of $R^2 = .340$ (see Figure 16).

Table 1 Pearson's Correlation between the WDI and TRI

Correlations

		TRI-2.0 Composite	WDI Composite
TRI-2.0 Composite	Pearson Correlation	1	.583**
	Sig. (2-tailed)		.000
	N	148	148
WDI Composite	Pearson Correlation	.583**	1
	Sig. (2-tailed)	.000	
	N	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

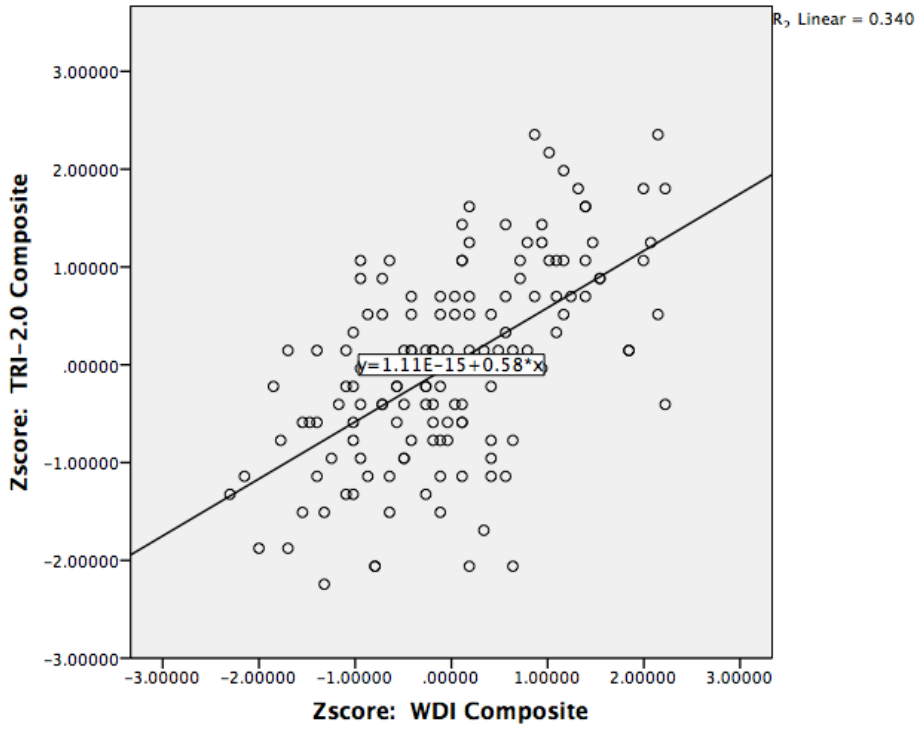

Figure 16 Scatter plot of TRI-2.0 and WDI correlation

Correlation Analysis of TRI-2.0 and WDI

The correlation analysis between the TRI-2.0 level and the attributes of the WDI revealed significant relationships (Field, 2009) with all attributes of the WDI. The TRI had a significant relationship of r = .382, p (two-tailed) < .01 with FO, a significant relationship of r = .561, p (two-tailed) < .01 with ER, and a significant relationship of r = .438, p (two-tailed) < .01 with EC summarized below (see Table 2).

Table 2 Correlations of TRI-2.0 with the Subattributes of WDI

Correlations

		TRI-2.0 Composite	FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
TRI-2.0 Composite	Pearson Correlation	1	.382**	.561**	.438**
	Sig. (2-tailed)		.000	.000	.000
	N	148	148	148	148
FO-Fusion w/Others	Pearson Correlation	.382**	1	.413**	.297**
	Sig. (2-tailed)	.000		.000	.000
	N	148	148	148	148
ER-Emotional Reactivity	Pearson Correlation	.561**	.413**	1	.568**
	Sig. (2-tailed)	.000	.000		.000
	N	148	148	148	148
EC-Emotional Cut-off	Pearson Correlation	.438**	.297**	.568**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

At the attributional level of the TRI-2.0 and WDI, more significant relationships were found (Field, 2009). Each of the TRI-2.0 attributes was analyzed with the attributes of the WDI. Significant relationships were found between TO and FO r = .294, p (two-tailed) < .01, ER r = .681, p (two-tailed) < .01 and EC r = .52, (two-tailed) < .01 (see Table 3). This indicates that an optimistic outlook regarding technology was significantly related to the subattributes of workplace differentiation of resisting emotional reactivity, fusion with others, and emotional cut-off.

Table 3 Correlations of the Subattributes TO and FO, ER, EC

Correlations

		TO-Technology Optimism	FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
TO-Technology Optimism	Pearson Correlation	1	.294**	.681**	.542**
	Sig. (2-tailed)		.000	.000	.000
	N	148	148	148	148
FO-Fusion w/Others	Pearson Correlation	.294**	1	.413**	.297**
	Sig. (2-tailed)	.000		.000	.000
	N	148	148	148	148
ER-Emotional Reactivity	Pearson Correlation	.681**	.413**	1	.568**
	Sig. (2-tailed)	.000	.000		.000
	N	148	148	148	148
EC-Emotional Cut-off	Pearson Correlation	.542**	.297**	.568**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

There was a significant relationship (Field, 2009) between TI and FO of r = .50 p (two-tailed) < .01, ER r = .44, p (two-tailed) < .01, and EC r = .35, p (two-tailed) < .01 (see Table 4). This demonstrates that innovative attitudes toward technology are significantly related to greater emotional reactivity, fusion with others, and emotional cut-off.

Table 4 Correlations of the Subattributes TI and FO, ER, EC

Correlations

		TI-Technology Innovation	FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
TI-Technology Innovation	Pearson Correlation	1	.504**	.438**	.345**
	Sig. (2-tailed)		.000	.000	.000
	N	148	148	148	148
FO-Fusion w/Others	Pearson Correlation	.504**	1	.413**	.297**
	Sig. (2-tailed)	.000		.000	.000
	N	148	148	148	148
ER-Emotional Reactivity	Pearson Correlation	.438**	.413**	1	.568**
	Sig. (2-tailed)	.000	.000		.000
	N	148	148	148	148
EC-Emotional Cut-off	Pearson Correlation	.345**	.297**	.568**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

Technology insecurity showed a significant relationship (Field, 2009) with ER of r = .20, p (two-tailed) < .05, EC r = .23, p (two-tailed) < .01, and EXP r = .32, p (two-tailed) < .01. With respect to FO, no significant relationship was shown (see Table 5). This indicates that insecurity

regarding technology is significantly related to reacting emotionally, cutting off from others, and experience, but not fusion with group opinion.

Table 5 Correlations of the Subattributes TS and FO, ER, EC

Correlations

		TS-Technology Insecurity	FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
TS-Technology Insecurity	Pearson Correlation	1	.132	.199*	.225**
	Sig. (2-tailed)		.110	.015	.006
	N	148	148	148	148
FO-Fusion w/Others	Pearson Correlation	.132	1	.413**	.297**
	Sig. (2-tailed)	.110		.000	.000
	N	148	148	148	148
ER-Emotional Reactivity	Pearson Correlation	.199*	.413**	1	.568**
	Sig. (2-tailed)	.015	.000		.000
	N	148	148	148	148
EC-Emotional Cut-off	Pearson Correlation	.225**	.297**	.568**	1
	Sig. (2-tailed)	.006	.000	.000	
	N	148	148	148	148

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Technology discomfort showed a significant relationship (Field, 2009) with ER of $r = .16$, p (two-tailed) $< .05$ and EC of $r = .22$, p (two-tailed) $< .01$, but no significant relationship with FO. This indicates that discomfort with technology has a significant relationship with reacting to others emotionally and cutting off from them, but not fusion with to group opinion (see Table 6).

Table 6 Correlations of the Subattributes TD and FO, ER, EC

Correlations

		TD-Technology Discomfort	FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
TD-Technology Discomfort	Pearson Correlation	1	.094	.163*	.221**
	Sig. (2-tailed)		.255	.047	.007
	N	148	148	148	148
FO-Fusion w/Others	Pearson Correlation	.094	1	.413**	.297**
	Sig. (2-tailed)	.255		.000	.000
	N	148	148	148	148
ER-Emotional Reactivity	Pearson Correlation	.163*	.413**	1	.568**
	Sig. (2-tailed)	.047	.000		.000
	N	148	148	148	148
EC-Emotional Cut-off	Pearson Correlation	.221**	.297**	.568**	1
	Sig. (2-tailed)	.007	.000	.000	
	N	148	148	148	148

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis was extended to the relationships between the WDI and the attributes of the TRI-2.0. The WDI had a significant relationship with TO r = .64, p (two-tailed) < .01), TI r = .54, p (two-tailed) < .01, TS r = .24, p (two-tailed) < .01, and TD of r = .21, p (two-tailed) < .05 (see Table 7). This indicates a significant relationship between technologic optimism, innovation, resisting insecurity, and avoiding discomfort with a greater tolerance of the disharmony represented by workplace differentiation.

Table 7 Correlations of WDI with the Subattributes of TRI-2.0.

Correlations

		WDI Composite	TO-Technology Optimism	TI-Technology Innovation	TS-Technology Insecurity	TD-Technology Discomfort
WDI Composite	Pearson Correlation	1	.641**	.543**	.237**	.206*
	Sig. (2-tailed)		.000	.000	.004	.012
	N	148	148	148	148	148
TO-Technology Optimism	Pearson Correlation	.641**	1	.295**	.116	.179*
	Sig. (2-tailed)	.000		.000	.160	.029
	N	148	148	148	148	148
TI-Technology Innovation	Pearson Correlation	.543**	.295**	1	.112	.114
	Sig. (2-tailed)	.000	.000		.175	.168
	N	148	148	148	148	148
TS-Technology Insecurity	Pearson Correlation	.237**	.116	.112	1	.385**
	Sig. (2-tailed)	.004	.160	.175		.000
	N	148	148	148	148	148
TD-Technology Discomfort	Pearson Correlation	.206*	.179*	.114	.385**	1
	Sig. (2-tailed)	.012	.029	.168	.000	
	N	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Research Question #2

Are there one or more aspects of the WDI that can serve as predictive models of technology readiness for individuals or groups? Before any predictive comparisons could be made, the WDI and the TRI-2.0, as well as the attributional variable values of fusion with others, emotional reactivity, emotional cut-off, technology optimism, technology innovativeness, technology insecurity, and technology discomfort were converted to z-scores since the scale, Likert values, and composite calculation of the final score differed.

TRI-2.0 and WDI z-Score Distribution

Figure 17 shows the boxplots and distributions of the WDI andTRI-2.0 z-scores. The comparison of the z-scores shows the differences between the distributions. Since the comparison is of the z-score statistic, the means were at zero, standard deviation at 1.000, and standard mean error at .0822. While the distributions were similar, there were some variances with the individual distribution characteristics, maximum value, minimum value, and range (see Figure 17).

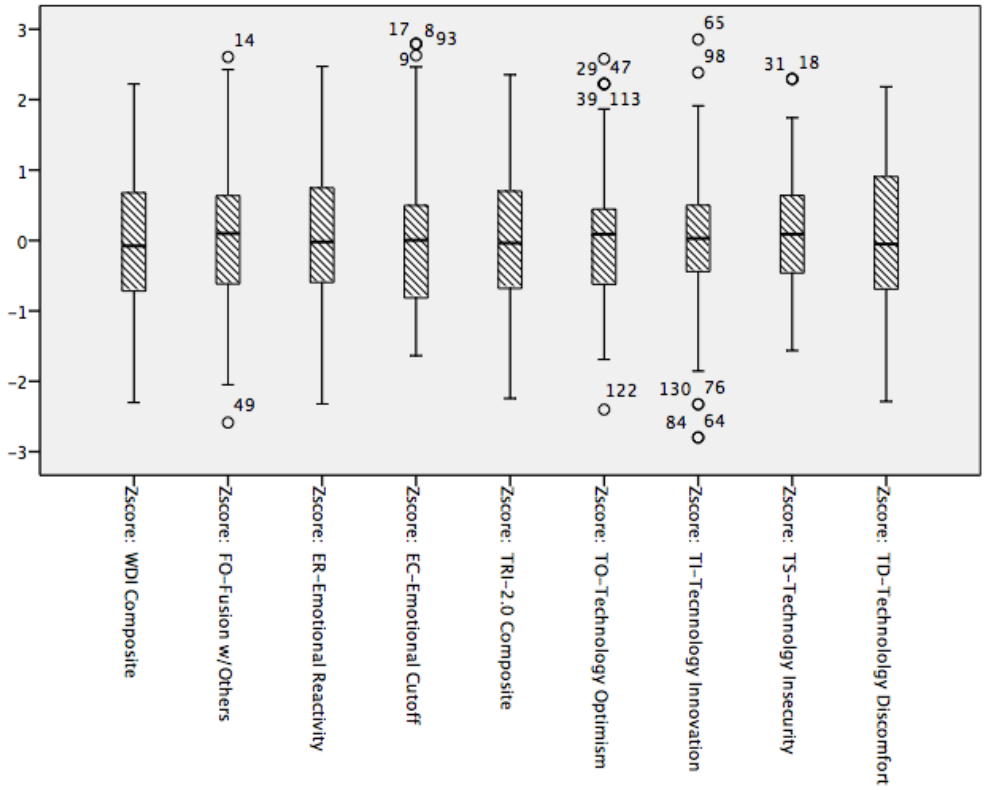

Figure 17 Boxplot of the z-scores of the WDI, TRI-2.0, and attributional variables

To determine if any predictive relationships existed between emotional differentiation in the workplace and technology readiness, multiple regression analyses were conducted between the TRI-2.0, WDI, and their respective attributes. Along with the composite TRI-2.0, the attributes of technology optimism, technology innovativeness, technology insecurity, and technology discomfort were considered as the dependent outcome variables. The composite WDI and the attributes of fusion with others, emotional reactivity and emotional cut-off were considered as the independent predictor variables.

Regression with WDI as Predictor Variable and TRI-2.0 as Outcome Variable

Below is a summary of the regression analyses that were performed to determine if there were any predictive relationships that existed between the WDI as an independent predictor

variable and the TRI-2.0 as a dependent outcome variable (see Table 8). First, the composite values of the WDI and TRI-2.0 were analyzed, and then compared between the attributes of the WDI. Using a step-by-step method with multiple regression analyses, the variables found to be insignificant were eliminated and subsequent tests were performed with until the strongest predictive relationships were found (see Table 8).

Table 8 Summary of Regression Analyses with TRI-2.0 and Attributes as the Outcome Variable

Independent Predictor Variable	Dependent Outcome Variable	R (square)
WDI	TRI-2.0	0.340
ER, EC, FO	TRI-2.0	0.360
ER, FO	TRI-2.0	0.343
ER	TRI-2.0	0.320
ER, EC, FO	TO	0.499
ER, EC	TO	0.499
ER	TO	0.460
ER, EC, FO	TI	0.325
ER, EC	TI	0.206
ER, EC, FO	TS	0.060
ER, EC, FO	TD	0.051

The regression analysis between the TRI-2.0 as the dependent value and WDI as the independent value of R^2 Linear = .34, $F(1, 147) = 75.218$, $p < .001$ (Table 9) showed a moderately strong predictive relationship (Field, 2009).

The attributes of the WDI, emotional reactivity, emotional cut-off, and fusion with others, were used as multiple independent predictor variables to determine their predictive effect on the TRI-2.0 and the attributes of technology optimism, technology innovativeness, technology insecurity, and technology discomfort. A review of the R^2 values for each test is shown in Table

8 to provide the degree of the predictive value of each test. The greatest values were found between ER and EC as independent predictor variables and TO as a dependent outcome variable.

Table 9 Regression Analysis of the TRI-2.0 and WDI

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.583[a]	.340	.335	.81517104

a. Predictors: (Constant), z-score: WDI Composite

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.127E-15	.067		.000	1.000
	Zscore: WDI Composite	.583	.067	.583	8.673	.000

a. Dependent Variable: z-score: TRI-2.0 Composite

To find any predictive relationships between the TRI-2.0 as the dependent variable and the attributes of the WDI, the attributes of FO, EC, and ER were added as independent variables. The multiple regression analysis showed a moderately strong predictive relationship (Field, 2009) of R^2 Linear = .36, $F(3, 144) = 26.985$, $p < .001$ with ER presenting the highest beta coefficient (see Table 10).

Table 10 Multiple Regression analysis of TRI-2.0 with FO, ER, EC

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.600[a]	.360	.347	.80836915

a. Predictors: (Constant), z-score: EC-Emotional Cut-off, Zscore: FO-Fusion w/Others, Zscore: ER-Emotional Reactivity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.033E-15	.066		.000	1.000
	Zscore: FO-Fusion w/Others	.170	.073	.170	2.310	.022
	Zscore: ER-Emotional Reactivity	.400	.085	.400	4.700	.000
	Zscore: EC-Emotional Cut-off	.160	.081	.160	1.973	.050

a. Dependent Variable: z-score: TRI-2.0 Composite

Since EC was at the level of insignificance at p = .050, it was eliminated and the multiple regression analysis was run again with TRI-2.0 as the dependent variable and FO and ER as independent variables. This showed a moderately strong predictive relationship (Field, 2009) of R^2 Linear = .34, $F(2, 145) = 37.778$, $p < .001$ (see Table 11).

Table 11 Multiple Regression analysis of TRI-2.0 with FO, ER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.585[a]	.343	.334	.81639304

a. Predictors: (Constant), z-score: ER-Emotional Reactivity, Zscore: FO-Fusion w/Others

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.214E-15	.067		.000	1.000
	Zscore: FO-Fusion w/Others	.182	.074	.182	2.458	.015
	Zscore: ER-Emotional Reactivity	.486	.074	.486	6.581	.000

a. Dependent Variable: z-score: TRI-2.0 Composite

Isolating ER further with the TRI-2.0 by dropping the lower beta coefficient value of FO showed a value of R^2 Linear = .32, $F(1, 147) = 67.195$, $p < .001$ (see Figure 18), which is a moderately strong predictive relationship (Field, 2009).

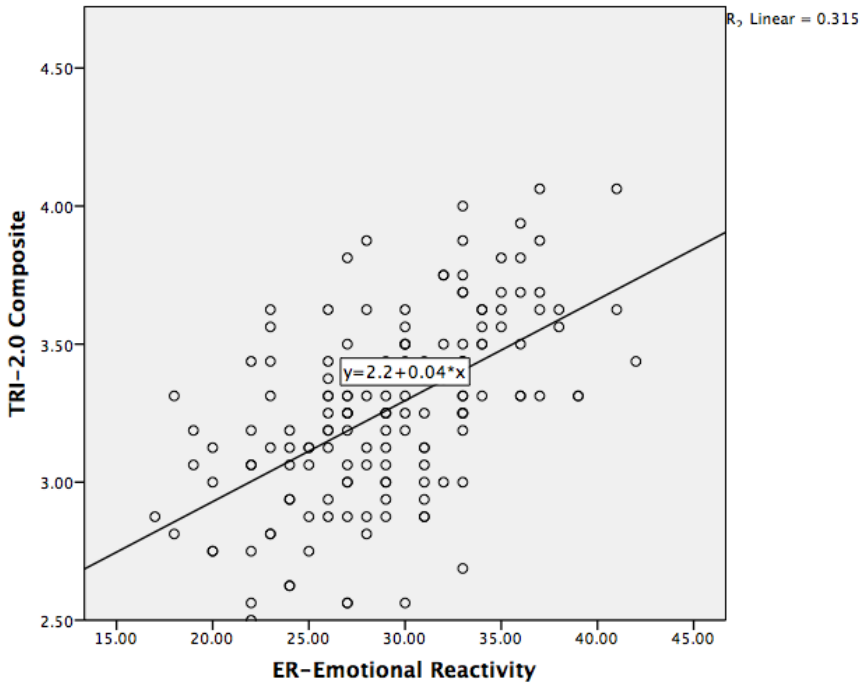

Figure 18 Scatter plot of Technology Readiness (TRI-2.0) and Emotional Reactivity (ER) showing line of regression R^2 Linear = .32.

The subattributes of TRI-2.0, technology optimism, technology innovativeness, technology insecurity, and technology discomfort were then introduced one-by-one, as dependent variables, to all three subattributes of emotional reactivity, fusion with others, and emotional cut-off.

