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Leadership In Extremis: Authentic Leadership in Recreational Scuba Instructors

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Leadership *In Extremis*: Authentic Leadership in Recreational Scuba Instructors

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Abstract

Leadership *In Extremis*: Authentic Leadership in Recreational Scuba Instructors

Geoffrey E. Sutton

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In the aftermath of the 9/11 attacks, the operational environment was chaotic and uncertain. Effective leadership in these circumstances was internally centered and values-based, rather than externally centered and rule-based. Theorists named this leadership style authentic leadership. Research into leadership in dangerous circumstances revealed that effective *in extremis* leaders display authentic leadership. Dangerous circumstances include not only military combat and traditional occupations such as law enforcement and firefighting, but also dangerous sports such as parachuting and mountain climbing. This investigation extended the existing research to a different dangerous sport, scuba diving. Data collection consisted of a single stage cross-sectional survey of recreational scuba instructors to investigate the correlation between instructor experience and authenticity. Survey results showed recreational scuba instructors are more authentic than the general leader population. Regression analysis showed some statistically significant relationships between experience factors and authenticity factors. The small effect sizes of these relationships suggest that experience is likely not relevant to authenticity in the real world. Supplemental analysis between groups within the sample showed that instructors with either prior training in dangerous operations or prior training in non-recreational diving were more authentic than instructors without such training. Further research is necessary to identify factors that influence the development of leader authenticity.

Dedication

To the volunteers: the military, firefighters, law enforcement officers, disaster response teams, search and rescue, clergy . . . .

Who each place the good of others before their own; who move toward the sound of the guns; who run into the burning building; who search the wilderness for the lost; who launch their vessel into the storm; who stand watch, while others sleep. They are the best among us.

And to those who passed out of the sight of men by the path of duty. Go with God.

And I heard the voice of the Lord saying,
Whom shall I send, and who will go for us?
And I said, Here am I; send me.
Isaiah 6:8

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I would first like to thank the members of my dissertation committee. Paul Shelton, the Chair, provided outstanding guidance and support throughout my doctoral experience. It is no exaggeration to say that without his help, I would not have made it. Thanks Paul. Chris Meade was the first to read my nascent writing about leadership, so in a real sense he has been with me since the beginning. I am glad to have him with me at the end as well. I have known Mike Kendall for more than 30 years, ever since I worked for him in the Army. More than simply a comrade-in-arms, Mike has been in my corner many times over the years. I am grateful that he was willing to serve on my committee. I thank each of them for their wisdom and guidance.

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I owe a special debt of gratitude to those leaders, managers and co-workers who, over the years, provided me with examples of that which I did not wish to emulate. To

them, I say thank you. They provided a counterpoint to the many others I worked with who displayed outstanding leadership qualities. In order to appreciate the light, we must also have the darkness. If you are reading this and wondering whether I mean you, I might. Those who possessed the outstanding leadership qualities that I so respected will have no concern that I am referring to them.

Finally, I would like to thank my wife, Meg Strong. She endured my weirdness and irascibility as I progressed through the doctoral program and then on to the dissertation. She patiently read, and then re-read, various drafts of my writing, serving as my first reader and editor. Her suggestions were always valuable and on target, even if I was sometimes loath to follow them. Thanks for being my wife, my friend, and my partner.

GES
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Chapter 1

Introduction

> Leadership is one of the most observed and least understood phenomena on earth.
>
> –James MacGregor Burns, *Leadership*

The ongoing global conflicts have stimulated interest in identifying combat leadership skills as well as in improving the development of these skills in those who fight. In 2003, Thomas Kolditz, a Colonel in the U.S. Army and the head of the psychology department at West Point, and colleagues, conducted battlefield interviews in Iraq with soldiers who were freshly removed from combat (Wong, Kolditz, Millen, & Potter, 2003). Their findings indicated the soldiers fought out of loyalty to their fellow soldiers as well as for idealistic reasons such as freedom and democracy. Kolditz (2007) subsequently continued to investigate leadership in dangerous circumstances, including contexts other than combat. His findings indicated successful leaders in dangerous circumstances displayed the qualities of authentic leadership. These leader characteristics are effective in combat, situations in which the lives of participants are at risk and where leader performance has a direct impact on follower survival. Kolditz stated environments such as these, in which physical danger is imminent and followers believe leader performance affects follower safety and survival, are *in extremis* environments, or environments where those in them operate near the point of death. Kolditz further stated the same leadership characteristics that make combat leaders effective are also effective in any environment in which the lives of the participants are at risk, not just in combat alone. These *in extremis* environments include sports where the participants risk death or injury, such as mountain climbing or parachuting, and Kolditz