With TO as a dependent variable and ER, FO, and EC as independent variables, the multiple regression analysis of R^2 Linear = .50, $F(3, 144) = 47.827$, $p < .001$ (see Table 12) exhibited a strong predictive relationship (Field, 2009).

Table 12 Multiple Regression analysis of TO with FO, ER, and EC

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.706[a]	.499	.489	.71508052

a. Predictors: (Constant), z-score: EC-Emotional Cut-off, Zscore: FO-Fusion w/Others, Zscore: ER-Emotional Reactivity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.195E-15	.059		.000	1.000
	Zscore: FO-Fusion w/Others	-.001	.065	-.001	-.023	.982
	Zscore: ER-Emotional Reactivity	.551	.075	.551	7.308	.000
	Zscore: EC-Emotional Cut-off	.230	.072	.230	3.198	.002

a. Dependent Variable: z-score: TO-Technology Optimism

Since FO was insignificant, it was eliminated, and the multiple regression analysis was performed with TO as the dependent variable and ER and EC as the independent variables. A very strong predictive relationship (Field, 2009) of R^2 Linear = .50, $F(1, 147) = 72.238$, $p < .001$ (see Table 13) was found.

Table 13 Multiple Regression analysis of TO with ER, and EC

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.706[a]	.499	.492	.71261178

a. Predictors: (Constant), z-score: EC-Emotional Cut-off, Zscore: ER-Emotional Reactivity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.192E-15	.059		.000	1.000
	Zscore: ER-Emotional Reactivity	.550	.071	.550	7.708	.000
	Zscore: EC-Emotional Cut-off	.230	.071	.230	3.218	.002

a. Dependent Variable: z-score: TO-Technology Optimism

Since ER had the highest beta coefficient, the regression analysis was run with TO as the dependent variable and ER as the only independent variable and found to be a strong predictive relationship (Field, 2009) of R^2 Linear = .46, $F(1, 147) = 126.040$, $p < .001$ (see Figure 19). This plot shows the overall strength of the predictive relationship for each factor with ER being the highest relationship followed by EC.

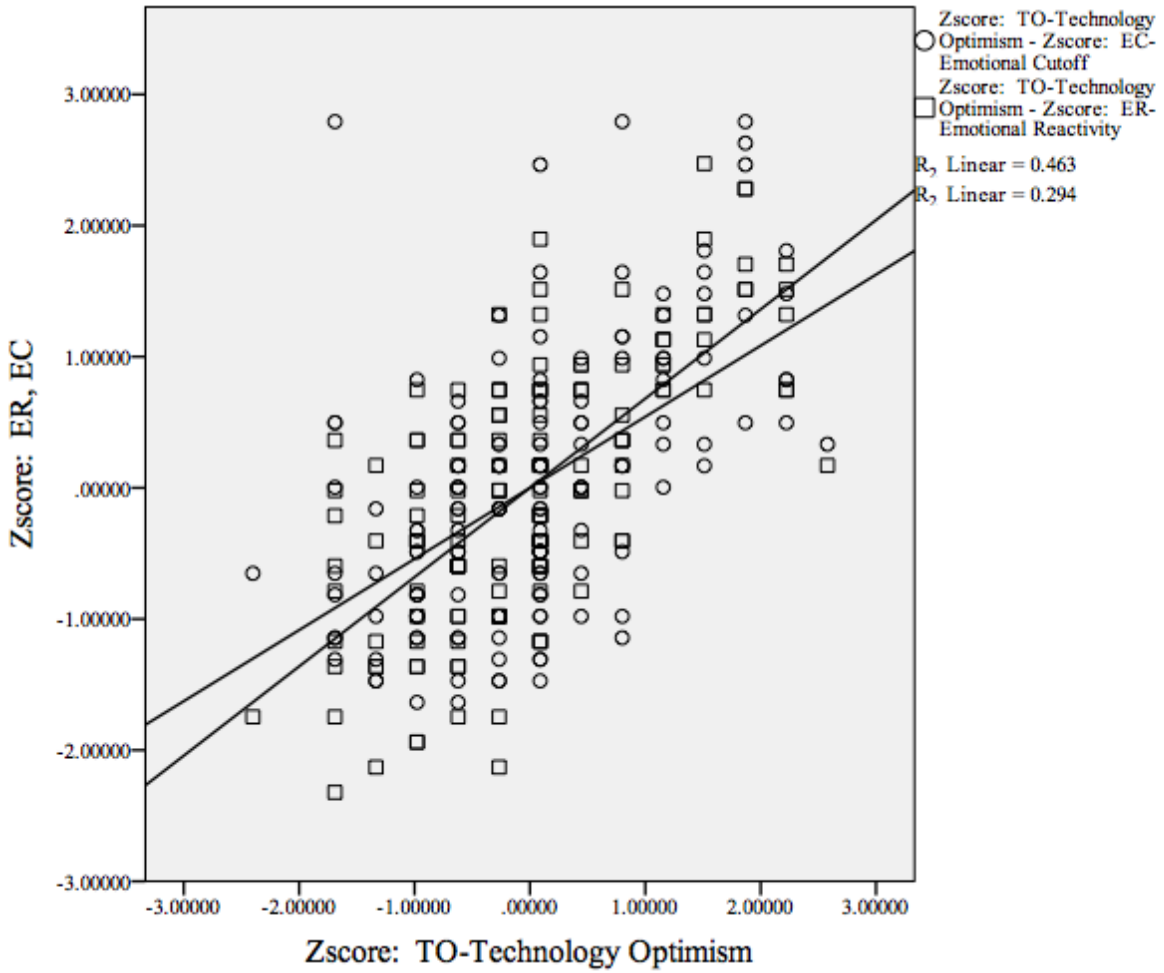

Figure 19 Scatter plot of Technology Optimism (TO) as the dependent variable and Emotional Reactivity (ER) and Emotional Cut-off (EC) as the independent variables. The regression line of Emotional Reactivity showed the highest predictive relationship followed by Emotional Cut-off.

When the additional subattributes of the TRI-2.0 were considered, TI gave a moderately strong predictive relationship of R^2 Linear = .33, $F(3, 144) = 23.150$ (Field, 2009) with all three WDI Attributes (see Table 14).

Table 14 Multiple regression analysis of TI with FO, ER, and EC

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.570[a]	.325	.311	.82987261

a. Predictors: (Constant), z-score: EC-Emotional Cut-off, Zscore: FO-Fusion w/Others, Zscore: ER-Emotional Reactivity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-4.578E-16	.068		.000	1.000
	Zscore: FO-Fusion w/Others	.381	.075	.381	5.055	.000
	Zscore: ER-Emotional Reactivity	.220	.087	.220	2.515	.013
	Zscore: EC-Emotional Cut-off	.107	.083	.107	1.286	.201

a. Dependent Variable: z-score: TI-Technology Innovation

Since the dependent variable of EC was insignificant at $p > .05$, it was excluded from the subsequent regression analysis. Accordingly, the regression was re-calculated using TI as the dependent variable and ER and EC as the independent variables. The resulting analysis showed a score of R^2 Linear = .206, $F(2, 145) = 18.770$ (see Table 15), which is considered a weak predictive relationship (Field, 2009). Since the relationship was weak an additional comparison of TI as a dependent variable and ER as an independent variable was not pursued.

Table 15 Multiple regression analysis of TI with EC and ER

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.453[a]	.206	.195	.89738693

a. Predictors: (Constant), z-score: EC-Emotional Cut-off, Zscore: ER-Emotional Reactivity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.494E-16	.074		.000	1.000
	Zscore: ER-Emotional Reactivity	.357	.090	.357	3.974	.000
	Zscore: EC-Emotional Cut-off	.142	.090	.142	1.583	.116

a. Dependent Variable: z-score: TI-Technology Innovation

Additional regression analyses were conducted with ER and EC as independent predictor variable and TI and TD as dependent outcome variables. Both were found to have an insignificant predictive relationship. TS had an insignificant relationship with R^2 Linear = .060, $F(3, 144) = 3.067$, and TD had an insignificant relationship at R^2 Linear = 0.051, $F(3, 144) = 2.594$.

Research Question #3

Are there one or more aspects of the TRI-2.0 that can serve as predictive models of workplace differentiation for individuals or groups? To examine if there was a predictive effect of technology on emotional differentiation at the workplace, multiple regression analyses were done with TO, TS, TD and TI as independent predictor variables and WDI as the dependent outcome variable. The relationship of TO, TI, and TS as independent predictor variables was

found to have the strongest predictive relationship with the dependent outcome variable of WDI with TO, TI contributing with the greatest statistical effect. As a result the TO and TI were then analyzed with each of the attributes of the WDI, with FO, EC, and ER, as dependent outcome variables to find the most significant predictive relationship. A summary of the regression analyses that were conducted is shown below (see Table 16).

Table 16 Summary of Regression Analyses with WDI as the Outcome Variable

Independent Predictor Variable	Dependent Outcome Variable	R (square)
TO, TI, TS, TD	WDI	0.566
TS, TO, TI	WDI	0.566
TO, TI	WDI	0.548
TO	WDI	0.410
TO, TI	FO	0.280
TO, TI	EC	0.330
TO, TI	ER	0.525

Multiple Regression with TRI-2.0 as Predictor Variable and WDI as Outcome Variable

A regression analysis was conducted with TO, TI, TS, and TD as the independent predictor variables and the WDI as the dependent outcome variable. This was to find if technology readiness or its attributes had any relationship with workplace differentiation. A very strongly predictive relationship (Field, 2009) was found R^2 Linear = .57, $F(4, 143) = 46.650$, $p < .001$ was found (see Table 17).

Table 17 Multiple Regression Analysis of WDI and TO, TI, TS, TD

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752[a]	.566	.554	.66782695

a. Predictors: (Constant), z-score: TD-Technology Discomfort, Zscore: TI-Technology Innovation, z score: TO-Technology Optimism, Zscore: TS-Technology Insecurity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.784E-15	.055		.000	1.000
	Zscore: TO-Technology Optimism	.511	.058	.511	8.758	.000
	Zscore: TI-Technology Innovation	.375	.058	.375	6.487	.000
	Zscore: TS-Technology Insecurity	.127	.060	.127	2.127	.035
	Zscore: TD-Technology Discomfort	.022	.060	.022	.365	.716

a. Dependent Variable: WDI Composite

Since TD was insignificant with $p > .05$, it was eliminated from the subsequent multiple regression analysis. Another regression analysis with WDI as the dependent outcome variable and TO, TI, and TS as independent predictor variables was found to have a very strong predictive relationship (Field, 2009) of R^2 Linear = .566 $F(3, 144) = 62.532$, $p < .001$ (see Table 18).

Table 18 Multiple Regression Analysis of WDI and TO, TI, TS

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752[a]	.566	.557	.66581432

a. Predictors: (Constant), z-score: TS-Technology Insecurity, Zscore: TI-Technology Innovation, Zscore: TO-Technology Optimism

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.818E-15	.055		.000	1.000
	Zscore: TO-Technology Optimism	.514	.058	.514	8.908	.000
	Zscore: TI-Technology Innovation	.376	.058	.376	6.525	.000
	Zscore: TS-Technology Insecurity	.135	.055	.135	2.442	.016

a. Dependent Variable: WDI Composite

Since TS was insignificant with a value $p > .01$, it was eliminated from the subsequent multiple regression analysis with WDI as the dependent outcome variable and TO and TI as independent predictor variables. The resulting analysis showed a very strong predictive relationship (Field, 2009) of R^2 Linear = .548, $F(2, 145) = 87.812$, $p < .001$ (see Table 19).

Table 19 Multiple Regression Analysis of WDI and TO, TI

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.740[a]	.548	.542	.67711181

a. Predictors: (Constant), z-score: TI-Technology Innovation, Zscore: TO-Technology Optimism

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.597E-15	.056		.000	1.000
	Zscore: TO-Technology Optimism	.526	.058	.526	9.004	.000
	Zscore: TI-Technology Innovation	.388	.058	.388	6.636	.000

a. Dependent Variable: WDI Composite

A regression analysis between just the WDI and TO was performed, the strongly predictive relationship (Field, 2009) was expressed as R^2 Linear = .41, $F(2, 145) = 101.634$, $p < .001$ (see Table 20). A scatter plot was generated to show the regression relationship between the WDI and the TO, TI, and TS values (see Figure 20). This plot shows the overall relationship and the strength of the predictive relationship for each factor with TO and TI the highest followed by TI.

Table 20 Regression of WDI and TO

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.641[a]	.410	.406	.77046583

a. Predictors: (Constant), z-score: TO-Technology Optimism

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.270E-15	.063		.000	1.000
	Zscore: TO-Technology Optimism	.641	.064	.641	10.081	.000

a. Dependent Variable: WDI Composite

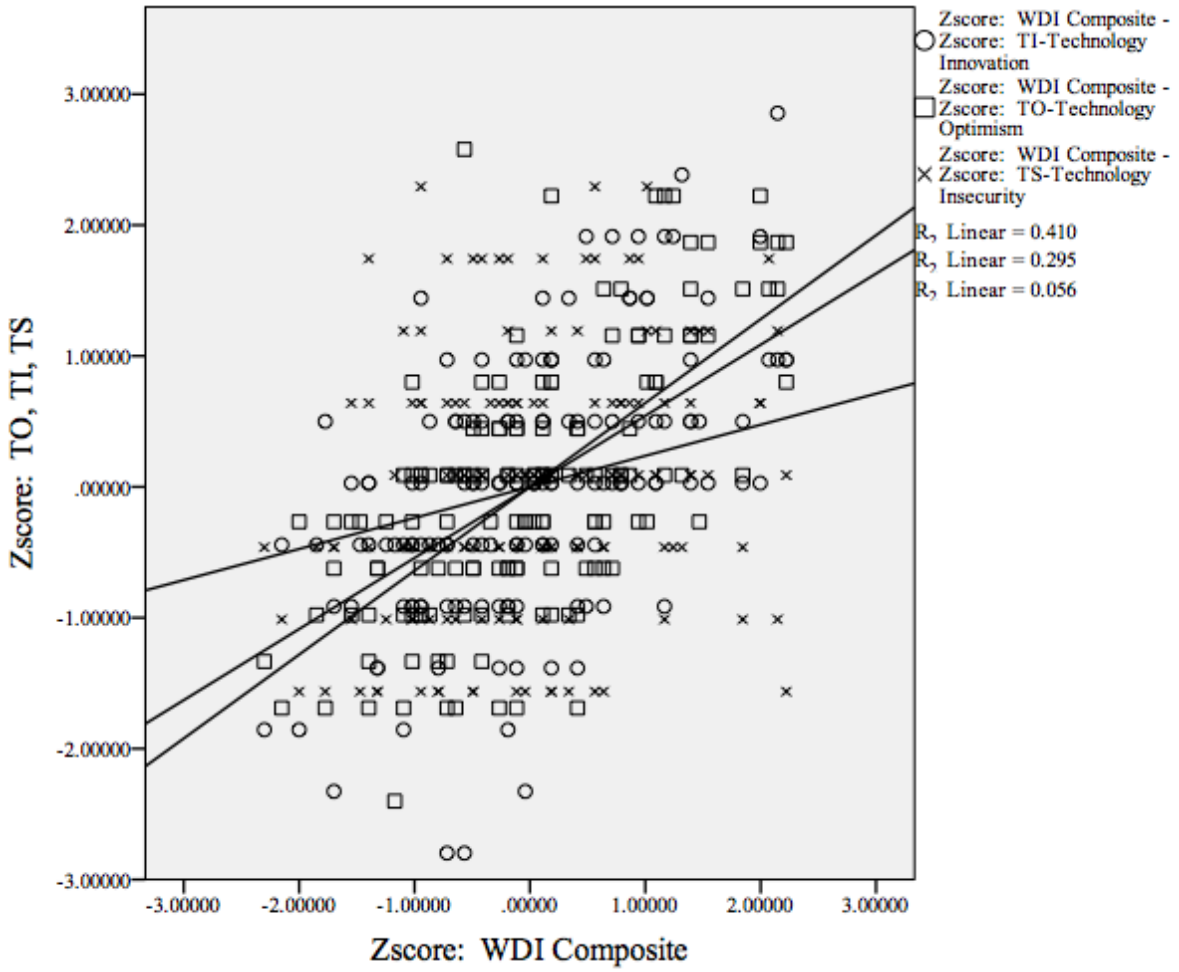

Figure 20 Scatter plot of Workplace Differentiation (WDI) as the dependent variable and Technology Optimism (TO), Technology Innovation (TI) and Technology Insecurity (TS) as the independent variables. The regression lines Technology Optimism and Technology Insecurity show the greatest predictive effect followed by Technology Insecurity.

The strongest predictive relationship existed with TO, TI, and TS as the independent predictor variables and the WDI as the dependent outcome variable with TO and TI contributing the greatest predictive effect. Further regression analysis was conducted with the attributes of the WDI, specifically, FO, ER, and EC, as dependent outcome variables and TO with TI as independent predictor variables. With FO as the dependent outcome variable; the regression

provided a weak predictive relationship (Field, 2009) of R^2 Linear = .28, $F(1, 147) = 27.758$, $p < .001$.

With EC as the dependent variable and TI and TO as independent variables, the predictive relationship was slightly higher with R^2 Linear = .33, $F(1, 147) = 35.942$, $p < .001$. However, the relationship between ER as the dependent variable and TI and TO as independent variables showed a strongly predictive relationship (Field, 2009) of R^2 Linear = .53, $F(1, 147) = 80.132$, $p < .001$ (see Table 21).

Table 21 Regression analysis between ER and TO and TI

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.725[a]	.525	.518	.69393728

a. Predictors: (Constant), z-score: TI-Technology Innovation, Zscore: TO-Technology Optimism

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.941E-15	.057		.000	1.000
	Zscore: TO-Technology Optimism	.604	.060	.604	10.084	.000
	Zscore: TI-Tecnnology Innovation	.260	.060	.260	4.340	.000

a. Dependent Variable: z-score: ER-Emotional Reactivity

Research Question #4:

Are there any differences based on demographic attributes of the sample population related to an individual's TRI-2.0 and WDI scores? The means of the demographic variables of Gender (G), Certification Level (CERT), Years of Experience (EXP), Technology Self-Assessment (TSA), and Office Affiliation (AFF) were compared to the values of the TRI-2.0 and WDI. Then the ANOVA analysis was performed among the demographic variables to find if a correlation analysis was possible.

Gender

When comparing the TRI-2.0 to the demographic variables, the following means were identified. Females and males scored on the TRI-2.0 with a score of 3.25 (0.34 STD) and 3.29 (0.33 STD) respectively. Figure 15 shows that females had a marginally greater TRI-2.0 mean with +/- 5% confidence level error bars (see Figure 21).

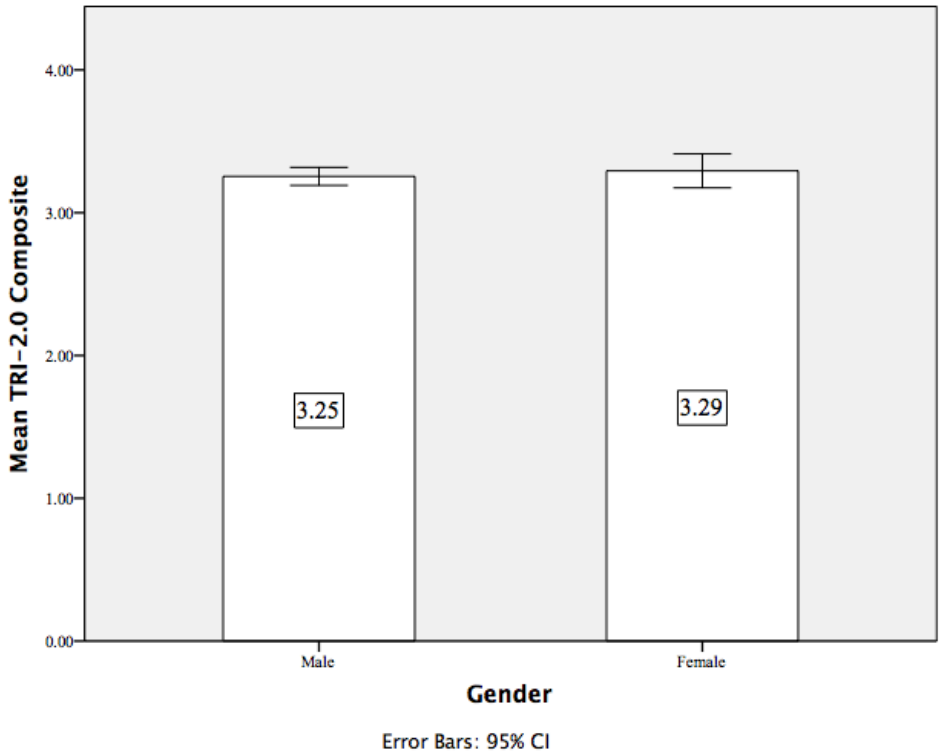

Figure 21 Comparison of the TRI-2.0 Composite mean score by Gender

The attributes of the TRI-2.0, technology optimism, technology innovation, technology insecurity, and technology discomfort were compared by gender. Females had a greater mean score of TO 3.87 (STD 0.70) and males 3.64 (STD 0.70). Males had a higher level of TI at 3.99 (STD 0.52) and TD at 3.08 (STD 0.79) compared to females of 3.98 (STD 0.58) and 2.91 (STD 0.75) respectively. Males had a higher level of TS at 2.47 (STD .93) than females with a score of 2.23 (STD 0.80) showing similar values (see Figure 22).

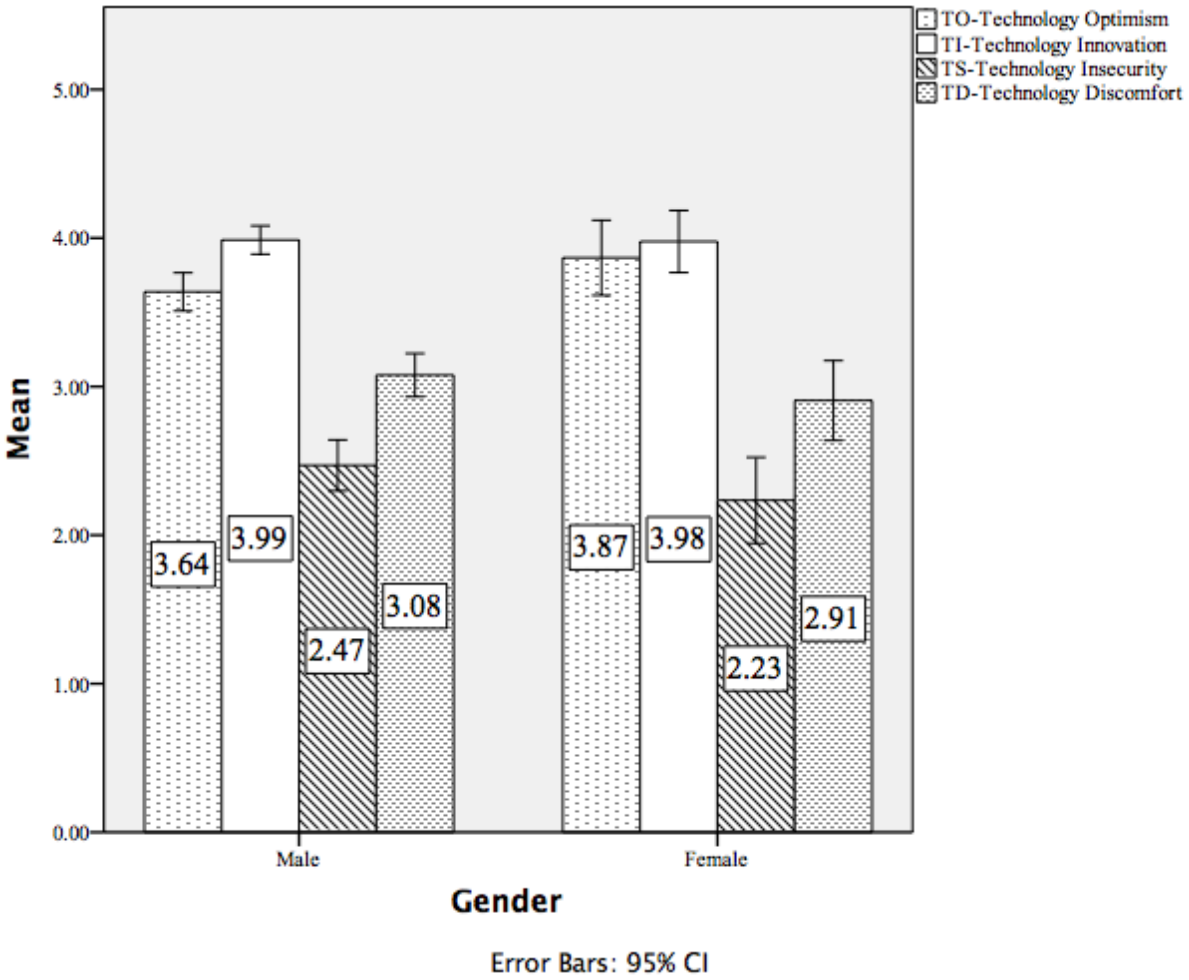

Figure 22 Comparison of the attributes of the TRI-2.0 by Gender

With respect to the WDI, females had greater mean score of 83.03 (STD 13.40) to males at 81.11 (STD 13.25). Figure 23 shows females with a slightly greater WDI mean score with +/- 5% confidence level error bars.

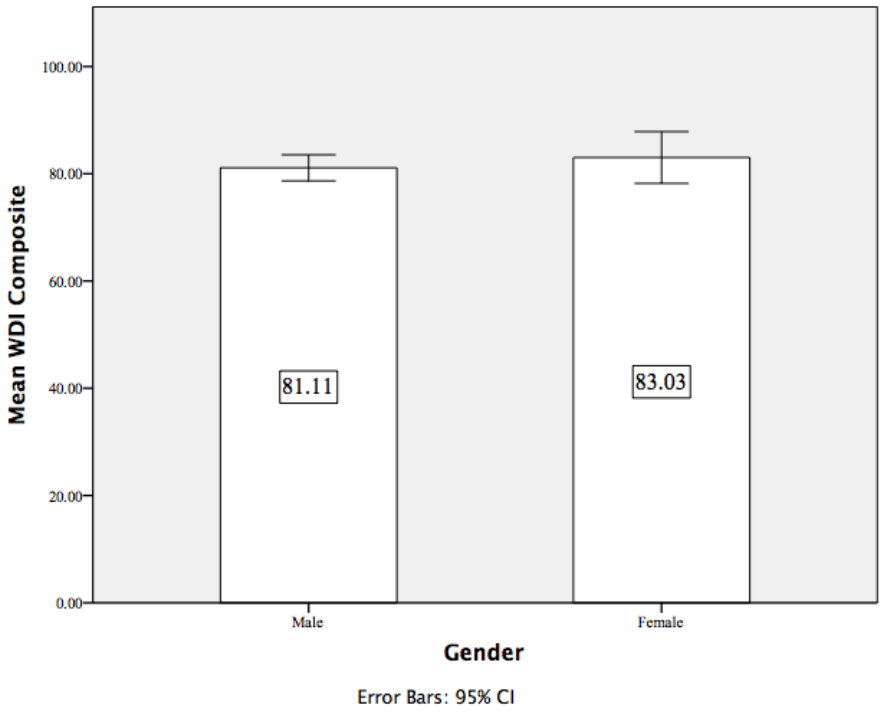

Figure 23 Comparison of the WDI Composite mean scores by Gender

Examination of the attributional variables of the WDI, fusion with others, emotional reactivity, and emotional cut-off also shows similar values. Females had a slightly greater ER score at 30.50 (STD 5.53) and an EC score at 16.19 (STD 6.56) than males of 28.72 (STD 5.08) and 15.91 (STD 5.99) respectively. Males had a slightly greater FO score with 36.47 (STD 5.67) than females at 36.34 (STD 5.35). Figure 24 illustrates the comparative similarity of the scores between the attributes of Workplace Differentiation between the male and female groups.

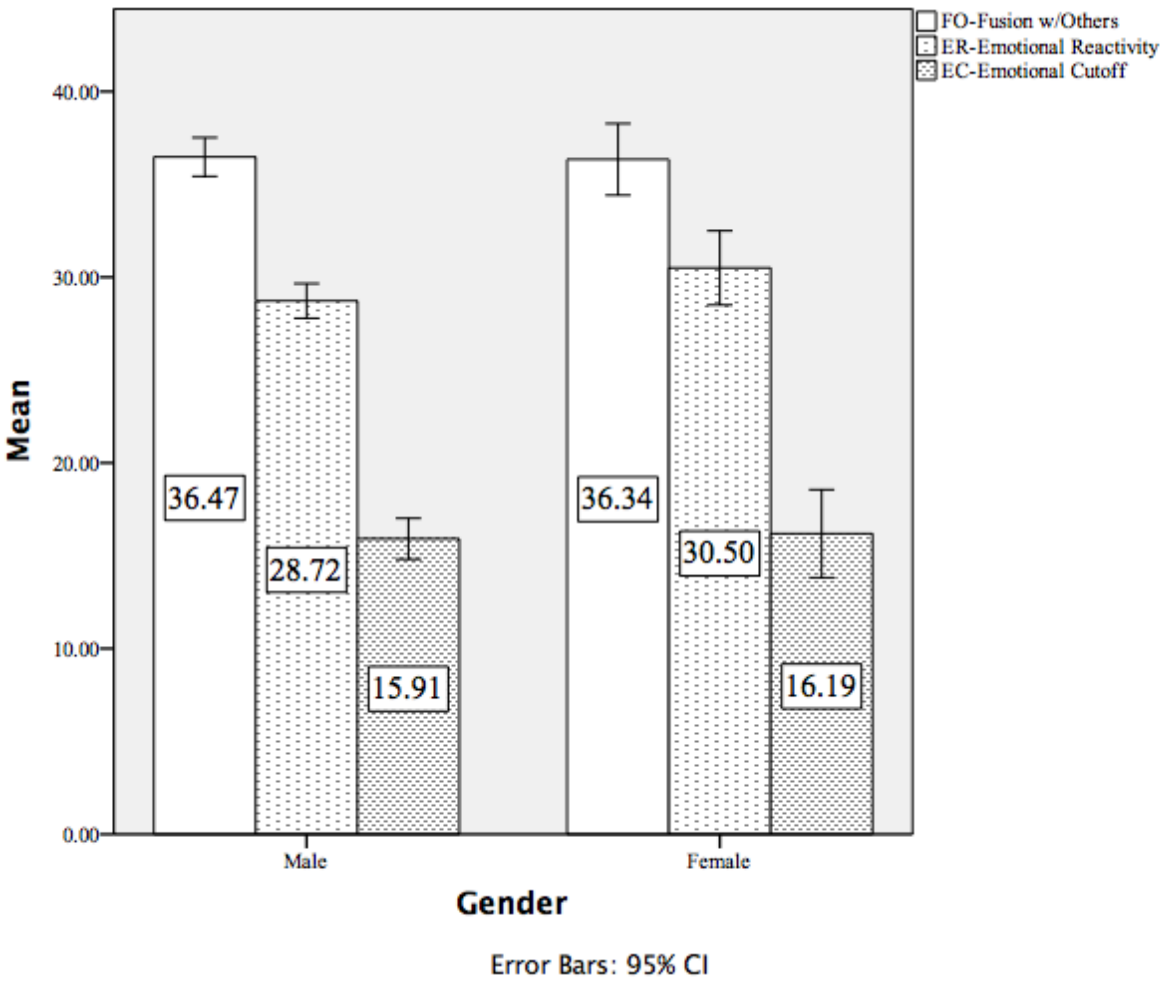

Figure 24 Comparison of the attributes of WDI mean scores by Gender

Gender Independent t-Test

Since the gender category involved only two groups with the same experimental conditions, independent-means t-tests were performed with the means of the WDI and TRI-2.0 compared among the female and male groups. Although mean value for WDI was greater for females (M = 83.03, SE = 2.37) than to males (M = 81.11, SE =1.23), this difference was not significant $t(146) = -.723$, $p > .05$. The mean value for the TRI-2.0 was greater for females (M = 3.29, SE = .058) than for males (M = 3.25, SE = .032), but the difference was insignificant $t(146) = -.568$, $p > .05$.

Self-Assessed Proficiency

Those self-assessing themselves as intermediates were the highest with a TRI of 3.31 (0.34 STD; n = 34) and had the highest scores in all categories of TO, TI, TS, and TD at 3.92 (0.73 STD), 4.05 (0.51 STD), 2.49 (0.84 STD), and 3.21 (0.84 STD) respectively. Specialists were the next highest with a TRI of 3.27 (0.35 STD; n = 48) and had scores of TO, TI, TS, and TD of 3.65 (0.70 STD), 4.04 (0.48 STD), 2.41 (0.98 STD), and 3.01 (0.84 STD) respectively. The one novice respondent had the lowest TRI-2.0 score of 2.88 (n = 1) with a TO, TI, TS, and TD score of 3.00, 3.75, 2.00 and 3.25 respectively. Experts had the next lowest TRI-2.0 score of 3.24 (0.34 STD; n = 65) and were lower in TO, TI, TS, and TD at 3.61 (0.68 STD), 3.92 (0.58 STD), 2.40 (.91 STD), and 2.97 (0.71 STD) respectively (see Figure 25, Table 22).

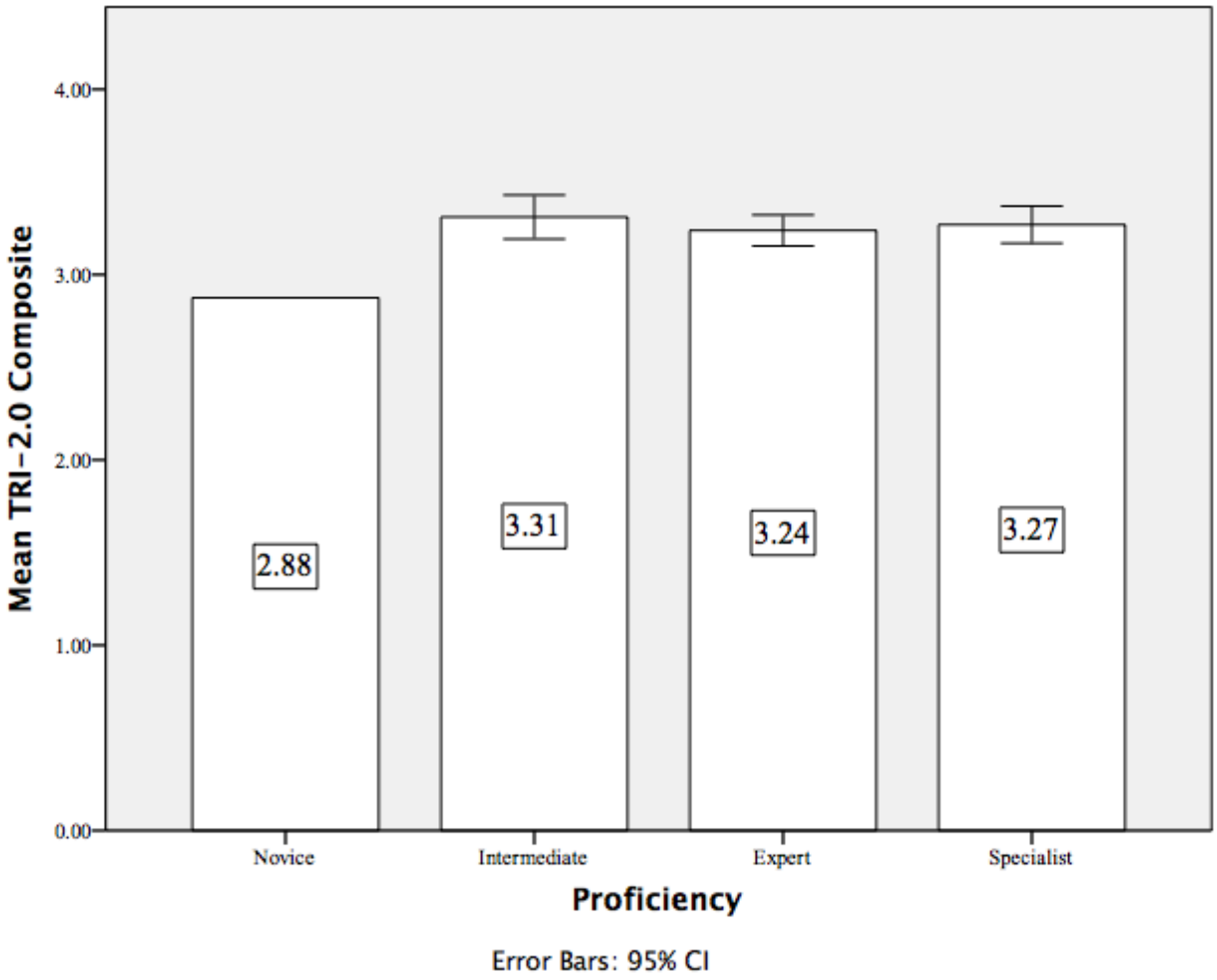

Figure 25 Comparison of the TRI-2.0 mean scores by level of Self-Assessed Proficiency

Table 22 Mean values of the attributes of the TRI-2.0 by level of Self-Assessed Proficiency

Report

Proficiency		TRI-2.0 Composite	TO-Technology Optimism	TI-Technology Innovation	TS-Technology Insecurity	TD-Technology Discomfort
Novice	Mean	2.8750	3.0000	3.7500	2.0000	3.2500
	N	1	1	1	1	1
	Std. Deviation	.	.	.	.	.
Intermediate	Mean	3.3107	3.9191	4.0515	2.4853	3.2132
	N	34	34	34	34	34
	Std. Deviation	.34007	.73009	.51042	.83924	.84417
Expert	Mean	3.2385	3.6077	3.9154	2.4000	2.9692
	N	65	65	65	65	65
	Std. Deviation	.33782	.68318	.57669	.90657	.71056
Specialist	Mean	3.2695	3.6458	4.0365	2.4062	3.0104
	N	48	48	48	48	48
	Std. Deviation	.34502	.68965	.48099	.97662	.83628
Total	Mean	3.2627	3.6875	3.9848	2.4189	3.0405
	N	148	148	148	148	148
	Std. Deviation	.33991	.70281	.53071	.90737	.78303

With the WDI, the intermediates were highest with a mean score of 85.56 (13.21 STD; n = 34) with greater mean scores in ER 31.21 (5.25 STD) and EC 17.82 (6.52 STD) but no significant differences observed (see Figure 26, Table 23). The single novice was the lowest at 63.00 (n = 1). Specialists were the next lowest with the WDI score of 81.10 (14.00 STD; n = 48) and low scores in EC of 15.6 (6.85 STD) and FO at 36.33 (5.96 STD; n = 48). Experts had a score of WDI score of 80.02 (12.40 STD; n = 65) with a low score in ER of 28.03 (4.91 STD).