noted leaders in these sports are *in extremis* leaders (IELs). Kolditz further stated that any risky sport falls into this category of an *in extremis* environment. Therefore, the qualities that make leaders effective in combat are likely to also create effective leadership in those who lead others in dangerous sports. Scuba diving, an activity conducted by participants who are completely submerged in water, can and does kill participants. Diving is therefore an extreme sport and scuba instructors are IELs.

Purpose

This research contributed to the body of knowledge of leadership thought by investigating an aspect of the evolving and little researched area of *in extremis* leadership. The knowledge gained in this research has the potential to contribute to both the development of leader skills for use *in extremis* and to the practice of leadership *in extremis*. Kolditz (2007) investigated leadership in dangerous circumstances and concluded that effective leadership when lives are at risk is best described as authentic. Separately, Avolio and colleagues developed authentic leadership theory (ALT), stating authentic leaders display four primary attributes of self-awareness, an internal moral compass, transparent actions, and rational decision-making (Avolio & Gardner, 2005; Luthans & Avolio, 2003; Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008). They then developed and validated a measure of authentic leadership called the Authentic Leadership Questionnaire (ALQ). This research used the ALQ to test the link proposed by Kolditz, who postulated that leaders in extreme sports are IELs who then may be expected to display authentic leader behavior.

Research Problem

Kolditz's (2007) research on *in extremis* leadership was of a qualitative nature, and hence has limited generalizability. Further, though Kolditz stated extreme sports are extreme environments, in his research he considered only two such sports: mountain climbing and sport parachuting. The current research investigated leaders in a different extreme sport, scuba diving, using the ALQ to fill a gap in the existing research by investigating a new sport using a quantitative measure.

Research Question

If scuba instructors display authentic leader behaviors, then this result would strengthen Kolditz's (2007) assertion that successful IELs practice authentic leadership. By investigating a dangerous sport, this result can improve the generalizability of Kolditz's assertion beyond that of combat. Strengthening the connection between any extreme environment and authentic leadership will enable programs that develop leaders for dangerous environments (e.g., the military, firefighting, and law enforcement) to focus on developing and strengthening authentic behaviors in their leadership students, that, in turn, will improve leader outcomes in practice.

The research question then is: What is the correlation between recreational scuba instructor scores on the ALQ and their experience?

Definitions

This research uses the following definitions:

Authentic leadership: This research used the construct developed by Avolio and colleagues (Avolio & Gardner, 2005; Luthans & Avolio, 2003; Walumbwa et al., 2008). Luthans and Avolio (2003) stated leaders in the chaotic circumstances after 9/11 were

most effective when displaying a specific leadership competence. Driven by technology and global conflict, where the context of operations was ambiguous, leaders relied less on established rules and more on internal processes. Authentic leaders are values-driven and strongly rooted in their self-concept. Maslow's hierarchy (Maslow, 1943, 1969) is especially important to authenticity with its focus on fully actualized individuals, who are the most authentic leaders. The final development of ALT included four factors of authentic leadership: leader self-awareness, leader transparency, an internalized moral perspective, and balanced processing.

Divemaster (DM): A dive leader trained to supervise divers and lead dives, but not to independently train and certify student divers. Within this research, the term refers to divemasters, assistant instructors, and their various equivalents unless otherwise specified.

Divers Alert Network (DAN): A nonprofit association of recreational scuba divers whose mission is to help divers in need of emergency medical assistance and to promote diver safety (DAN, n.d.). DAN publishes an annual report on worldwide diving fatalities, injuries, and incidents.