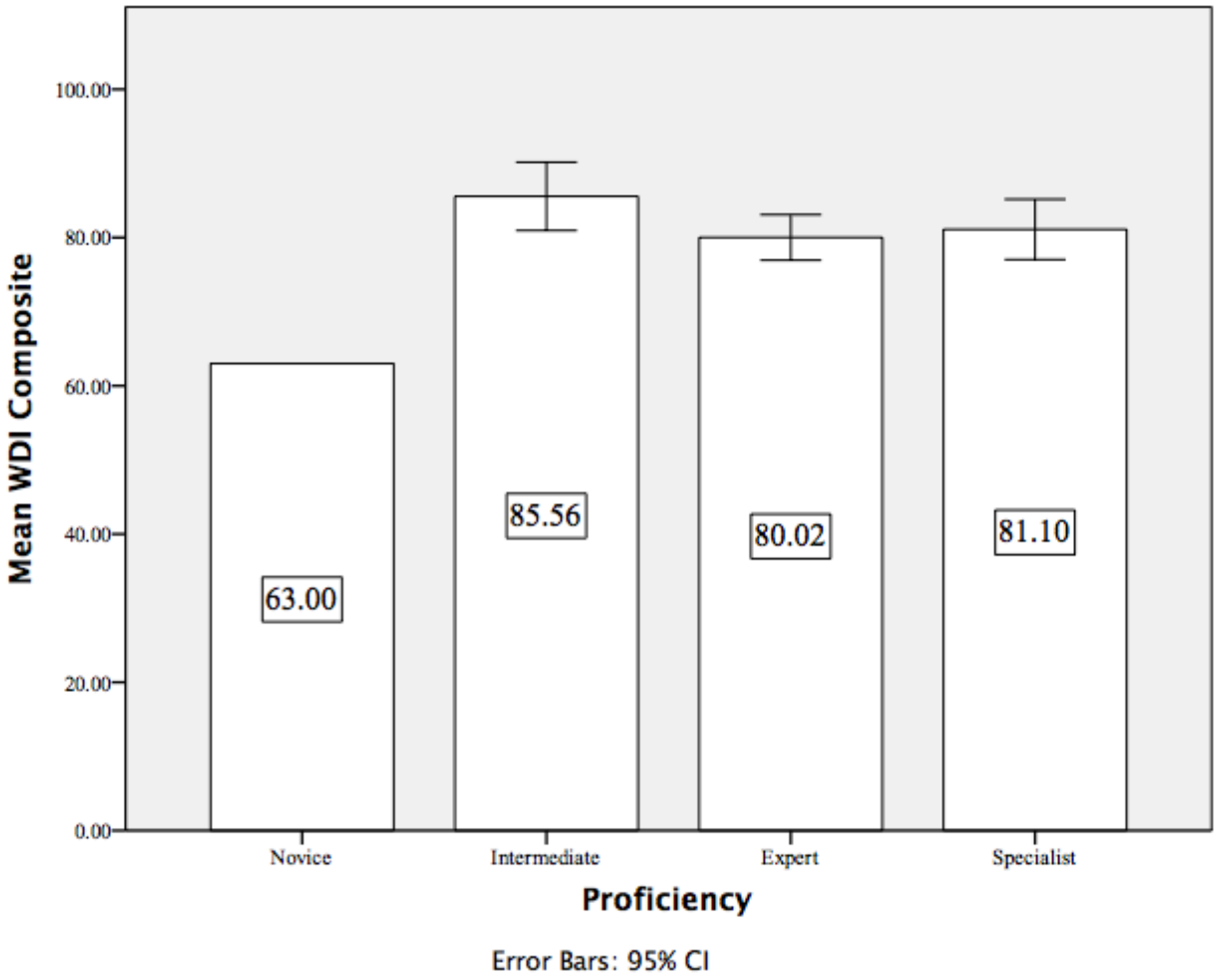

Figure 26 Comparison of the WDI mean scores by level of Self-Assessed Proficiency

Table 23 Mean values of the attributes of the WDI by level of Self-Assessed Proficiency

Report

Proficiency		WDI Composite	FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
Novice	Mean	63.0000	30.0000	27.0000	6.0000
	N	1	1	1	1
	Std. Deviation	.	.	.	.
Intermediate	Mean	85.5588	36.5294	31.2059	17.8235
	N	34	34	34	34
	Std. Deviation	13.20971	5.17708	5.24999	6.51558
Expert	Mean	80.0154	36.5846	28.0308	15.4000
	N	65	65	65	65
	Std. Deviation	12.39896	5.57307	4.90526	5.02432
Specialist	Mean	81.1042	36.3333	29.1250	15.6458
	N	48	48	48	48
	Std. Deviation	13.99884	5.96205	5.29803	6.85252
Total	Mean	81.5270	36.4459	29.1081	15.9730
	N	148	148	148	148
	Std. Deviation	13.26365	5.58580	5.21528	6.09778

Years of Experience

With years of experience (EXP), the TRI-2.0 was highest with two groups; those over 30 years at 3.34 (0.27 STD; n = 31) and 11-15 years at 3.34 (0.66 STD; n = 21). Those with over 30 years had a high score of 2.95 (0.76) of TS. Practitioner with 11-15 years of experience had the highest TI score of 4.21 (.50 STD) and TO of 3.89 (.66 STD). The lowest mean score was the group with 0-5 years of experience of 3.14 (0.19 STD; n = 16) with the lowest mean score of 1.94 (0.68 STD) in technology insecurity than the other groups (see Figure 27, Table 24).

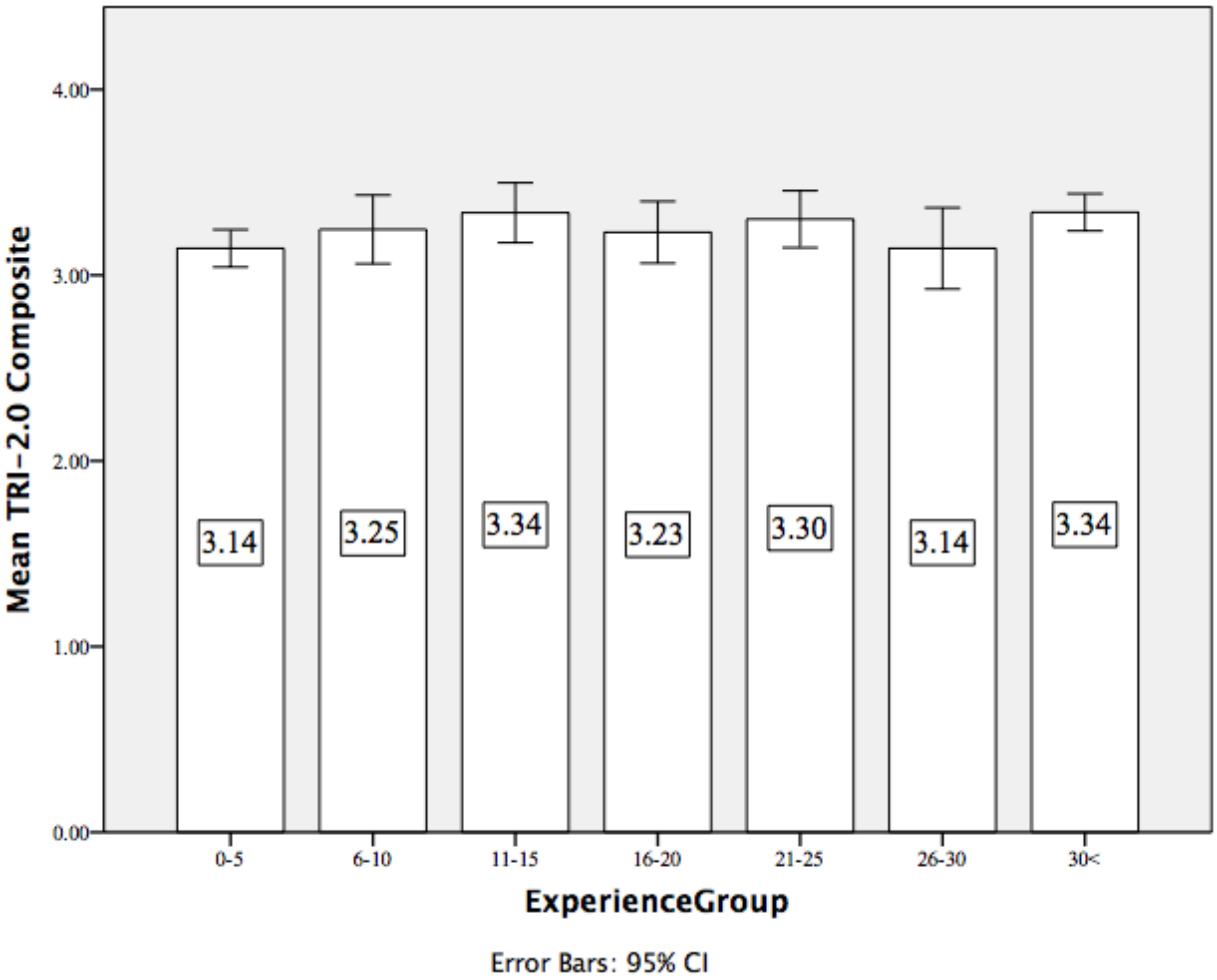

Figure 27 Comparison of the TRI-2.0 mean scores by Years of Experience

Table 24 Mean values of the attributes of the TRI-2.0 by level of Years of Experience

Report

Experience Group		TO-Technology Optimism	TI-Technology Innovation	TS-Technology Insecurity	TD-Technology Discomfort
0-5	Mean	3.8281	3.9844	1.9375	3.1719
	N	16	16	16	16
	Std. Deviation	.55316	.40279	.68007	.54558
6-10	Mean	3.8333	4.0694	2.1667	3.0833
	N	18	18	18	18
	Std. Deviation	.74755	.55443	.72761	.62426
11-15	Mean	3.8929	4.2143	2.2143	2.9762
	N	21	21	21	21
	Std. Deviation	.65941	.50178	.79955	.90797
16-20	Mean	3.7065	4.0435	2.4783	3.3043
	N	23	23	23	23
	Std. Deviation	.72163	.50369	.95915	.71094
21-25	Mean	3.6739	3.9783	2.4783	2.9239
	N	23	23	23	23
	Std. Deviation	.51915	.52176	.94722	.89327
26-30	Mean	3.3906	3.7500	2.2500	2.8125
	N	16	16	16	16
	Std. Deviation	.83151	.68920	1.15470	.84902
30<	Mean	3.5403	3.8629	2.9516	3.0000
	N	31	31	31	31
	Std. Deviation	.78288	.49514	.75669	.81394
Total	Mean	3.6875	3.9848	2.4189	3.0405
	N	148	148	148	148
	Std. Deviation	.70281	.53071	.90737	.78303

Comparing years of experience to the WDI scores showed the highest score at 86.33 (STD 12.29; n = 21) for 11-15 years of experience and the lowest of 73.69 (STD 16.65; n = 16) for 26-30 years of experience. A slight downward trend was seen from 11-15 years until 26-30 years then upward after 30 years. Fusion with others was highest with those with 0-5 years at 37.69 (STD 6.38; n = 16) and lowest for those with 26-30 years at 33.75 (STD 6.57; n = 16). Emotional reactivity was highest with those with 11-15 years at 31.29 (STD 4.74; n = 21) and lowest with those with 26-30 years at 26.00 (STD 6.20; n = 16). Emotional cut-off mean score was highest for those with 11-15 years at 17.05 (STD 6.49; n = 21) and for those with 30 or more years at 15.52 (STD 5.48; n = 31) it was the lowest (see Figure 28, Table 25).

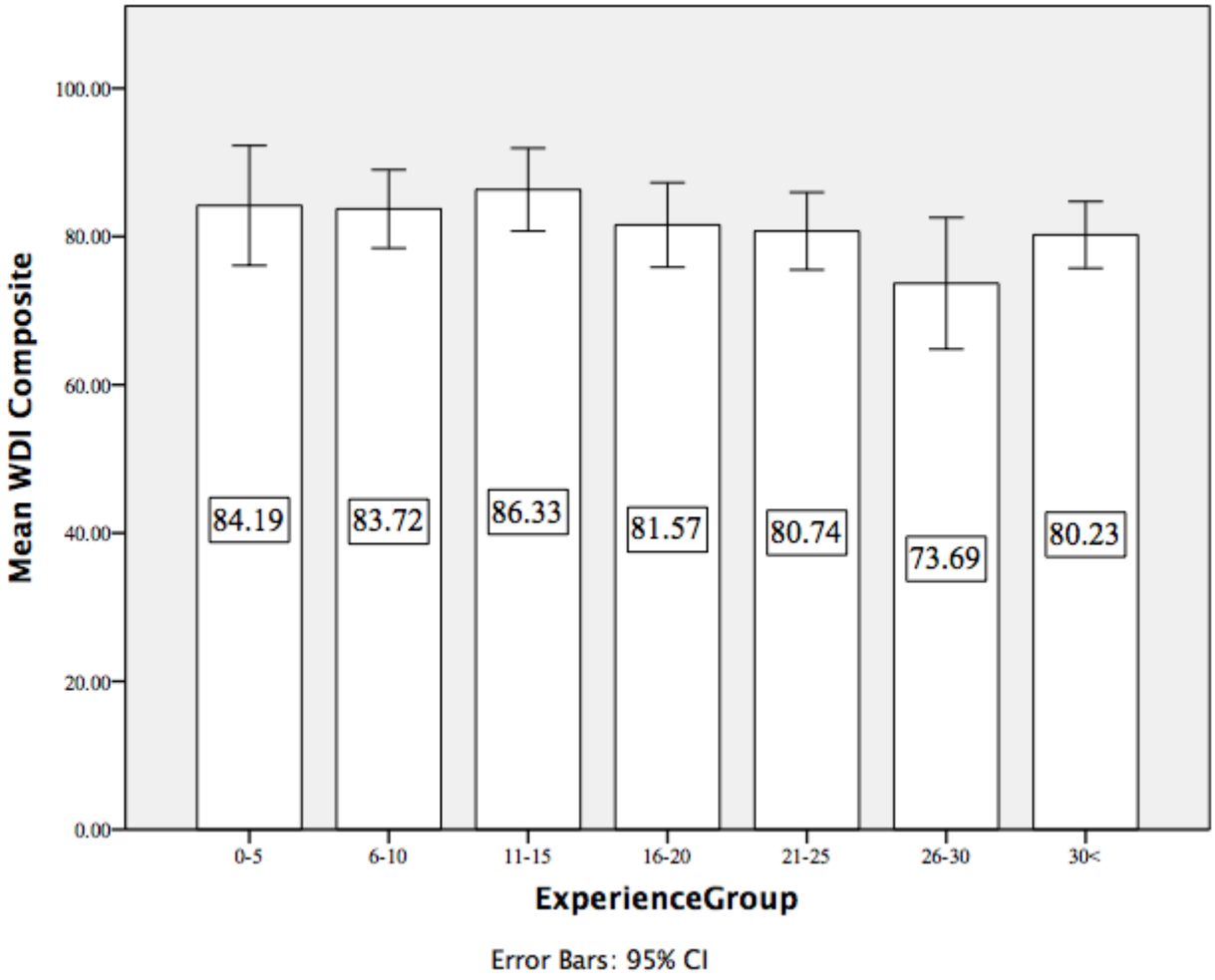

Figure 28 Comparison of the WDI mean scores by Years of Experience

Table 25 Mean values of the attributes of the WDI by level of Years of Experience

WDI Values by Years of Experience

Experience Group		FO-Fusion w/Others	ER-Emotional Reactivity	EC-Emotional Cut-off
0-5	Mean	37.6875	30.3750	16.1250
	N	16	16	16
	Std. Deviation	6.38455	6.18466	7.12624
6-10	Mean	35.8889	30.5000	17.3333
	N	18	18	18
	Std. Deviation	5.06300	4.54067	4.71543
11-15	Mean	38.0000	31.2857	17.0476
	N	21	21	21
	Std. Deviation	4.38178	4.74492	6.49212
16-20	Mean	35.4348	29.2609	16.8696
	N	23	23	23
	Std. Deviation	6.65942	5.37855	6.00231
21-25	Mean	37.8261	27.9565	14.9565
	N	23	23	23
	Std. Deviation	5.44937	3.49647	6.47708
26-30	Mean	33.7500	26.0000	13.9375
	N	16	16	16
	Std. Deviation	6.56760	6.20752	6.79675
30<	Mean	36.1935	28.5161	15.5161
	N	31	31	31
	Std. Deviation	4.51973	5.11124	5.48252
Total	Mean	36.4459	29.1081	15.9730
	N	148	148	148
	Std. Deviation	5.58580	5.21528	6.09778

Certification Level

As shown in Figure 29 the certification levels (CERT), the other certifications category had the highest composite TRI-2.0 score with 3.40 (0.61 STD; n = 5) followed by BOCP at 3.39 (0.16 STD; n = 5) and CFo at 3.34 (0.13 STD; n = 2) with the lowest score by the CPA at 2.63 (n = 1).

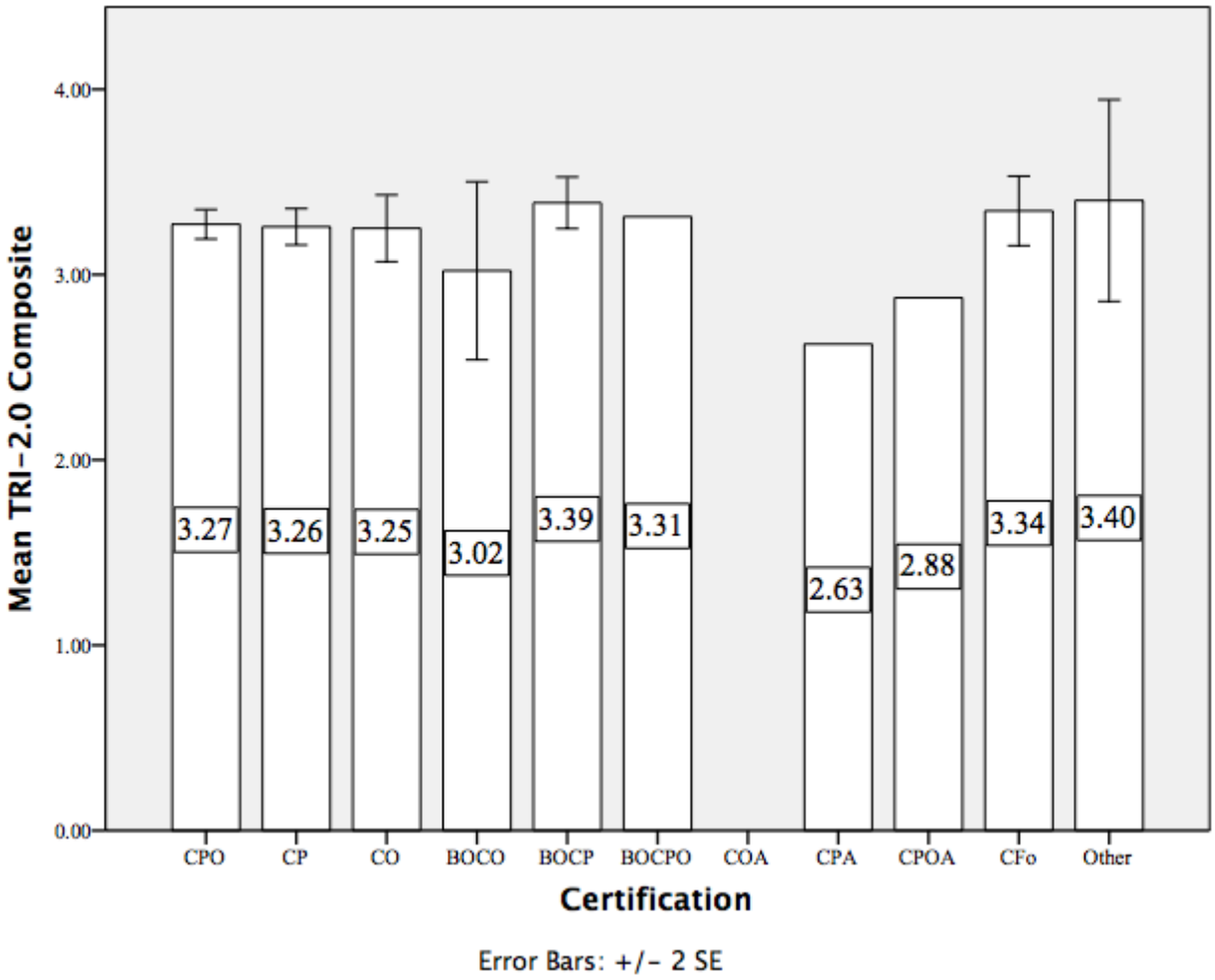

Figure 29 Mean scores of TRI-2.0 by Certification Level

The BOCP had the highest mean WDI score at 87.00 (6.32 STD; n = 5) followed by CFo at 85.50 (16.26 STD; n = 2) and Other Certifications at 85.20 (18.07 STD; n = 5). The CPA at 55.00 (n = 1) had the lowest value (see Figure 30).

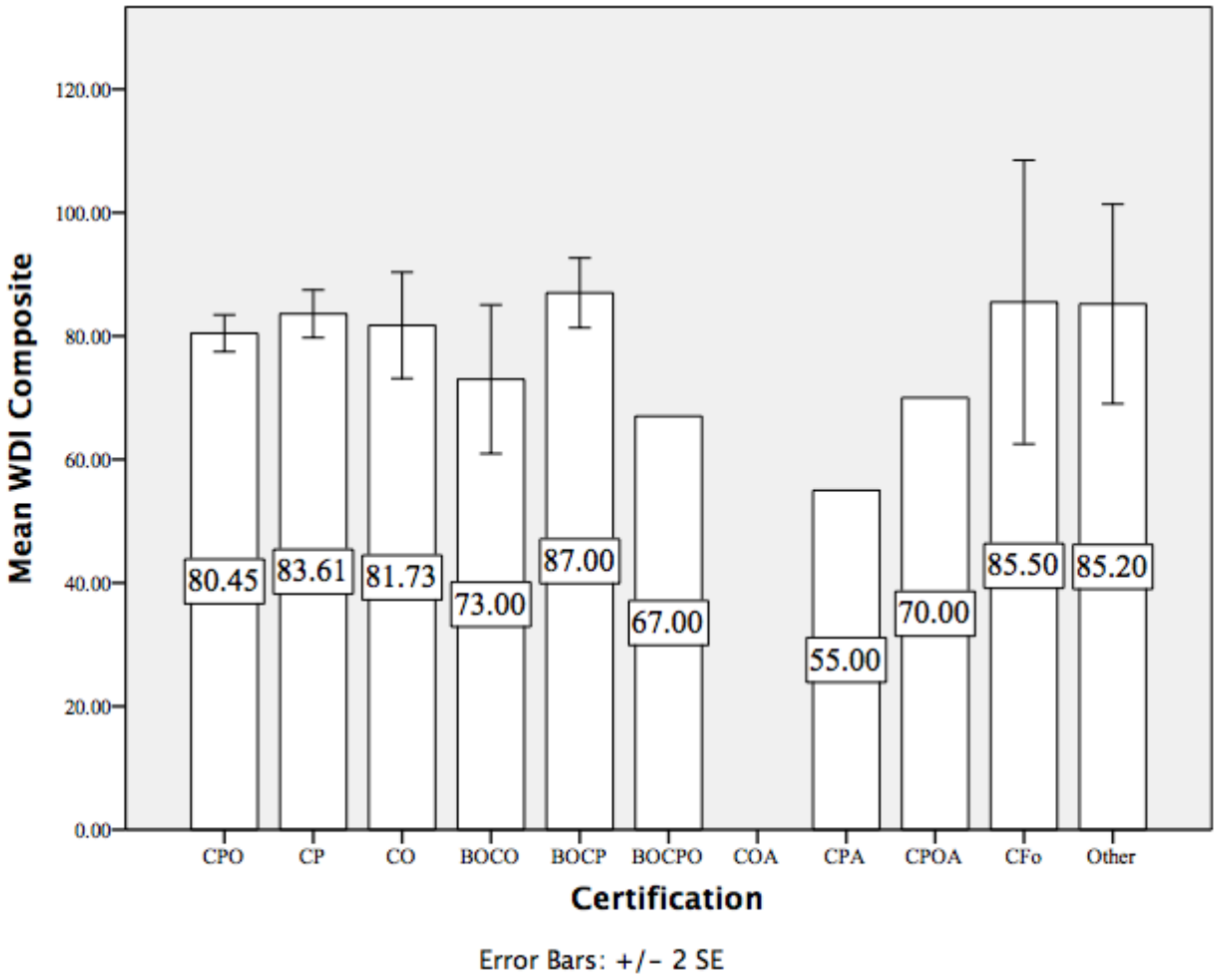

Figure 30 Mean scores of WDI by Certification Level

Office Affiliation

With respect to those affiliation hospital/rehab center group had the highest TRI-2.0 score with 3.41 (0.42 STD, n = 17) followed by private clinics with 3.27 (0.35 STD; n = 83) and corporate affiliation with 3.24 (0.29 STD; n = 32). The TRI-2.0 among those with institutional clinics at 3.06 (0.27 STD; n = 2) had the lowest value (see Figure 31).

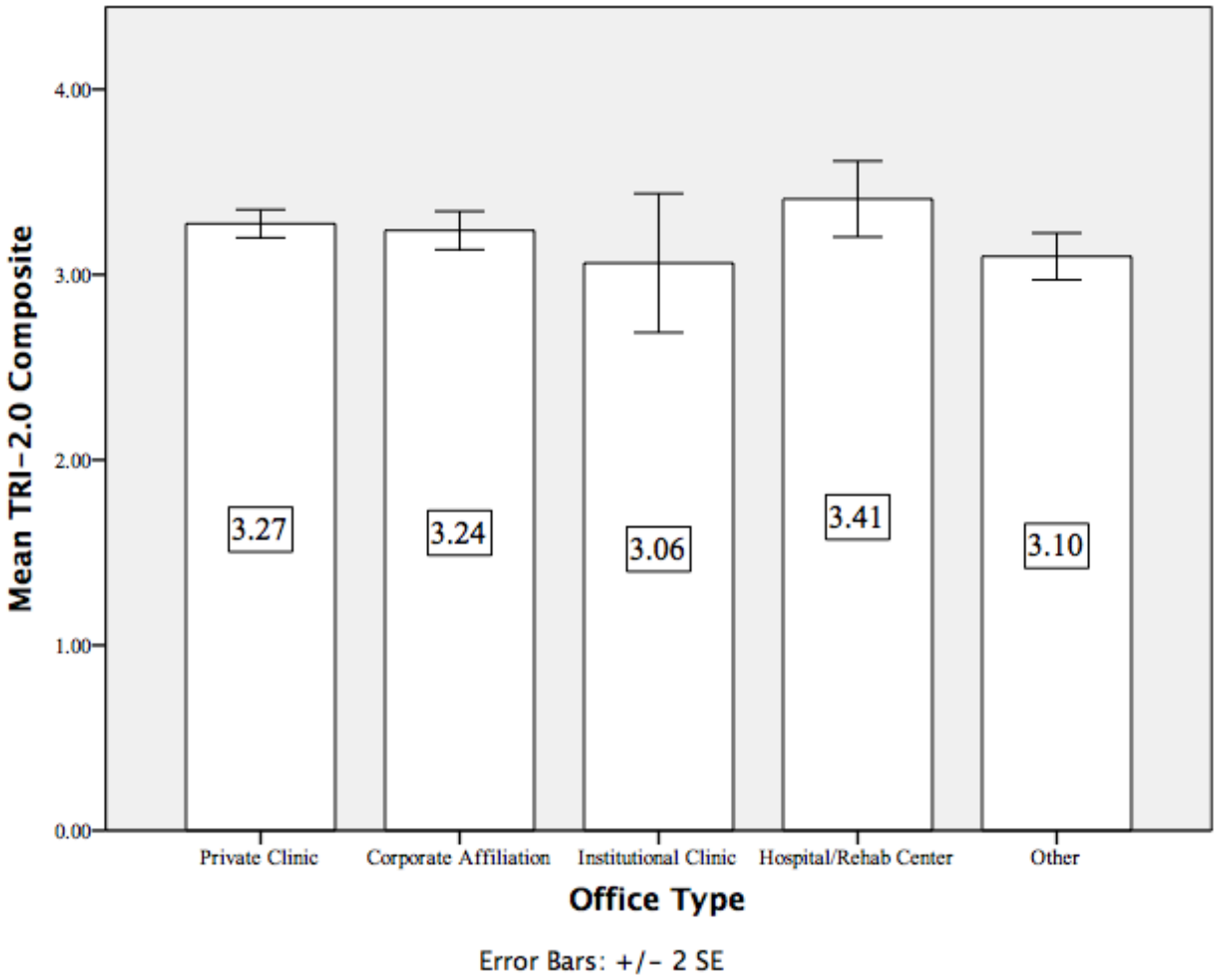

Figure 31 Mean scores of TRI-2.0 by Office Affiliation

The comparison of WDI scores by office type (see Figure 32) showed the highest level among those with hospital/rehab center affiliations at 87.00 (14.79 STD; n = 17) and private clinics at 82.13 (13.59 STD; n = 83). The WDI was shown to be lowest among the classification of other groups at 72.64 (11.37 STD; n = 14) and institutional clinics at 80.50 (14.85 STD; n = 2).

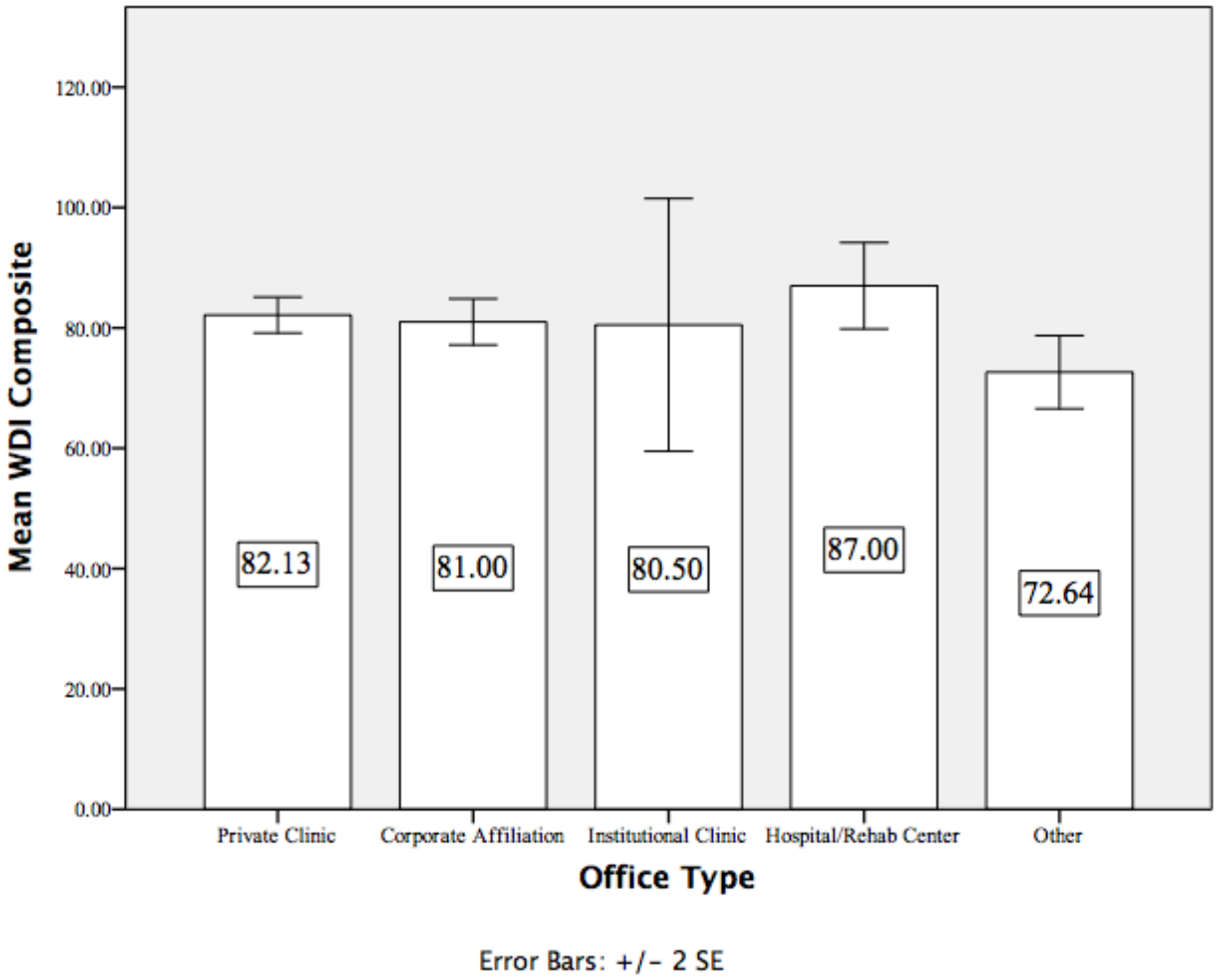

Figure 32 Mean scores of WDI by Office Affiliation

Internal and External Linkages

When respondents were asked about the number of internal (INLK) and external linkages (EXLK), the mean of the aggregate group was 6.17 (STD 13.65) for internal linkages and 10.22 (STD 17.58) for external linkages. As expected, specialists had a greater number of mean internal and external linkages at 8.27 (18.88 STD; n = 48) and 14.81 (22.27 STD; n = 48) respectively, experts at 5.49 (12.46 STD; n = 65) and 8.86 (17.2 STD; n = 65) and intermediates at 4.62 (3.28 STD; n = 34) for internal linkages and 6.62 (6.38 STD; n = 34). The results are summarized below for each level of self-assessed proficiency (see Figure 33).

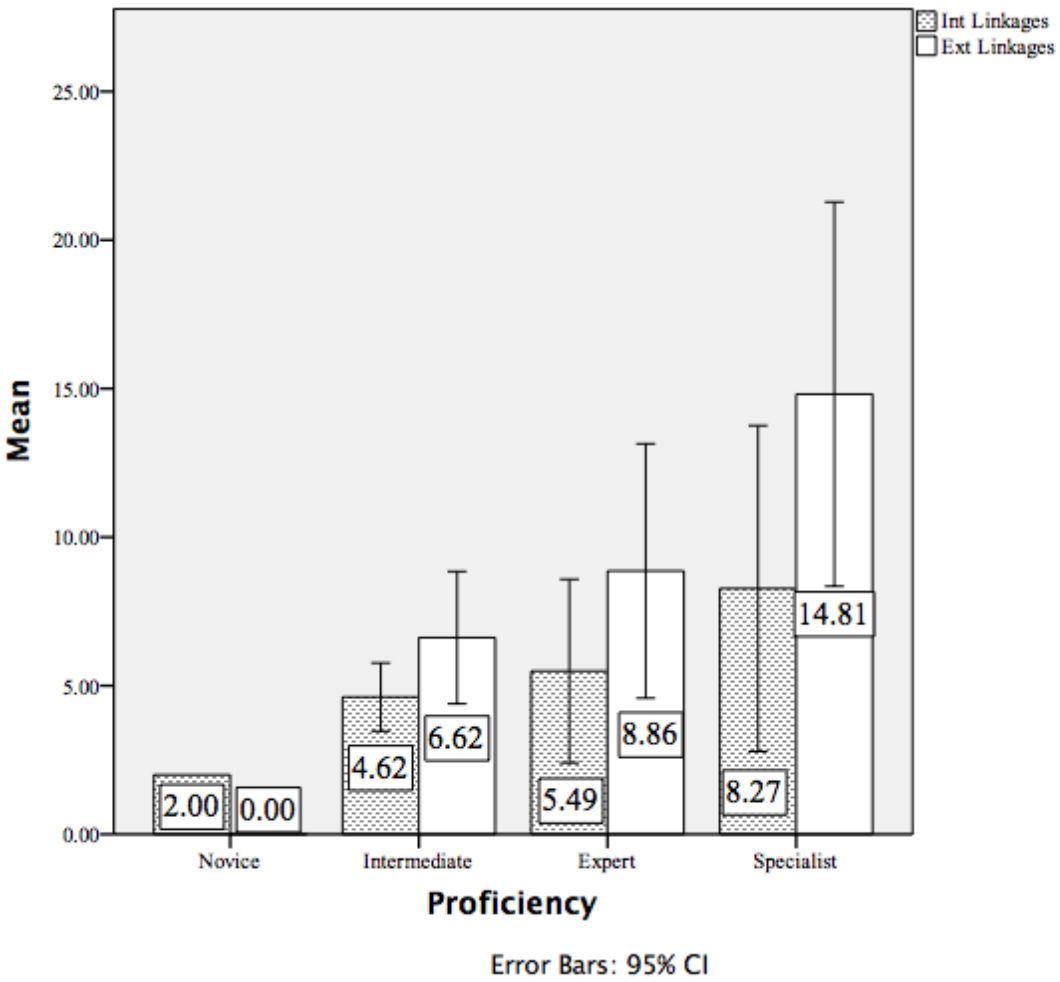

Figure 33 Mean Internal and External Linkages by Self-Assessed Level of Proficiency

Number of High Tech Components used Annually

The number of estimated High Tech Patients seen per year (HTP) was a mean of 5.69 (9.17 STD) for elevated vacuum, 7.06 (14.83 STD) for microprocessor knees, 6.03 (16.93 STD) for upper extremity myoelectric systems, 1.74 (5.17) for microprocessor/stance control orthoses, and 1.51 (5.15 STD) for neurostimulation devices. Specialists were the highest group respectively for MPK at 9.15 (20.09 STD; n = 48) and for myoelectric devices at 14.75 (27.62 STD, n = 48), and neurostimulation products at 2.29 (8.16 STD, n =48), but the experts were

greater with microprocessor/stance orthoses at 2.06 (6.03 STD; n = 65). The results are shown for each level of self-assessed proficiency (see Figure 34).

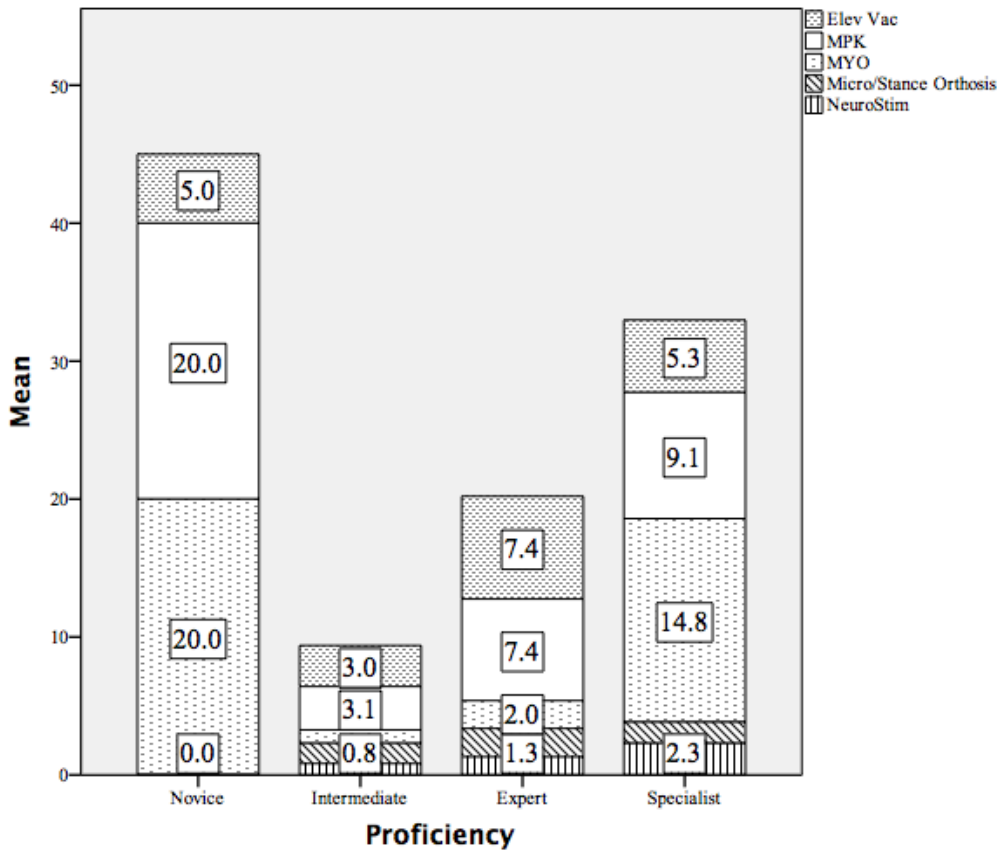

Figure 34 Mean number of High Tech components per year by Self-Assessed Level of Proficiency

With respect to the office affiliation (AFF) the corporate affiliation showed the highest cumulative means with 10.47 (20.23 STD, n = 32) microprocessor knees, 12.81 (27.71 STD; n = 32) myoelectric, 0.91 (2.08 STD; n = 32) microprocessor/stance control orthoses, and 1.56 (4.92 STD; n = 32) neurostimulation products. Institutional clinics showed a greater number of microprocessor/stance control devices at 7 (7.07 STD; n = 2) as well as other affiliations with 5.36 (13.93 STD; n = 14).

Correlation Analysis of Demographic Variables

The demographic variables of gender (G), certification level (CERT), years of experience (EXP), technology self-Assessment (TSA), and office affiliation (AFF) were analyzed with the TRI-2.0 and the WDI using a bivariate two-tailed correlation. The TRI-2.0 did not have significant relationships with G, CERT, EXP, TSA, or AFF. The WDI had a slightly significant relationship with years of experience with $r = -.19$, p (two-tailed) $< .05$ (Field, 2009). This indicated that the EXP had a slightly significant relationship with workplace differentiation where more years of experience denoted a slightly lower degree of workplace differentiation.