Extreme context: "An environment where one or more extreme events are occurring or are likely to occur" (Hannah, Uhl-Bien, Avolio, & Cavarretta, 2009, p. 898).

Extreme event: A "discrete episode or occurrence that may result in an extensive and intolerable magnitude of physical, psychological or material consequences" (Hannah et al., 2009, p. 898).

In extremis leadership (IEL): Kolditz (2007) defined *in extremis* leadership "as giving purpose, motivation and direction to people when there is imminent physical

danger and where followers believe that leader behavior will influence their physical well-being or survival" (p. xvi).

International Training, Inc. (ITI): The parent organization of Scuba Diving International (SDI), a recreational diving training organization. Subsidiary ITI diving organizations also include Technical Diving International (TDI), a technical diving training organization; and Emergency Response Diving International (ERDI), a public safety diving training organization. Although not strictly subordinate to ITI, the American Academy of Underwater Sciences (AAUS), a scientific diving training organization, is affiliated with SDI, and AAUS instructors receive ITI emails although they are not required to be SDI instructors.

Leadership: Establishing direction and setting goals (Zaleznik, 1977). Leaders develop fresh approaches to problems, thriving on risk and danger. They prefer to operate in an environment that is turbulent and intense, and that may appear chaotic. Leadership is distinct from management and may tend to create tensions between managers and leaders.

Management: Fosters bureaucracy, rationality, and control (Zaleznik, 1977). Managers maintain order and focus on process rather than results. They may feel anxious in a chaotic environment, striving as they do for order.

Recreational scuba diving: SDI's definition is scuba diving for recreation conducted with compressed air or enriched air, to a maximum depth of 130 feet of water, with no planned decompression stops or overhead obstructions preventing ascent to the surface (SDI, 2019). Recreational scuba diving is distinct from other types of diving, such as technical diving, scientific diving, commercial diving, and military diving.

Within this research, the terms diving and scuba diving refer to recreational scuba diving unless specifically stated otherwise.

Recreational Scuba Training Council (RSTC): A regional council of the World Recreational Scuba Training Council (WRSTC), an international organization with a primary goal of developing worldwide minimum acceptable scuba training standards (WRSTC, n.d.). World council membership comprises regional councils that are themselves made up of the training organizations that collectively issue over 50% of the annual diver certifications in the region. The regional council for the United States includes SDI among the member training organizations. The U.S. regional scuba council has been designated the American National Standards Institute (ANSI) the accredited standards developer for recreational scuba diving (ANSI, n.d.). Within the United States, ANSI develops national voluntary consensus standards for virtually every sector of business and industry. ANSI is the U.S. representative to the International Organization for Standardization (ISO), the largest developer of international standards (ISO, n.d.). Scuba diving standards adopted by the U.S. regional council thus are both U.S. national standards and ISO recognized standards. Within this research, RSTC refers to the U.S. regional council unless specifically stated otherwise.

Scuba diving: Scuba is an acronym for self contained underwater breathing apparatus (NOAA, 2001). The scuba system is used by recreational divers to breathe while swimming underwater.

Scuba Diving International (SDI): The recreational scuba diving training branch of International Training, a dive training organization that also has technical and public safety dive training branches (SDI, n.d.). SDI is an RSTC member.

Scuba instructor: Individuals who have been certified to independently train and certify recreational scuba divers. Within this research, the terms instructor and scuba instructor are synonymous.

Technical scuba diving: This term was originally coined by Menduno (1991) to describe diving outside the bounds of recreational diving. Subsequently, technical diving has come to mean one or more of the following: diving deeper than 130 feet, using gas mixtures other than air (mixed gases and enriched air with greater than 40% oxygen), using other than open circuit scuba, using more than one cylinder, diving in overhead environments, and making planned decompression stops (Swanepoel, 2012).

Delimitations

This research surveyed recreational scuba instructors. For this reason, the results and conclusions of this research may not necessarily be generalizable to other types of scuba diving, such as technical diving, military diving, or commercial diving. Though it is possible that leaders in these other diving disciplines may display leadership characteristics similar to those of recreational instructors, further research on these other disciplines is necessary before generalizing conclusions to those diving populations.