In addition, the WDI did not have a significant relationship with G, CERT, or TSA, or AFF. Between G and EXP there was a significant relationship of $r = -.34$, p (two-tailed) $< .01$, and a significant relationship between G and AFF $r = .22$, p (two-tailed) $< .01$. A significant relationship was found between CERT and AFF $r = .16$, p (two-tailed) $< .05$, and EXP and TSA $r = .34$, p (two-tailed) $< .01$ (see Table 26).

Table 26 Correlations between TRI-2.0 and WDI with demographic variables

Correlations

		TRI-2.0 Composite	WDI Composite	Gender	Cert	Exp	Self Assess	Office
TRI-2.0 Composite	Pearson Correlation	1	.583**	.047	.007	.096	-.014	-.049
	Sig. (2-tailed)		.000	.571	.937	.244	.867	.554
	N	148	148	148	148	148	148	148
WDI Composite	Pearson Correlation	.583**	1	.060	.009	-.190*	-.081	-.089
	Sig. (2-tailed)	.000		.471	.915	.021	.327	.281
	N	148	148	148	148	148	148	148
Gender	Pearson Correlation	.047	.060	1	.074	-.336**	-.143	.216**
	Sig. (2-tailed)	.571	.471		.369	.000	.083	.008
	N	148	148	148	148	148	148	148
Certification	Pearson Correlation	.007	.009	.074	1	-.146	.076	.164*
	Sig. (2-tailed)	.937	.915	.369		.078	.358	.047
	N	148	148	148	148	148	148	148
Experience	Pearson Correlation	.096	-.190*	-.336**	-.146	1	.339**	.061
	Sig. (2-tailed)	.244	.021	.000	.078		.000	.459
	N	148	148	148	148	148	148	148
Proficiency	Pearson Correlation	-.014	-.081	-.143	.076	.339**	1	-.010
	Sig. (2-tailed)	.867	.327	.083	.358	.000		.901
	N	148	148	148	148	148	148	148
Office Type	Pearson Correlation	-.049	-.089	.216**	.164*	.061	-.010	1
	Sig. (2-tailed)	.554	.281	.008	.047	.459	.901	
	N	148	148	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Since the only significant relationship found in the demographic correlation was between the WDI composite score and years of experience, a regression analysis was done to determine if there was a predictive relationship. A predictive relationship existed with R^2 Linear = .036, $F(1, 147) = 5.465$, $p < .05$ (see Table 27), which is considered to be extremely weak (Field, 2009).

Table 27 Regression relationship of WDI Composite and Years of Experience

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.190[a]	.036	.029	13.06669

a. Predictors: (Constant), Experience

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	86.211	2.273		37.920	.000
	Experience	-.224	.096	-.190	-2.338	.021

a. Dependent Variable: WDI Composite

Certification Level ANOVA Analysis

The ANOVA analysis was compared with TRI-2.0 and the WDI with respect to certification level. All certification groups with less than 10 respondents, other than CPO, CP, and CO, were combined into one group labeled combined other for the analysis of variance. Levene's statistic for equality of variants was insignificant at $F(3, 144) = .335$, $p > .05$ between certification groups and the TRI-2.0 scores. The ANOVA analysis showed an insignificant effect between certification groups and the TRI-2.0 scores, $F(3, 144) = .034$, $p > .05$. Levene's statistic

for equality of variants was insignificant at $F(3, 144) = 1.153$, $p > .05$ between certification groups and the WDI scores. The ANOVA analysis showed an insignificant effect between certification groups and the WDI scores, $F(3, 144) = .589$, $p > .05$.

Technology Self-Assessment ANOVA Analysis

The ANOVA analysis was performed with TRI-2.0 and the WDI with respect to the technology self-assessment. Because the novice group with n =1 was inadequate to fulfill the requirements for homogeneity and distribution, it was not included in the analysis of variance which was done between the three intermediate, expert, and specialist groups. Levene's statistic for equality of variants was insignificant at $F(3, 144) = .068$, $p > .05$ between technology self assessment and the TRI-2.0 scores. The ANOVA analysis showed an insignificant effect between technology self-assessment and the TRI-2.0 scores, $F(3, 144) = .772$, $p > .05$. Levene's statistic for equality of variants was insignificant at $F(3, 144) = .640$, $p > .05$ between technology self assessment and the WDI scores. The ANOVA analysis showed an insignificant effect between technology self-assessment and the WDI scores, $F(3, 144) = 2.038$, $p > .05$.

Office Affiliation ANOVA Analysis

The ANOVA analysis was run with TRI-2.0 and the WDI with respect to the office affiliation level and no significant difference was found between the groups. To insure that the groups were mutually exclusive, if the respondent chose more than one, the higher certification was chosen as the representative certification. For example if a person was an American Board for Certification certified prosthetist (CP) and a Board for Certification orthotist (BOCO), CP was chosen as the single representative certification. Levene's statistic for equality of variants

was insignificant at $F(3, 144) = 2.450$, $p > .05$ between office affiliation and the TRI-2.0 score. The subsequent ANOVA analysis showed an insignificant effect between office affiliation and TRI-2.0 score, $F(3, 144) = 2.521$, $p > .05$. Levene's statistic for equality of variants was insignificant at $F(3, 144) = 1.397$, $p > .05$ between office affiliation and WDI score. However there was a significant effect of office affiliation on the WDI score of $F(3, 144) = 3.055$, $p < .05$ and the (see Table 28). Using the Games-Howell there was a significant difference of means between the combined other and the hospital/rehab center groups. The Dunnett t 2-tailed showed differences of means between the combined other, private clinics, and hospital/rehab center groups (see Table 29).

Table 28 ANOVA Analysis of WDI and Office Affiliation.

Test of Homogeneity of Variances

WDI Composite

Levene Statistic	df1	df2	Sig.
1.397	3	144	.246

ANOVA

WDI Composite

			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		1547.600	3	515.867	3.055	.030
	Linear Term	Weighted	200.951	1	200.951	1.190	.277
		Deviation	1346.649	2	673.325	3.988	.021
	Quadratic Term	Weighted	379.497	1	379.497	2.248	.136
		Deviation	967.152	1	967.152	5.728	.018
Within Groups			24313.292	144	168.842		
Total			25860.892	147			

Table 29 ANOVA analysis of WDI and TRI-2.0 with Office Affiliation.

Multiple Comparisons

Dependent Variable: WDI Composite

	(I) Office Type	(J) Office Type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Games-Howell	Private Clinic	Corporate Affiliation	1.13253	2.43021	.966	-5.2630	7.5281
		Hospital/Rehab Center	-4.86747	3.88512	.601	-15.6602	5.9252
		Combined Other	8.50753	3.25583	.068	-.4814	17.4965
	Corporate Affiliation	Private Clinic	-1.13253	2.43021	.966	-7.5281	5.2630
		Hospital/Rehab Center	-6.00000	4.06781	.467	-17.1773	5.1773
		Combined Other	7.37500	3.47180	.170	-2.0954	16.8454
	Hospital/ Rehab Center	Private Clinic	4.86747	3.88512	.601	-5.9252	15.6602
		Corporate Affiliation	6.00000	4.06781	.467	-5.1773	17.1773
		Combined Other	13.3750*	4.60886	.033	.8438	25.9062
	Combined Other	Private Clinic	-8.50753	3.2558	.068	-17.4965	.4814
		Corporate Affiliation	-7.37500	3.4718	.170	-16.8454	2.0954
		Hospital/Rehab Center	-13.3750*	4.6089	.033	-25.9062	-.8438
Dunnett t (2-sided)[b]	Private Clinic	Combined Other	8.5075*	3.5478	.042	.2399	16.7751
	Corporate Affiliation	Combined Other	7.3750	3.9786	.144	-1.8964	16.6464
	Hospital/Rehab Center	Combined Other	13.3750*	4.5260	.009	2.8279	23.9221

*. The mean difference is significant at the 0.05 level.

b. Dunnett t-tests treat one group as a control, and compare all other groups against it.

Years of Experience ANOVA Analysis

Years of experience was separated into seven different groups, 0-5, 6-10, 11-15, 16-20, 21-25, 26-30, Greater than 30, to run the ANOVA analysis for the TRI-2.0 and the WDI. (see Table 32). Levene's statistic for equality of variants was insignificant at $F(6, 141) = 1.612$, $p > .05$ between years of experience and the TRI-2.0. The ANOVA analysis showed an insignificant effect of years of experience on the TRI-2.0 scores, $F(6, 141) = 1.165$, $p > .05$. Levene's statistic for equality of variants was insignificant at $F(6, 141) = .629$, $p > .05$ between years of experience and the WDI scores. The ANOVA analysis showed an insignificant effect of years of experience on the WDI scores, $F(6, 141) = 1.690$, $p > .05$.

Summary of Results

A total of 148 respondents took the survey over a 14-day period. The majority of the respondents were male (78%) with a mean value of years of experience at 21 years. A majority of respondents indicated their proficiency as experts with only one respondent as a novice. A majority worked in private clinics followed by corporate offices. Most of the respondents indicated certification as prosthetists, orthotists, or orthotists-prosthetists. These means were compared with several other surveys within the orthotic and prosthetic profession to evaluate the validity of the sample and found to be similar except the self-assessment, as experts and specialists seemed to be skewed higher.

Comparison of the means did not reveal obvious demographic differences or trends of the Technology Readiness Index (TRI-2.0) and Workplace Differentiation Inventory (WDI) with respect to gender, certification level, or self-assessed proficiency. Those affiliated with hospital/rehab centers seemed to score slightly higher with respect to the TRI-2.0 and WDI

scores. The groups with 11-15 and 30 or more years of experience scored slightly higher on the TRI-2.0, while those with 0-5 and 26-30 years of experience scored lower. The group with 11-15 years of experience scored more highly with the WDI, while those with 26-30 years of experience scored lower. As an internal check of the self-assessment validity, those who identified themselves as specialists and experts showed a greater number of internal and external linkages as well as use of number of high tech patients seen per year. Those with a corporate affiliation also showed a greater number of linkages and high tech componentry.

Examination of the relationships using two-tailed Pearson r correlation showed significant relationships between the composite scores of the Workplace Differentiation Inventory (WDI) and the Technology Readiness Index (TRI-2.0) as well as the attributional variables. There was a significant relationship between technology optimism with all attributes of the WDI, fusion with others, emotional reactivity, and emotional cut-off. Technology innovation also had significant relationships with fusion with others, emotional reactivity, and emotional cut-off. Technology insecurity showed significant relationships with emotional reactivity, emotional cut-off, and years of experience. Technology discomfort showed significant relationships with emotional reactivity and emotional cut-off.

The regression analysis showed a moderately strong predictive relationship between the WDI and the TRI-2.0. Using multiple regression and elimination of the lower coefficients, a very strong predictive relationship was found between technology optimism with emotional cut-off and emotional reactivity. Technology optimism and emotional reactivity alone shared a strong predictive relationship. Conversely, the WDI had very strong predictive relationship with technology optimism, technology innovativeness and technology insecurity with technology optimism contributing a majority of the effect. At the attributional level, the relationship of

technology innovation and technology optimism showed a strong predictive relationship with emotional reactivity.

The only significant difference among the demographic variables was an extremely weak relationship between the WDI composite score and years of experience. With a majority of demographic variables, the ANOVA analysis did not show significant variance of the means of the TRI-2.0 or the WDI respectively (see Table 30). There was a significant variance of the mean of the WDI scores found between private clinics and rehab/hospital centers with the combined other group using additional post hoc statistical tests.

Table 30 Summary of ANOVA Analyses with Levene's Statistic

Variable	Demographic Attrib.	F-Value	Df	Sig	Levene's Statistic	Sig
TRI-2.0	Cert. Level	0.034	(3, 144)	0.992	0.335	0.800
	Tech Self. Assess.	0.772	(3, 144)	0.511	0.068	0.934
	Office Aff.	2.521	(3, 144)	0.060	2.450	0.066
	Years of Exp	1.165	(6, 141)	0.328	1.612	0.148
WDI	Cert. Level	0.589	(3, 144)	0.623	1.153	0.330
	Tech Self. Assess.	2.038	(3, 144)	0.111	0.640	0.529
	Office Aff.	3.055	(3, 144)	0.030*	1.397	0.246
	Years of Exp	1.690	(6, 141)	0.128	0.629	0.707

* denotes significance $p < .05$

CHAPTER V

SUMMARY AND DISCUSSION

As the central tenant of Bowen Theory, differentiation has had limited empirical support and application outside of the area of family systems therapy (Licht, 2006; Miller, 2004). Through the systematic development of psychometric instruments that measure individual differentiation within the context of work relationships (Cavaiola, 2012; Skowron, 1998) the effect of differentiation may be examined. Within the discussion of diffusion of innovation, technology readiness can be used as measure of individual acceptance of technology (Parasuraman, 2014). The impetus for the study was to investigate why some healthcare practitioners were more adept with providing complex orthopedic technology than others. The methodological design of this investigation attempted to identify trait similarities of individuals described as having greater emotional differentiation and those who are considered early adopters of technology. This was done to discover if individuals who are more thoughtful, less emotionally reactive, and tolerant of differing opinions within the group are also more receptive to emerging innovations and are more technologically ready than others.

Statement of the Problem

The purpose of this study was to determine if any relationships existed between the attributes of individual emotional differentiation as measured by the WDI and technology readiness as measured by the TRI-2.0 with allied healthcare workers. Emotional differentiation

was defined by the three attributional sub-scores of the Work Differentiation Inventory (WDI) which included, emotional reactivity (ER), emotional cut-off (EC), and fusion with others (FO) as classified by Cavaiola (2012). These attributes were individually compared with the four sub-scores of the Technology Readiness Index 2.0 (TRI-2.0), which included: technology optimism (TO), technology innovativeness (TI), technology discomfort (TD), and technology insecurity (TS) as the attributes (Parasuraman, 2001, 2014). Both composite and attributional values were compared with the demographic variables of gender (G), certification level (CERT), years of experience (EXP), technology self-assessment (TSA), and office affiliation (AFF) that were assessed in preliminary studies by the author (Stark, 2014a, 2014b).

For this study, a sample of orthotic and prosthetic healthcare clinicians was surveyed to find if a relationship between emotional differentiation and technology readiness existed. Although the concept of differentiation in Family Systems Theory had been recognized since the late 1950's to describe the qualitative capability and performance of family groups (Bowen, 1978), it has not been utilized to identify varying levels of adoption of innovation. This same systemic measure can be used to predict how organizations and groups function while accepting emerging innovations or undergoing planned organizational change processes. Since the decision to adopt emerging technologies requires a higher level of social group interaction, emotional differentiation between individuals may play a significant overall role (Rogers, 2003; Schein, 2010).

Explanation of the Literature Review

A comprehensive literature review was conducted in the areas of Bowen Family Systems Theory, other family systems theories, diffusion of innovation, emotional intelligence, systems

based group processes, industrial/organizational psychology, and technology readiness. Since extensive empirical support was not found, a comparative analysis was done with a number of system-based theories with respect to workplace differentiation, and technology readiness. Along with similarities, various differences were explored among the various behavioral studies to provide added dimension and contrast to the discussion.

The comprehensive literature review did not reveal a substantial amount of empirical evidence regarding the application of Family Systems Theory within Industrial/Organizational Psychology. Much of the literature that existed was in the form of behavioral case studies and accounts relating the eight concepts of Bowen Theory within the workplace with little or no empirical support. Although these case studies described clinical application and use, there was little or no quantifiable data to support the results. Additional psychometric instruments were described within the literature review that explored the notion of emotional differentiation.

While empirical evidence existed associating differentiation with chronic anxiety, marital satisfaction, and psychological distress (Cavaiola, 2012; Kim-Appel, 2007; Skowron, 2000, 2014), little support existed for other factors, such as equal differentiation levels among married couples, effects of sibling order, and triangulation (Licht, 2006; Miller, 2004). Also, more empirical support was required for the concept of cross-generational research that described the influence of the anxiety from previous generations to subsequent generations (Miller, 2004).

The development of the empirical instruments that attempted to measure individual differentiation was described in the literature review. Bowen (1978) advocated against quantitative self-assessed measures of differentiation since he felt it took many hours of observational study and evaluation to properly assess. Although these early instruments were able to classify the attributes of differentiation, they failed to find cross-correlation between the

components of differentiation or to evaluate the intrapsychic aspects of the individual (Miller, 2004; Skowron, 1998).

Bowen Theory was compared to other system based family systems theories. Although there were structural similarities describing the influence of the group on the individual, Bowen Theory differed with the description of natural systems that are created spontaneously. Additionally, Bowen Theory advocated a more objective positioning of the observer to limit bias and influence on the group. Bowen expressed caution with the application of family systems theory to the workplace since he felt it did not have the same level of intimacy and emotional intensity. Nevertheless, modern workplaces are subject to a number of family role projections that may raise the level of social intensity (Cavaiola, 2012; Hochschild, 2001)

Similar social theories were compared from various organizational psychologists who proposed systems based organizational structures to support or inhibit organizational change behavior. These organizational psychologists described an invisible structural conflict that simultaneously pulled the group forward yet anchored it to previous beliefs to maintain homeostasis (Burke, 2010; Northouse, 2010; Schein, 2010). The successful groups were shown to have a greater capacity for differences of opinion with thoughtful communication that did not inhibit emotionally charged intensity between individuals (Burke, 2010; Northouse, 2010; Schein, 2010).

The effect and influence of group emotionality on the individual found in Bowen theory provided parallels to cognitive theories that describe thoughtful versus emotional thinking. Increased anxiety and emotionality were shown to increase the difficulty for individuals to make thoughtful choices especially with life and death decisions within healthcare (Kahneman, 2011). Although not a matter of life and death, innovation within an organization comes with a degree

of individual risk that the group can act to support or inhibit (Kahneman, 2011; Plous, 1993; Rogers, 2003).

The concept of differentiation within Bowen Theory was presented as the characteristic of the individual to resist the emotional anxiety of the group on their decision-making (Kahneman, 2011; Plous, 1993). Early adopters of innovation have been described as having a greater amount of social interaction, capacity for risk, and the ability to manage the uncertainty and anxiety of innovation (Rogers, 2003). Those with greater amounts of differentiation have been described as more rational, less dogmatic, and less anxious within a social group (Bowen, 1978; Rogers, 2003). This supported the notion that the two theories may describe similar traits.

A comparison was made between Bowen Theory and the more popular concept of Emotional Intelligence within the literature review (Goleman, 1995; Petrides, 2001; Salovey, 2004). Although both theories examine the use of emotion to convey the appropriate level of concern to the contextual situation, they differ with respect to the nature of the response. Emotional Intelligence recognizes, identifies, and attempts to utilize emotional processes as a tool for understanding and adjusting group functionality, whereas Bowen Theory interprets emotionality as a possible source for anxiety that inhibits rationality and function (Bowen, 1978; Kerr, 1988a).

Bowen Theory provides a more quantifiable measure of a behavior than the subjective trait of emotion described by Emotional Intelligence (Bowen, 1978; Kerr, 1988a). Bowen initially resisted a quantitative measure of differentiation because he felt that differentiation was vulnerable to misinterpretation when applied by untrained individuals toward themselves and to others. He felt that only trained observers who had undergone extensive examination of their own emotionality could assess individuals and groups. The main area of measurement of

Emotional Intelligence has been the effect of emotionality on Intelligence Quotient (IQ) scores. This has been conjectural since it is difficult to make a definitive correlation due to a variety of environmental factors (Locke, 2005).

The development of Technology Readiness was traced from Diffusion of Innovation described by Rogers (2003) with the innovation decision process. Originally Technology Readiness consisted of four main dimensions regarding technology: innovativeness, optimism, discomfort, and insecurity (Liljander, 2006). These formed the basis for future attributional values of technology readiness.

The Technology Readiness Index 2.0 (TRI-2.0) was condensed from earlier forms by updating technology references and examining internal reliability of the various questions (Parasuraman, 2014). During the re-development of the TRI, the qualitative motivators for technology were discussed such as freedom, control, mobility, and social connection. The inhibitors for adoption for innovation like loss of confidence, financial risk, cost, security/privacy and dehumanization were also prioritized. Factor analysis was able to reduce the number of questions based on those with the least amount of variance and strongest reliability (Parasuraman, 2014).

Review of the Research Questions and Hypotheses

The overarching research questions addressed whether varying levels of individual emotional differentiation were correlated to individual levels of technology readiness. Those research questions of the study were:

1) Are there one or more relationships between the sources of individual emotional anxiety identified by the WDI and the acceptance and adoption of emerging technology?

2) Are there one or more aspects of the WDI that can serve as predictive models of technology readiness for individuals or groups?
3) Are there one or more aspects of the TRI-2.0 that can serve as predictive models of workplace differentiation for individuals or groups?
4) Are there any differences based on demographic attributes of the sample population related to an individual's TRI-2.0 and WDI scores?

The corresponding hypotheses were derived from the research questions addressing various attributes of individual emotional differentiation as well as technology readiness and can be stated as:

H_1) There will be a statistically significant relationship between one or more of the three attributes of workplace differentiation with any of the four attributes of technology readiness.

H_2) A statistically significant predictive relationship for the technology readiness score will be associated with one or more of the attributional measures of the Workplace Differentiation Inventory.

H_3) A statistically significant predictive relationship for the workplace differentiation score will be associated with one or more of the attributional measures of the Technology Readiness Index-2.0.

H_4) There will be a statistically significant correlation between one or more of the eight demographic attributes and the composite scores of differentiation of self and technology readiness.

Summary of the Results

The administration of the survey produced a sample group of n = 148 from the population of 5,700 orthotists and prosthetists, surpassing the minimum threshold of n = 98 for 90% confidence found with Slovin's formula. The sample population was consistent with similar surveys for orthotists and prosthetists in terms of gender, office affiliation, and certification level. The sample group had a greater number of respondents with 31 or more years of experience when compared to earlier surveys. The group also showed a skewed positive value of self-assessed proficiency with expert and specialist comprising the largest groups with a smaller Intermediate group and only one novice.

In terms of the first research question and hypothesis there were several significant relationships between the WDI and the TRI-2.0 rejecting the null hypothesis. The WDI composite measure showed a significant relationship with the TRI-2.0 composite score. The TRI-2.0 had a significant relationship with all attributes of the WDI. The highest correlation coefficients were found between TRI-2.0 and ER and EC. At the attributional level, significant relationships were found between technology optimism and all attributes of the WDI with the highest correlation coefficients with emotional reactivity and emotional cut-off.

Technology innovation had significant relationships with all attributes of the WDI with fusion with others and emotional reactivity being the highest. Technology insecurity showed weak significant relationships with emotional reactivity, emotional cut-off, and experience, but not with fusion. Technology discomfort showed weak significant relationships with emotional reactivity and emotional cut-off, but no relationship with fusion. In terms of the composite WDI, there was a significant relationship with all attributes of the TRI-2.0, with the highest correlation coefficients for technology optimism and technology innovation.

For the second research question and hypothesis, there were one or more predictive models with the WDI as the independent predictor variable and the TRI-2.0 as the dependent outcome variable to reject the null hypothesis. Although the WDI and TRI-2.0 only had a moderately strong predictive relationship, there was a strongly predictive relationship between emotional reactivity, emotional cut-off, and technology optimism with emotional reactivity contributing a majority of the effect.

Regarding the third research question and hypothesis, the TRI-2.0 was modeled as the independent predictor variable and the WDI was the dependent outcome variable. In this case, there was more than one predictive model, rejecting the null hypothesis. Technology optimism, technology innovativeness, and technology insecurity had a very strong predictive relationship with the WDI with technology optimism contributing a majority of the effect. When evaluated separately with the attributes of the WDI, technology optimism and technology innovativeness had very strong predictive effect on emotional reactivity and only moderate to weak relationships with fusion and emotional cut-off.

The fourth research question and hypothesis addressing the demographic variables produced no significant differences of the mean TRI-2.0 sore with gender, certification level, years of experience, and self-assessed proficiency. There was no significant difference of the WDI score and gender and self-assessed proficiency. There was a very slight relationship between the WDI and years of experience, that produced a significant, but weak predictive relationship. The WDI also had a significant difference between the mean scores with office affiliation. Additional post hoc statistical tests showed a variance of means between private clinics, rehab/hospital, and the combined other groups. In summary, there was a very weak significant relationship with the WDI and years of experience as well as office affiliation to

reject the null hypothesis. However, none of the demographic attributes had any significant effect on technology readiness.

Discussion and Implications of the Study

The first key finding for the study was a strong predictive relationship of emotional reactivity and emotional cut-off on technology optimism with a majority of the effect from emotional reactivity. This would indicate that emotional reactivity among individuals and groups has a significant predictive relationship with technology optimism. The importance of emotional cut-off suggests that cutting off from others in the group is predictive of a greater difficulty of accepting emerging innovations or thoughts. The effect of emotional reactivity was corroborated an the earlier dissertation by de Carbonel (2007) between emotional reactivity measured by the Differentiation of Self-Inventory (DSI-R) and job satisfaction assessed with the Job Satisfaction Survey (JSS).

The potential change agent could assess the level of emotional reactivity and tendency to cut-off from the group to predict the level of technology optimism and acceptance of emerging ideas, concepts, processes, or technology. A consistent theme of evaluation and organizational theory is the exchange of behaviors, attitudes, and values between the individual, group, and culture within any organization (Burke, 2011; Schein, 2010). The rate of transfer between these networks-within-networks has a direct impact on organizational decision-making and in particular the challenging and potentially risky area of innovation. Perhaps the assessment of emotional reactivity and cut-off could help analyze the nature of communication and rate of transfer within the group (Burke, 2011; Northouse, 2010; Schein, 2010).

Since transformational change often faces initial resistance (Burke, 2011), the predictive relationship between the emotional reactivity and cut-off could be utilized to assess the level of systemic opposition. Emotional reactivity to planned organizational change can be instantly transmitted throughout a group and can lead to a high degree of initial resistance (Burke, 2010; Mathews, 2009). This blind, political, or ideological resistance, intensified by emotionality, can gradually act to stiffen and ossify the communication for internal decision-making, control systems, and mental models leading to cultural-lock in (Burke, 2011; Mathews, 2009). Organizational resistance slows the ability of the group to change the work culture to survive the immanent threats from the marketplace (Burke, 2011; Mathews, 2009). The key for any leader would be the determination of which factors create the greatest amount of emotional reactivity and anxiety. As evident in the comments (see Appendix C, comments 5, 14, 19, 21, 23) the greatest source of anxiety within this study may have been the imminent threat of reimbursement challenges rather than technology itself.

With this understanding of anxiety associated with individual interactions, the leader could examine system-wide behavior by observing the degree of emotionalism, interpersonal reactivity, and public displays during conferences and meetings (Schein, 2010). Lowering the emotionally reactive context could increase thoughtful disagreement and tolerance of different opinions rather than allowing emotional outbursts or cutting off. Reducing the effect of the group's undifferentiated emotional ego mass would have a significant predictive effect to allow the group to become more adaptable and self-regulating as exhibited in autopietic organizations (Burke, 2011; Kerr, 2007b). By avoiding reactive behavior, the group could develop a context of optimism toward change and new concepts by providing scaffolding and support for innovation for the individual rather than inhibiting it (Burke, 2011; Kerr, 2007b).

Using the information provided by this study, the group leader could empirically assesses the individual level of emotional differentiation, particularly emotional reactivity and cut-off, with technology readiness. The level of emotional reactivity and cut-off could be cross-validated with a qualitative assessment of attitudes, behaviors, and actions of the group to determine if emotionalism and technology readiness are significantly related. The potential change agent could determine the level of emotional reactivity and cut-off and its effect upon technology readiness.

A second key finding for the study was the very strong predictive relationship of technology optimism, innovation, and insecurity on Workplace Differentiation with a majority of the effect from technology optimism. This strong predictive relationship was the result of investigating the reverse relationship of technology readiness on emotional differentiation. The implication is that an individual, who is optimistic, innovative, and secure with technology, significantly predicts a person who also has a higher level of workplace differentiation.

These traits are reflective of early adopters who are more optimistic, innovative, and secure with innovation. They generally have a more favorable attitude toward change and science and are able to cope with the uncertainty of the future (Rogers, 2003). The early adopters are able to imprint these traits on the early and late majority in the adoption process by providing scaffolding through their innovation leadership. This supports the notion that groups who demonstrate an optimistic, innovative, and confident attitude toward technology, may be predictive of a greater amount of thoughtfulness or emotional differentiation.

The potential leader could use this strongly predictive relationship by systematically introducing emerging innovations and technology to raise the predictive capacity and tolerance for inherent dissonance that occurs. One way of overcoming dissonance in adoption of

technology in the instructional design process is accomplished by the creation of constructivist environment to increase self-efficacy. As the proficiency to manage dissonance during change processes or adoption of innovation increases, the emotional scaffolding can be removed. Each individual may benefit from the ability to manage his/her own sense of unease. Overall, the group with a higher number of individuals that are able to adopt emerging ideas and concepts more readily is strongly predictive of a group with a higher amount of workplace differentiation.

The potential change agent as a facilitator of learning and leadership would seek the disruptive effects of innovation as well as potential disharmony to break down individual and systemic resistance. The continual introduction of emerging concepts and technology would be a strong predictor of a more emotionally tolerant and thoughtful group. This is not to imply that every concept should be adopted, but rather the decision-making within technology acceptance can be done more comprehensively and thoughtfully rather than reacting for or against the idea emotionally.

If there is a high degree of emotional tension and personal, rather than objective arguments, introduction of emerging innovation may heighten the emotional level as well as resistance. Individuals could be qualitatively assessed for their capacity to tolerate differences of opinion and disharmony as facilitators of change within the group. The change agent could then gauge the tolerance for change and adjust the level of the change objectives accordingly. Eventually the goal would be to achieve a higher capacity for thoughtful disagreement rather than harmony.

These two key findings may work in concert with one another in that decreasing emotional reactivity and emotional cut-off has a significant predictive relationship with technology optimism. Conversely, increasing technology optimism, innovativeness, and security

has a positive significant predictive relationship with workplace differentiation. Since the strongest predictive relationship exists between innovation and technology on workplace differentiation, the initial step in any planned organizational change may involve the introduction of emerging innovations to build a more differentiated and tolerant work group.

The disruptive, yet positive role that innovation provides to break down rigid and stagnant organizational structures has been noted by organizational practitioners (Christensen, 2011; Dyer, 2011; Senge, 2006) as well as clinical psychologists (Ackerman, 1958; Bateson, 1972; Bowen, 1978; Minuchin, 1987; Satir, 1987). The introduction of innovation provides individuals, families, and organizations, an instant paradigm shift since the definition of innovation can include any technology, process, or novel concept (Rogers, 2003). Current instructional design has been shifting away from a leader-to-group focus to contextual third-party objectives associated with the innovation (Richey, 2011; Rothwell, 2008). This removes any delusions about performance, and helps the individual or group understand what processes have a positive or negative effect. As a result the individual or group can become more tolerant of emerging innovation and less emotionally resistant (Rogers, 2003). The use of innovation provides a greater amount of participatory group leadership/followership and contextual support as the organization collectively engages the innovation (Burke, 2011; Northouse, 2010; Rogers, 2003).

The third key finding was there was a very strong predictive relationship between technology optimism and technology innovation particularly on emotional reactivity, with technology optimism showing a majority of the effect. This would indicate that an innovative and technologically optimistic context would be a strong predictive relationship with emotional reactivity. An optimistic environment with positive values associated with innovation is strongly

predictive of a group where individuals become more tolerant of diverse and differing viewpoints.

When engaged with adopting a prospective innovation, the group needs to place the emotionality aside and improve communication linkages. This supports the notion that leaders and groups should establish bold plans and regularly introduce innovation. As the group evolves, it must not only develop technical skills, but also the ability to manage emotionality for adoption of future innovation. Each individual in the group acquires a higher capacity and tolerance for change by managing their own internal dissonance while providing support for one another.

Workplace differentiation does not necessarily increase level of harmony within the group, but rather the capacity for disharmony that innovation inherently presents. Introducing emerging innovations, concepts, and technology to challenge groups could bolster the overall effectiveness of the group. This concept is consistent with other authors in organizational leadership; the introduction of emerging technology disrupts the ossification of the organizational structure as well as the individual that resists change (Burke, 2011).

Although the sample group felt confident with technology, some of the comments suggested the disharmony of the current changes with respect to reimbursement and outcomes (see Appendix C, comments 5, 14, 19, 21, 23). The orthotic and prosthetic community may have exceeded the technologic needs of the market as well as their ability to support the higher reimbursement demands created by these products. The groups that are able to respond to this source of anxiety may be those who are able to adapt the innovations of electronic billing, use of outcome measures, and paperless medical charting.

A fourth key finding was that there was no significant relationships between the TRI-2.0 scores with any of the demographic variables of gender, certification level, self-assessed

proficiency, office affiliation and years of experience. There was an extremely weak predictive relationship between the WDI and years of experience (Field, 2009). Also there was a significant difference of the mean with the WDI and office affiliation specifically between private clinics, hospital/rehab centers, and the combined other groups using additional post hoc statistical tests. Previous studies of differentiation have suggested differences with respect to gender with the WDI, but this was not evident in this study (Cavaiola, 2012). Since there were no significant differences of the TRI-2.0 by age, this validates the notion that acceptance of innovation is not age dependent (Rogers, 2003). The sample results showed self-assessed proficiency was not related to workplace differentiation or technology readiness.

Interestingly those who identified themselves as experts or specialists were no more technologically ready or differentiated in the workplace as measured by the WDI or TRI-2.0. This calls into question the value of individual self-assessment to accurately indicate workplace differentiation. Also, the results do not show any relationship between technology readiness and private, corporate, hospital/rehab centers, and the combine other settings. The significant statistical difference between the WDI scores the undefined combined other, private clinics, and hospital/rehab group would require additional study with larger sample groups. Since the characteristics of the combined other group was undefined, it would be impossible to derive any conclusion from the results of this study as a key finding.

There were several comments from the survey (see Appendix C, comments 5, 14, 19, 21, 23) that led to greater questions about the construct of the survey and the effects that it had on the measurement of readiness and anxiety. These remarks indicated that the survey was heavily weighted toward technology rather than other areas that carried the greatest dissonance and anxiety. The implication was that reimbursement, billing, and collection from insurance is the

area where most clinicians feel inadequate and that may have created the greater sense of dissonance. Since the survey utilized examples of high-tech componentry to validate the self-assessment internally, the survey indirectly suggested the innovation and technology were exclusively related to componentry. Other feedback after the survey suggested that the combination of innovation bias and high self-assessment was the reason the profession has exceeded the need of the market in providing such high-end componentry.

Limitations of the Study

Based on the skewed distribution shown on the self-assessment of proficiency, the sample group may have overvalued their abilities, a finding which subsequently calls into question other measures of the WDI and TRI-2.0. Only one practitioner classified her/himself as a novice and the largest group was at the expert followed by specialist level. Although it is imperative the healthcare clinicians have confidence in their abilities, the overvaluing of skills may have influenced their impressions of themselves in terms of differentiation. This confidence could have been due to the inclusion of high-tech componentry references within the survey used as an internal check of the validity of the self-assessment. Although high-tech componentry use did show higher prevalence among the expert and specialist groups, they did not score higher on the technology readiness scale.

This pro-innovation bias may have influenced other results by inflating the technology optimism and technology innovativeness scores, while lowering the technology discomfort and technology insecurity values (Parasuraman, 2014). Although the Workplace Differentiation Inventory scores were not directly influenced, there may be an over representation of pro-innovation respondents with respect to within emotional reactivity, emotional cut-off, and fusion

with others. As mentioned previously, a number of comments indicated reimbursement issues have created increased dissonance since it directly impacts the survival of small private clinics. Perhaps the inclusion of references within the survey that caused greater anxiety would have blunted the effect of the pro-innovation bias and resulted in a more even distribution of responses.

The references to high-tech components in the survey may have contributed to the perception that technology was the sole form of innovation rather than other forms addressing adaptive processes and change management. The survey could have identified other factors that the caused greater dissonance such as reimbursement, electronic billing, clinical outcome studies, and medical necessity audits. In terms of technology readiness this would have amplified the levels of technology insecurity and discomfort (Parasuraman, 2014; Rogers, 2003).

The sample group represented a group with more years of experience than previous surveys. The proportion of the over 31 years may have been over represented due to the method of delivery and availability of the population to take the online survey. This may have affected attitudes regarding technology readiness, although years of experience did not have any significant effect on technology readiness in the regression analysis. However, there was a slightly significant effect of years of experience on the WDI that may have been affected by the age of the group.

Although the number of the sample achieved the minimum threshold for 90% confidence, a larger sample population could have increased the statistical power of the sample size. For example, if 352 participants partook in the study, the statistical weight would have increased to 95%. However, this would have been challenging to achieve based on the response rate of previous surveys. Since the sample population was relatively small, the effect of the demographic attributional variables, such as gender, office affiliation, years of experience,

certification, and self-assessed proficiency, may have been difficult to establish. The populations for each of the categories were simply too small for comparison between them.

Recommendations for Further Research

Originally, Bowen cautioned against self-assessment of differentiation by people that had not undergone extensive training in Bowen Theory (Bowen, 1978). He felt that differentiation could only be evaluated after many hours of observation and study of the family system. In this study, the respondents were asked to make relatively quick assessments with no training in this area. Although the WDI has been evaluated for reliability and validity, the subjects may have had an overly positive bias when assessing their own skills and thoughts, which may require additional study. This halo effect may have influenced other areas of evaluation. Since the study relied on the accuracy of the respondents with respect to their self-assessment, this may have inherently altered the results and limited the internal validity and reliability of the study.

Since the effect of the attributes of technology readiness on workplace differentiation was stronger than the converse relationship, logic would indicate there might be a factor that was not measured. This led the researcher to speculate that group assessment of the respondents could provide more objective measures that may increase the consistency and reliability of the results. More research with respect to group effects would need to be done to determine if this represents the missing factor when considering the stronger converse relationship between technology acceptance and workplace differentiation. Assessments with the group context of the respondents could record the effects of systemic interaction and communication.

Although much more time consuming and methodologically difficult, group assessment would provide the observer the opportunity to account for group effects as well as influence on

workplace differentiation and technology readiness. Group assessment would provide the additional measure of the effect of context on the individual. The validity of the assessment could be increased with an external evaluation to guard against the halo effect. This measure of group behavior might explain the stronger predictive effect of technology acceptance on workplace differentiation.

References to factors that intentionally raise the level of anxiety and dissonance may have attenuated overconfidence of the respondents. In this case, third-party insurance reimbursement, electronic billing, clinical outcome studies, and medical necessity audits may be responsible for more individual dissonance rather than high tech componentry. This increased the areas of technology insecurity and discomfort while raising the level of anxiety among the group to challenge the level of workplace differentiation. The deliberate elevation of the systemic anxiety to detect conflict and weakness was utilized previously by Ackerman (1970) in family groups and may prove beneficial for future studies.

Verbal feedback by a respondent after the survey suggested that the innovation bias of the group and skewed self-assessed proficiency might be responsible for the profession overshooting the needs of the orthotic and prosthetic market. The respondent felt this caused the unintended consequence of greater reimbursement issues (Rogers, 2003). The respondent went on to suggest higher technology has exceeded the practitioner's ability to optimize and support the devices to justify reimbursement. The researcher then speculated that recent less-expensive disruptive technology in the form of 3D printing, as well as more stringent reimbursement oversight, has threatened the current model of orthotics and prosthetics. The suggestion to the investigator was that the reimbursement anxiety could be an unintended result of the increased development and use of the latest technology. This reinforced the notion to the researcher that reimbursement

should have been associated with the study since it functioned as the systemic limiting factor to technologic innovation.

The strongest predictive relationship between technology optimism, innovation, and insecurity influencing workplace differentiation indicates technology creates a more differentiated group. Continually challenging the group with an optimistic outlook toward technology will help the organization become more differentiated and tolerant of opposing viewpoints. In a clinical and educational setting, this would entail introducing abstract concepts early on in the learning process to help foster more open and less rigid thinking. This may explain why contextual groups that have a positive attitude toward change are able to pull others within the group to greater acceptance. In terms of prosthetics and orthotics, an ambivalent patient is often pulled to acceptance through family and peer encouragement and support. Additional studies could investigate how groups promote or inhibit acceptance by individuals.