This research surveyed scuba instructors who were certified by SDI, which is a member of the RSTC. RSTC member agencies meet internationally recognized minimum standards for scuba instructor training. All programs that meet or exceed RSTC standards should be substantially equivalent, regardless of training agency. Results and conclusions based on research with one member agency should therefore be easily generalizable to other member agencies. Though the results and conclusions of

this research may be generalizable to non-RSTC instructor populations, further research into non-RSTC populations is necessary before generalizing the results to them.

This research was restricted those instructors who were able to read and understand English. This limited issues related to translating the ALQ into languages other than English, which would have introduced the possibility of changing the meaning or nuance of instrument questions. It further limited the number of instructors who were able to respond to the worldwide survey invitation, which was in English.

Assumptions and Limitations

A major assumption within this research was that scuba diving is a dangerous sport. This assumption is supported by evidence in the literature of psychology that considers scuba diving to be risky (Doka, Schwarz, & Schwarz, 1990; Guszkowska & Boldak, 2010; Heyman & Rose, 1979; Raglin, 1998; Vredenburgh & Cohen, 1995), as well as by DAN, which analyzed fatalities among its members between 2000 and 2006 (Denoble et al., 2008).

This research was limited to those instructors who had access to both a computer and an Internet connection, who had a valid email address on file with ITI, and who had not opted out of receiving ITI electronic mailings. Because it is a requirement to have an email address in order to be an SDI instructor, this limitation excluded few members of the sample population.

Need for the Study

Kolditz (2007) stated IELs include leaders of participants in extreme sports. He identified skydiving and mountain climbing as sports in which participants risk death, and as part of his research into IELs, he interviewed leaders in both sports. Psychological

researchers have investigated risky sports and the nature of those who participate in such sports. This area of research has included mountain climbing and parachuting, as investigated by Kolditz, which have risks comparable to those of scuba diving. The following is not an exhaustive review of the psychology literature, but rather examples showing that scuba diving is considered risky from this perspective. Heyman and Rose (1979) investigated the personality characteristics of scuba students, noting that scuba diving is a high-risk sport, as is parachuting. Investigating the impact of diver death on survivors in the diver's community, Doka et al. (1990) stated scuba diving is a high-risk sport similar to parachuting and mountain climbing. Vredenburgh and Cohen (1995) investigated whether participants in high risk sports, including scuba diving, complied with safety warnings when participating in their activities. Raglin (1998) investigated the onset of panic in scuba diving, noting that panic is not rare and may play a role in more than 19% of diving fatalities. Finally, Guszkowska and Boldak (2010) the investigated the behavior of men who participate in high risk sports, including scuba diving, parachuting, and mountain climbing. From this brief sampling, it is apparent that psychology researchers have considered scuba diving to have risks comparable with parachuting and mountain climbing, and that research into the risky nature of the sport has continued over a period of many years.

Kolditz (2007) further stated that IELs are authentic. This research extended that of Kolditz by investigating the leader behaviors of recreational scuba instructors to determine whether these leaders displayed authentic leader behaviors, as Kolditz claimed they should.

Scuba diving was an appropriate venue for investigation for a number of reasons. One is that the WRSTC has established minimum standards for diver training that are also recognized ISO standards. This means results from studying one WRSTC diver certification agency are likely to generalize to another member agency. Further, regional council membership consists of agencies that issue over 50% of the diver certifications in each region. This means the results of this study are likely generalizable to the majority of scuba instructors worldwide.

Another reason is that scuba diving is a hazardous sport and new scuba divers are trained to dive and supervised both during and after training by scuba instructors. Governmental agencies in the United States (Occupational Safety and Health Administration [OSHA], 2011, 2017), the United Kingdom (United Kingdom Health and Safety Executive, n.d., 2014; United Kingdom Government, 1997), Australia (Australian Diver Accreditation Scheme, n.d.), and New Zealand (New Zealand Department of Labour, 2004; WorkSafe, 2018) explicitly regulate occupational scuba diving because of its hazardous nature, with both the United Kingdom and New Zealand considering recreational instruction to be occupational diving. Scuba instructors who teach new skills to novice divers and who supervise these novices during their initial scuba dives are responsible for their safety and survival when teaching in this hazardous environment. Their leadership directly affects the safety of their students, who are their followers.