Conversely, identifying emotional reactivity and emotional cut-off are two factors that may greatly influence a positive outlook for structured change leadership. Individuals would need to assess their own internal behaviors of acting out of emotional reactivity rather than greater thoughtfulness, as well as cutting off from others. These two artifacts identified with group activities and personal relationships may be the most crucial in identifying the general level of differentiation. Creating a technologically innovative and optimistic group may be the more effective method of increasing workplace differentiation, which in turn acts to decrease emotional reactivity and cut-off to increase technology optimism. This results in a dyadic exchange process between these two predictive relationships to increase overall functionality of the group. Additional studies could examine the dynamics of this dyadic exchange process to increase group effectiveness.

Further study could examine how disagreements and differing opinions are dealt with in the group. If the group is prone to escalate the disagreement to a high emotional level quickly, they are exhibiting a higher level of emotional reactivity. When there is evidence of the group members cutting off from one another or not speaking, this may have a relationship with the degree of technology optimism. These simple tests during observation of the groups and individuals during meetings and descriptions of personal and managerial relationships could help provided a greater amount of understanding. Subjects that present the higher level of dissonance and anxiety could elicit the broader spectrum of anxiety, such as reimbursement issues with the sample group.

Personal interactions could be evaluated as behavioral artifacts during meetings to evaluate the overall level of differentiation especially with the introduction of emerging innovation. This may be especially poignant when there is a form of threat that causes increased anxiety. Constant introduction of emerging innovation while fostering an optimistic atmosphere would have the effect of increasing the level of workplace differentiation and tolerance for emerging ideas.

Although there were significant correlations with WDI and years of experience and office affiliation, they were fairly weak. Perhaps with a diverse and larger sample group such as nurses within a hospital setting, this correlation may have been more pronounced. Prosthetists and orthotists are primarily in the private setting, but other healthcare professions may have a larger population within institutional settings.

This study was limited in its use of the available population of prosthetists and orthotists. A broader discussion of allied health professionals, such as nurses or medical technologists, may be more germane to the larger group in assessing the effect of workplace differentiation on

technology readiness. A larger segment may produce a more diverse rather than the homogeneous sample represented by the orthotic and prosthetic group. A broader examination of the group dynamics could provide greater resolution and dimension to the discussion of workplace differentiation and the effect of the contextual interaction. This would be in greater alignment with Bowen theory with respect to the study of natural systems and how group contexts deal with their environment.

Summary

In summary, this research study has been one of the first efforts to explore empirically the relationships between workplace differentiation and technology readiness. This study attempted to quantitatively describe and apply the concept of differentiation of Bowen Family Systems Theory (Bowen, 1978) within the work context. Although the relationship of differentiation measured with the Workplace Differentiation Inventory (WDI) and technology readiness as measured by the Technology Readiness Index (TRI) showed a significant relationship, there was only a moderately strong predictive relationship. However when considering the individual attributes, other significant relationships were found. This study has indicated that emotional reactivity and emotional cut-off had a strongly significant predictive relationship with technology optimism with emotional reactivity being the most substantial. This study has shown that technology optimism, technology innovativeness, and technology insecurity had a very strong significant predictive relationship on workplace differentiation with technology optimism being the most substantial. Additionally, technology optimism and technology innovativeness had a strongly predictive relationship with emotional reactivity with technology optimism providing the greater contribution. The other key result was that gender, technology self-

assessment, certification level, years of experience, and office affiliation had little or no effect on the measures of differentiation or technology readiness. Although some significant, but weak relationships, were seen with the workplace differentiation and years of experience and additional research is required with a larger sample size.

The stronger effect of technology readiness on workplace differentiation suggests that introduction of innovation in the form of technology and novel processes may have a positive effect on individual and interoffice relationships. This positive effect on relationships may in turn support the use of the innovation. The initial introduction of the innovation may be used to initiate the process and ready the group for planned organizational change. This study may support the use of workplace differentiation and technology readiness as a tool to measure the individual relationships and system-wide anxiety in the workplace.

Conclusion

The key foundation of Bowen Family Systems Theory in the form of workplace differentiation proves to have some significance in the assessment of technology readiness for innovations. Additional empirical studies are required to link these two concepts of human behavior as well as discover any additional factors such as the effect for group context that may be present in the subsequent analyses. More studies of the application of Bowen Family Systems Theory may show the influence of the social system of the workplace on individual opinions regarding innovation and technology acceptance as well as group and individual decision-making. Additional empirical evidence of differentiation is required to validate this theory of human behavior for wider application in the area of organizational change. This study represents

an attempt to quantitatively compare systems-based psychology for the adoption of innovation within industrial/organizational psychology.

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APPENDIX A

VARIABLE ANALYSIS OF THE STUDY

Table 31 Variable Analysis of the Study

Variable type	Variable label	Levels of Variable	Sale of Measure
Dependent Attributional	Technology Optimism	TRI-2.0 Index (1-5)	Interval
Dependent Attributional	Technology Innovativeness	TRI-2.0 Index (1-5)	Interval
Dependent Attributional	Technology Discomfort	TRI-2.0 Index (1-5)	Interval
Dependent Attributional	Technology Insecurity	TRI-2.0 Index (1-5)	Interval
Independent Attributional	Emotional Reactivity	WDI Scale (1-6)	Interval
Independent Attributional	Emotional Cut-off	WDI Scale (1-6)	Interval
Independent Attributional	Fusion	WDI Scale (1-6)	Interval
Attributional Variable	Gender	1=Male 2=Female	Nominal
Attributional Variable	Years of Experience	0-Years of Exp.	Scale
Attributional Variable	Certification Type	1=CP 2=CO 3=CPO	Nominal
Attributional Variable	Technology Self-Assessment	1=Novice 2=Intermediate 3=Expert 4=Specialist	Nominal
Attributional Variable	High-Tech Pts/year	Elevated Vacuum MPK Myoelectric Upper Limb Stance Control Neurostimulation	Interval
Attributional Variable	Number of External Linkages	External Contacts	Interval
Attributional Variable	Number of Internal Linkages	Internal Contacts	Interval
Attributional Variable	Affiliation	1=Private Clinic 2=Corporate Clinic 3=Institutional Clinic 4=Other	Nominal

APPENDIX B

SURVEY INSTRUMENT FOR THE STUDY

Directions: Below are a number of questions that ask about technology and attitudes within the workplace. The survey is completely anonymous so try to answer as honestly and truthfully as you can. Answer how YOU FEEL RIGHT NOW, not what you think is "correct."

1) Please indicate Gender
   - ☐ Male
   - ☐ Female
2) Indicate Certification Type
   - ☐ CPO
   - ☐ CP
   - ☐ CO
   - ☐ BOCO
   - ☐ BOCP
   - ☐ BOCPO
3) Indicate Years of Experience: _____
4) What designation best describes your level of proficiency?
   - ☐ Novice
   - ☐ Intermediate
   - ☐ Expert
   - ☐ Specialist
5) Indicate the number of professional linkages, or people you confer with routinely concerning clinical issues:
   Number of Internal (In Office Linkages:_____
   Number of External (Outside of Office) Linkages:____
6) Indicate affiliation of office you work in:
   - ☐ Private Clinic
   - ☐ Corporate Affiliation
   - ☐ Institutional Clinic
   - ☐ Hospital/Rehab Center
   - ☐ Other
7) How many of new "High Tech" Patients do you see in the following categories per year?
   Elevated Vacuum: ____
   Microprocessor Prosthetic Kne
   Myoelectric Upper
   Extremity: ____
   Microprocessor/Stance Contro
   Orthosis
   Neurostimulation: ____

8) The following are questions regarding your feelings and thoughts about technology. Please read each statement carefully and decide if that statement is generally true about you or not generally true about you. Please check the number that best describes you. There are no right or wrong answers.

Note: These questions comprise the Technology Readiness Index 2.0, which is copyrighted by A. Parasuraman and Rockbridge Associates, Inc., 2014. This scale may be duplicated only with written permission from the authors.

	Not true of me	Somewhat True of me	Generally True of me	More True of me	Very true of me
New technologies contribute to a better quality of life.	1	2	3	4	5
Technology gives me more freedom of mobility.	1	2	3	4	5
Technology gives people more control over their daily lives.	1	2	3	4	5
Technology makes me more productive in my personal life.	1	2	3	4	5
Other people come to me for advice on new technologies.	1	2	3	4	5
In general, I am among the first in my circle of friends to acquire new technology when it appears.	1	2	3	4	5
I can usually figure out new high-tech products and services without help from others.	1	2	3	4	5
I keep up with the latest technological developments in my areas of interest.	1	2	3	4	5
When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do.	1	2	3	4	5

Technical support lines are not helpful because they don't explain things in terms I understand.	1	2	3	4	5
Sometimes, I think that technology systems are not designed for use by ordinary people.	1	2	3	4	5
There is no such thing as a manual for a high-tech product or service that's written in plain language.	1	2	3	4	5
People are too dependent on technology to do things for them.	1	2	3	4	5
Too much technology distracts people to a point that is harmful.	1	2	3	4	5
Technology lowers the quality of relationships by reducing personal interaction.	1	2	3	4	5
I do not feel confident doing business with a place that can only be reached on-line.	1	2	3	4	5

9) The following are questions regarding your feelings and thoughts about your work and your relationships with supervisors and coworkers (including people you supervise). Please read each statement carefully and decide if that statement is generally true about you or not generally true about you. Please circle the number that best describes you. There are no right or wrong answers.

Note: These questions comprise the Workplace Differentiation Inventory, which is copyrighted by A. Cavaiola of Monmouth University, West Long Branch, New Jersey, 2012. It may be duplicated only with written permission.

	Not true of me	Some what True of me	Fairly True of me	Generally True of me	More True of me	Very True of Me
I have a lot of interests and hobbies outside of work.	1	2	3	4	5	6
Coworkers and supervisors often make me feel frustrated.	1	2	3	4	5	6
I tend to handle job stress pretty well.	1	2	3	4	5	6
I often feel emotionally overwhelmed at work.	1	2	3	4	5	6
I wish I were less emotionally reactive at my job.	1	2	3	4	5	6
If I won the lottery, the first thing I would do is quit my job.	1	2	3	4	5	6
I often feel that I like my work but I hate my coworkers.	1	2	3	4	5	6
I react strongly to negative performance evaluations at work.	1	2	3	4	5	6
I often feel that my supervisors or coworkers demand too much from me.	1	2	3	4	5	6
If I've had an argument at work, I'll have trouble letting go of it.	1	2	3	4	5	6
Overall, I'm pretty satisfied with my work.	1	2	3	4	5	6
I tend to get along well with people	1	2	3	4	5	6

I work with.						
Sometimes, I get so frustrated with my job that I shut down emotionally or withdraw from coworkers.	1	2	3	4	5	6
I feel job burnout is the result of stressful interactions with supervisors and/or coworkers.	1	2	3	4	5	6
If I've had an argument or disagreement with a coworker, I'll often have trouble sleeping at night.	1	2	3	4	5	6
When faced with a difficult work decision, I'll find that I most often "go with my gut" when deciding what to do.	1	2	3	4	5	6
I like to socialize with people I work with.	1	2	3	4	5	6
I like when I'm in charge of other people at work.	1	2	3	4	5	6
I am very committed to my work, but I often feel that coworkers are not as committed or dedicated as I am.	1	2	3	4	5	6
I find most of my interactions with coworkers and supervisors satisfying and pleasant.	1	2	3	4	5	6
I find myself thinking a lot about things that happen at work even when I'm at home.	1	2	3	4	5	6
I often feel very unappreciated in my job/career.	1	2	3	4	5	6
When it comes to my job, I agree with the statement "If you want something done right, do it yourself."	1	2	3	4	5	6

The thing that stresses me out most about work is the fear of not doing a good job.	1	2	3	4	5	6
I've been told that I'm a perfectionist when it comes to work.	1	2	3	4	5	6
I've been told that I'm a "control freak" when it comes to work.	1	2	3	4	5	6

10) Please add any additional comments:

_____

_____

APPENDIX C

SURVEY COMMENTS FROM THE STUDY

Comment 1: Coming from an [sic] Corporate Engineering background for 10+years before O&P, I find that it is an industry that is unwilling to change and/or embrace necessary progress. The "Old Timers" don't understand that the reason we are in the predicament with billing we face today, is because of their practices and inability to respect constructive criticism. It is an industry filled with so much potential on many levels, but will continue to stay the red-headed stepchild of the healthcare industry until new generations and minds force out the old. Regentrification works in cycles just like technology, but depends on the mindset and need/want of the user.

Comment 2: Your list of technologies did not include custom carbon leaf spring orthoses. I think the electronic stuff is overblown in the outcomes if professes and what actually happens, whereas the technologies of the braces, though strictly mechanical, are in some cases more sophisticated in their insights and more dramatic in their outcomes. Also, the key technologies of these times, meaning from now going forward are outcome technologies rather than devices themselves. You should study that area, if you have time left in your academic career.

Comment 3: The most stressful element is a poorly designed workflow that forces working hard, but not efficiently

Comment 4: On a [sic] the question of how many high tech devices do you see? I may not SEE or touch 150 [sic] but I am consulted by clinicians over calls, [sic] and mails or video of many. I do not have a personal office

Comment 5: One factor currently causing massive problems in the field is the excessive requirement for documentation and recovery audits. These factors are leading me personally to consider early retirement. This has little to do with my skills or job satisfaction since I feel I do a good job and people rely on me for technical information but the external environment is killing the field. Technology has improved the field and the lives of clients but if we can't get paid for it we will all suffer.

Comment 6: I AM WORKING IN A GOVERNMENT MEDICAL COLLEGE QND I FEEL OTHERS AFRAID OF ME BECAUSE THEY ARE UNQUALIFIED TO WORK IN THE PROSTHETICS AND ORTHOTICS

Comment 7: Good Luck Gerald in your journey

Comment 8: Will I have to call you Dr. Stark?

Comment 9: I am an owner and supervise employees.

Comment #10: I admit that I am not a high tech type person and would not personally want a high tech prosthesis for my own lifestyle if I did need one someday. I did see myself in the article you wrote a while ago about those that are slower to accept new technologies. I have seen this field shift through an enormous amount of new inventions that have not proven to be worthwhile. I appreciate that this sifting through process is the only way to continue to go forward.

Comment 11: I don't do prosthetics. I specialize in pediatric orthotics and gait analysis. I use a Zeno electronic walkway and PKMAS software by Protokinetics on a daily basis in my practice to solve biomechanical problems and improve orthotic management.

Comment 12: I work as a clinical specialist for a manufacturer, not in a "traditional" clinic. Work with O&P providers, therapists, and patients focusing on upper extremity.

Comment 13: I am a company owner/CPO and the numbers of high tech items listed are from the company. I do mostly administration and consult on problem patients. I keep up to date on new technologies but do not have an active clinical load.

Comment 14: Prior to OPIE software and our current super, savvy I.T./Operations Manager, I felt valued for my 34 years of experience in O & P. There is no other profession where creative, mechanical, & critical thinking skills culminate to produce the most rewarding feeling in helping someone walk again. Sadly, my skill set is no longer required, needed, wanted, or valued. Of utmost importance is my documentation. If done properly, each new patient evaluation with its associated coding, justification of codes, outcomes testing, parts ordering, fabrication tracking, etc [sic] takes at least three hours. 65-70% of my day should be spent as a Documentarian. As of this year, I hate my job and have one foot out the door to leave my profession. The thrill is gone. Technology can be a cold, cruel, heartless bitch that doesn't play well with hands-on, quality patient care. Patients need my eyes looking at them, not a computer screen.

Comment 15: In order to survive in any Industry for 28 years. You need to learn to let things go.... [sic]

Comment 16: good survey it always give the positive and negative of the coworker because of their proffessional scenenorio [sic] yhat [sic] they are constrained do to only the job alloted [sic] to them eventhough [sic] they technically and professionally motivated but they are nullified for our professional outlook for the media image.

Comment 17: Dear, It seems you are doing a really interesting PhD. Maybe we can collaborate somewhere. I am working with 20 other colleagues, in Mobilab in Belgium (expertise centre [sic] of technology in health) as a biomedical engineer. We are involved in a project Efforth. You can find more information here: http://www.mobilab.be/efforth.html . If you are interested in participated somewhere, we can talk about. Can you give some more information about your Phd [sic]?

Comment 18: In the "advanced technology" section, answers of zero were answered, as I am only seeing orthotic patients at this time. We do each of these prosthetics in our clinic, I cannot say with certainty as to how many.

Comment 19: Technology is great except for the fact that it is overly expensive and no one wants or can pay for it!

Comment 20: I own the business of 10 staff so this is an owners [sic] perspective really to questions that look like are for employees not the employer maybe

Comment 21: With the state of affairs in O and P, it is a very rough time for longevity for a practitioner. I have seen and been affected by the chopping block due to slow business, poor reimbursement, doctors [sic] and hospitals trying to do more by themselves to increase their revenue, thus [sic] decreasing ours, encroachment by other fields into the P and O realm, as well as TV/internet ads taking business away from us. Often we are struggling to keep afloat and though we keep reading how much of a shortage of P and O practitioners there is and how much of a need is out there for our services, often the quality and pay of these jobs is less than optimal. I do feel bad for some of the kids coming out of P and O school with a master's degree now, saddled with a ton of debt and most of them will be lucky to earn 40k a year and will not be in a clinic setting. They will be out in the field fitting wrist splints, OTC knee braces and fighting for every scrap of business they can get. Many of the smaller mom and pop offices are either shutting down or selling to retire and move on, [sic] they have made their money when there was good money to be made in the field. Technology is great in the advancement of O and P, especially the P end [sic] but NO ONE wants to pay for technology and how they can help. Amputees are continually getting the shaft from insurance companies, as are the P and O clinicians/owners, who can get nailed with an audit and file review at any time and have thousands of dollars taken back because someone feels they could have used the cheapest foot or knee on their patient, a different type of brace or the old brace a patient has, needs to last them for 3-5 years. In many cases, that's unreasonable. All of us honest pracs need to team up against the garbage ones who are trying to milk the system and get the respect we deserve or this field will die off. I personally spent a great deal of time and money educating myself and I don't want to see this happen. I still don't know everything and I never will. I've been doing this almost 15 years and in the places I have worked, there have been years that have gone by where maybe I will see ONE KAFO, [sic] or ONE or TWO pediatric cases. It's hard to get a good comfort level in certain areas but, [sic] we are expected to know everything at the drop of a hat. It can be frustrating but, [sic] rewarding at the same time.

Comment 22: I Don't [sic] have coworkers at the moment!

Comment 23: why [sic] so doom and gloom? Did you just go through a RAC audit?

VITA

Gerald Stark was born in Aurora, Illinois to the parents of Gerald and Linda Stark. He attended high school in the small farm town of Shabbona, Illinois with an interest in science, psychology, and medicine. He attended Northern Illinois University where he received his Bachelor of Science degree in Mechanical Engineering where he gained an interest in biomedical engineering. While working for Baxter Healthcare, as a design and production engineer, Gerry returned to his curiosity with prosthetic design and received his prosthetic certificate from the Northwestern University Prosthetic-Orthotic Center (NUPOC) in Chicago, Illinois. After completing his clinical residency in Denver, Colorado, he returned to NUPOC as a Prosthetic Instructor specializing in biomechanics, computer-aided design, upper extremity components, and learning technologies. Gerry joined Hosmer-Dorrance Corporation in San Jose, California as the Education and Product Development Coordinator. Following Hosmer's acquisition by Fillauer, Inc. in Chattanooga, Tennessee, Gerry was promoted to Vice-President of Product Development and Education. He has been recognized nationally and internationally for his work in prosthetic/orthotic education and received his orthotic certification from NUPOC. In 2011 Mr. Stark received his Master of Science in Engineering Management from the University of Tennessee in Chattanooga where he is continues his education as a candidate for the Doctorate in Education in Learning and Leadership. Gerry is employed by Ottobock based in Duderstadt, Germany as the Senior Upper Limb Clinical Specialist. Gerry lives on Signal Mountain with his wife, Lisa, and their three children, Adam, Joshua, and Sophie.