A third reason for investigating the leadership behaviors of scuba instructors is that the results have strong potential for influencing the training instructors complete before they are certified to independently train new scuba divers. Any changes in leadership curricula made in response to the results of this research have the potential to

improve the performance of scuba instructors. Improved instructor performance is likely to translate directly into improved student safety.

A final reason to investigate the leader behaviors of scuba instructors is that if the results of the investigation indicate scuba instructors do display authentic leader behaviors, then it is likely that this result will be useful to other leader development programs such as the military, firefighting, and law enforcement. In this case, leader development programs in these areas may be further refined and developed to focus on authentic leadership, improving the performance of leaders in these public safety areas.

Researcher's Perspective

I am a former officer in the U.S. Army, a combat veteran, and an SDI instructor. As part of my military training and experience, I was exposed to dangerous situations and events that had significant potential to cause me harm. These included both direct and indirect fire, parachuting, mountain climbing, and vehicle fires. As a scuba instructor, I have trained hundreds of student divers at all levels, from entry level to instructor. While diving, I have often been in environments that are significantly more hazardous than the standard recreational environment, including overhead environments and diving beyond recreational depth limits using mixed gasses and accelerated, staged decompression. I have completed more than 1,000 open water dives. Military colleagues have been killed, wounded, or injured while serving, and scuba diving colleagues have been killed or injured while diving.

I have experience with *in extremis* leadership, am an experienced scuba diving instructor, and have ties to SDI, the agency that assisted me in surveying scuba instructors. Either this past experience or my close association with SDI had the potential

to result in bias on my part during the data collection, the data analysis, or developing the conclusions based on the research. I remained aware of this potential bias, and to correct any potential for bias during this research, I relied on my dissertation committee to provide an external, impartial review of my research.

Summary

Given the global environment of the War on Terrorism, interest has grown in investigating leadership in dangerous circumstances. Kolditz and colleagues investigated soldiers in combat and determined that they fight out of loyalty to their peers as well as for ideals such as democracy and freedom (Wong et al., 2003). Kolditz subsequently continued this investigation, determining that leaders in dangerous environments are authentic leaders (Kolditz, 2007). The current research extended the existing literature through an investigation of the leader behaviors of scuba instructors, who lead other divers in the risky sport of scuba diving, in order to determine whether scuba instructors display authentic leader behaviors, as Kolditz stated they should.

Chapter 2

Literature Review

In the ocean, things can go wrong in one breath, and the stakes are life or death.

–Chris Hadfield, *An Astronaut's Guide to Life on Earth*

In the dangerous operational aftermath of 9/11, leaders were most effective when displaying a leadership style that relied less on an external framework and more on an internal, values-driven framework. This leadership style has been named authentic leadership by researchers (Avolio & Gardner, 2005; Luthans & Avolio, 2003). Separately, Kolditz and colleagues investigated leader behaviors in combat and other dangerous circumstances (Kolditz, 2007; Wong et al., 2003), concluding that effective IELs display authentic leader behaviors.

Management as a practice has existed for thousands of years. Wren and Bedeian (2009) described management practices developing in military operations, organizational practices, government functions, and construction projects stretching as far back as 1,000 BCE. It was not until the late 18th century, however, that the size and complexity of organizations began to outstrip the ability to use simple practices to control operations and results. It was at this time that early management theorists began writing about their ideas, even before the theory of management had been identified or formalized. Only in the early 20th century was the first coherent theory of management proposed by Henri Fayol. Later theorists developed and expanded management theory, and by the second half of the 20th century, theorists began to differentiate between the control functions of management and the directive functions of leadership.

This review of the literature traces the development of theory from its beginnings in management, through the definition of leadership as a separate area, and then to authentic leadership itself using a generally chronological sequence. It concludes with a discussion of the contemporary development of the *in extremis* leadership model.

Defining the Construct

Management and leadership can be considered to be related but substantially distinct realms, each requiring a skill set that differs from the other. Early leadership theorists took the position that there might be substantial overlap between the practices of management and of leadership (Northouse, 2019). For the purposes of this research, however, management and leadership were considered as distinct but partially overlapping domains. Managers must have some leadership skills in order to influence others both to meet organizational goals and to follow organizational procedures, whereas leaders must have some management skills in order to plan operations and coordinate resources. The construct diagram in Figure 1 shows the overlapping domains of each as the intersection of two circles, with the intersection representing the limited set of crossover skills. *In extremis* leaders function wholly within the realm of leadership, yet they must also have some managerial skill if they are to plan for the necessary support required to lead mountain climbing expeditions or train and deploy a unit of firefighters into action at a blaze with all the attendant equipment and its associated maintenance requirements. The *in extremis* domain is shown as the shaded circle within the leadership domain, whereas the necessary managerial component is shown as the crosshatched area intersecting the management domain, yet lying completely within the leadership domain. The construct diagram graphically shows how leaders in general, and IELs in particular,

possess the ability to thrive in a world of chaos while at the same time having the management skills necessary to plan and sustain operations in extreme contexts.

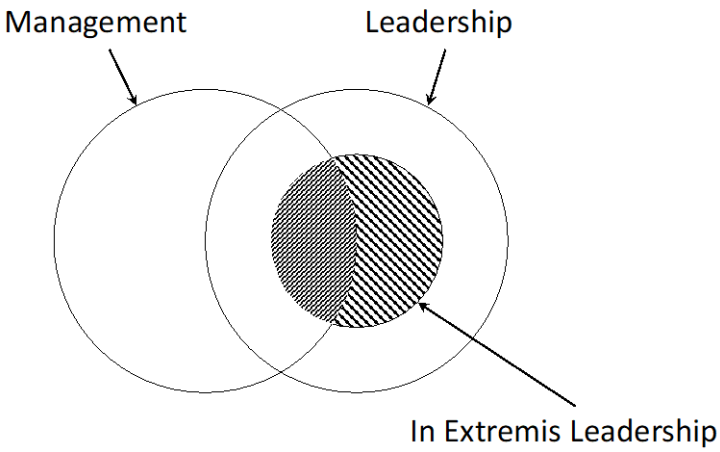

Figure 1. Construct diagram.

A Brief History of Management Theory

French management theorist Henri Fayol developed the first consolidated theory of management in 1916 (Wren & Bedeian, 2009). Fayol published his theory as *Administration Industrielle et Generale* (AIG), which was translated into English in 1930 by Coubrough as *Industrial and General Administration* (Fayol, 1930).

Fayol (1930) considered the discipline of management to have five "elements," or functions, of planning, organizing, command, coordination, and control. He elaborated on these functions with 14 principles of management: division of work, authority, discipline, unity of command, unity of direction, subordination of individual interests to the general interest, remuneration, centralization, scalar chain, order, equity, stability of tenure of personnel, initiative, and esprit de corps. Fayol recognized that by calling them principles, he might be giving the impression that they were rigid rules (Wren & Bedeian,

2009), and he went to some lengths to explain that they were flexible and meant to be adapted to the situation as necessary. The purpose of management, he believed, is to make organizations run more efficiently and effectively.

After Fayol's theory was published, management theory developed further, moving from focusing on improving business processes and increasing production efficiency toward recognizing the intrinsic worth of employees. Wren and Bedeian (2009) provided a discussion of these developments, some examples of which follow. Although not an exhaustive review, these examples show some of the typical developments in management thought from the point Fayol published AIG to the emergence of leadership theory after World War II. In Europe, for example, Weber developed the theory of bureaucracy in the early 1920s, complete with division of labor, management hierarchy, and organizational rules. Separately, in the United States from 1924 to 1932, the Hawthorne studies at the Hawthorne Works of the Western Electric Company investigated the effects of various workplace conditions on employee productivity, the impact of supervisor–employee relationships on morale and productivity, and the effects of inter employee relationships on production. These researchers were the first to focus on the human aspect of management, although their goal was to investigate ways to improve efficiency and productivity. Subsequently, Maslow (1943, 1969) developed a theory of human motivation, describing first five and then six levels of intrinsic human needs. These needs formed a hierarchy from existence needs such as food and shelter to higher needs such as self-actualization and acting on considerations beyond the self. The development of management thought consistently trended away from a mechanistic approach focused on people as cogs in a machine with

their value based on their productivity toward a humanistic approach that regarded employees as having intrinsic value. Eventually, theorists increasingly focused on the human aspect, giving rise to the study of leadership, which distinguished between maintaining organizational efficiency and determining organizational direction.

Diverging Leadership and Management Theories

Bennis (1961) considered the differences between management and leadership. When discussing leadership theory, Bennis stated leadership is the process of balancing the needs of the individual with the needs of the organization. This balancing must, out of necessity, consider individual freedom and organizational authority, the need for individual growth and the need for organizational productivity, and the need for maximizing satisfaction on both sides. Leaders operate in a dynamic and tension filled environment, balancing competing needs to achieve the best possible outcome.

Writing between 1974 and 1999, Drucker (2001) described both management and leadership, stating all managers focus on the same thing—bringing people together to accomplish joint goals. Managers capitalize on the strengths of those surrounding them, compensating for their weaknesses. They set strategies to meet objectives and must have the technical skills of their business. Managers establish and maintain the processes of their organizations. Drucker specifically discussed the functions of management, stating managers define the purpose and mission of the organization, make workers efficient and effective, and control the social impacts of the organization. The bottom-line responsibility of management is to maximize the economic performance of the organization.

Drucker (2001) went on to also describe leadership, stating it is a means to an end and that there are no inherent leadership traits or qualities. Leadership is work, and leaders set organizational goals and define the organization's mission. Leaders see their leadership position as a responsibility rather than a rank, and if operations fail to go as expected, they assume the responsibility for the failure rather than shifting the blame to others. Effective leaders generate vision in those around them and are not afraid of the strengths or successes of their subordinates. They are trustworthy and instill trust in those around them. They behave consistently. Drucker concluded that this description also describes successful managers.

Drucker (2001) also considered whether managers are leaders, saying that although managers are collectively part of the organizational leadership team, individually it is inappropriate to consider managers as leaders. Although the leadership team is both internally and externally visible and has professional management responsibility to the organization, it is futile to expect individual managers to be leaders. Historically, leadership is rare and confined to a few individuals, whereas there are many managers. In spite of this somewhat different description of management and leadership, Drucker concluded that the two skills are functionally the same, even while asserting that most managers are not leaders. In the process of developing management theories, Drucker was moving toward a more modern view of management and leadership, which considers them as separate and distinct functions.

Separately, Zaleznik (1977) considered the difference between managers and leaders. When considering managers and leaders, Zaleznik concluded they are different types of people. Managerial functions foster bureaucracy, rationality, and control.

Managers maintain order and focus on process rather than results. Leaders, on the other hand, take an active role in shaping goals and developing fresh approaches to problems, thriving on risk and danger. Leaders thrive in an environment that is turbulent and intense, and that may appear chaotic. Managers may feel anxious in a chaotic environment, striving as they do for order. The two different perspectives of order and chaos tend to create organizational tensions between managers and leaders.

Similarly, Kotter (1990) considered management and leadership to be different but stated the two functions complement each other. Leaders control change, set direction, align people with goals, motivate others, and show a willingness to take risks, learning from both successful and unsuccessful outcomes. Managers, on the other hand, create order, establish process, provide resources and staffing for organizations, make plans, and typically maintain a narrower professional base than leaders.

Covey (2004) further described leadership and management as separate disciplines. Management focuses on the bottom line of an organization, or how best to produce the organizational output. Leadership, on the other hand, focuses on the top line, or determining what the output should be. Covey provided a hypothetical example of an organization cutting a pathway through a jungle. While the workers are cutting back the jungle, managers are determining the most efficient method of cutting the path, emplacing procedures to ensure the correct method is in place. The leader, on the other hand, scales a tree, surveys the jungle, and then yells down, “wrong jungle!” Covey noted that changing jungles disrupts the efficiencies emplaced by managers, and this tendency of leaders to cause organizational change inevitably leads to conflict between leaders and managers.

These developing theories consolidated around the view that leadership is the process of controlling change in organizations and providing direction in chaos. Leaders are inherently comfortable in unstable environments, unafraid of taking risks, and willing to try the unknown or uncertain. This comfort with chaos often puts them at odds with managers, who strive to make operations routine and to make certain the unknown.

Development of Transformational Leadership Theory

Burns (1978, 2003) described two fundamental leadership theories: transactional leadership and transforming leadership. Burns described transactional leadership as an exchange between the leader and follower, and noted it accounted for the bulk of leadership interactions. Both leader and follower are engaged in an exchange of value that benefits each as an individual. The leader receives both the effort of the follower and the work products, and the follower receives pay for the work. Essentially, each party is involved for their own benefit. Followers have no other tie to the organization or effort beyond self-interest. Transforming leadership, on the other hand, introduces the element of values into the interaction. The leader takes a moral stand, states a commitment to a moral value or position, and appeals to followers based not on self-interest, but on these higher moral values. Transforming leadership converts followers from self-interested parties to moral agents, thereby increasing their commitment to success and their level of effort for the organization. By introducing the element of moral values to the leadership interaction, Burns was able to compare the effectiveness of the use of power to the use of moral appeal, and concluded that moral appeal is potentially more effective. Further, by considering the needs and values of followers, Burns introduced the concept of the follower into the developing body of leadership theory.

Bass (1985) extended and formalized transactional and transforming leadership theories. When he proposed his formalization of transforming leadership, Bass renamed it transformational leadership. He acknowledged that transactional leadership had some effectiveness, but said it was only marginally effective in improving organizational performance. To achieve greater improvements, he stated leaders should focus on transformational leadership. Bass described transactional leadership as the exchange of value for value between leader and follower, leaving that aspect of theory largely unmodified. He then expanded the description of transformational leadership, identifying three methods leaders might use to introduce moral considerations to leadership interactions. One way is for leaders to increase the importance followers place on methods and outcomes. A second way is to cause followers to look beyond their own self-interests. The third way is to raise the followers' needs focus on Maslow's needs hierarchy.

Bass (1999) later discussed this third option in more detail. He stated that in order to move beyond self-interest, both leaders and followers need to be able to move beyond the top level of Maslow's hierarchy of needs. Maslow (1943) introduced a five-tier model of human needs and theorized that humans are most motivated by the greatest need they feel, which is the lowest unfulfilled level of the hierarchy. At the lower end of the spectrum are physiological or existence needs, such as food and shelter. These are followed up the hierarchy by the need for safety; the need for love, affection, and belonging; the need to be esteemed by the self and others; and the need for self-actualization. At the top of the hierarchy, a person will be completely focused on the self. To be an effective transformational leader, however, the leader must look beyond

his or her own needs to the needs of others. Although Bass said Maslow's theory required modification, Maslow (1969) added a sixth level shortly before his death, called transhumanistic, and stated the motivation for the fully developed person transcends considerations of his or her own self. Koltko-Rivera (2006) discussed Maslow's modification of the hierarchy, naming the sixth level self-transcendence. The reality is that Maslow's revised hierarchy is sufficient to support transformational leadership theory.

Bass (1985, 1990) further discussed the characteristics of both transactional leaders and transformational leaders. Transactional leaders engage in a system of contingent rewards in which they reward subordinates for complying with directives. They typically manage by exception, intervening in operations only when standards are not met; or by laissez-faire management, taking no action at all and diverting responsibility to others. Transformational leaders, on the other hand, are charismatic, engaging followers and generating enthusiasm; they provide intellectual stimulation, develop problem-solving abilities in those around them, and treat followers as individuals, coaching and teaching them. In a survey of U.S. Army officers, Bass (1985) found that officers in combat units displayed more transformational leadership behaviors than did officers in non-combat units. It is possible that this finding illustrated even then the recognition among IELs that transactional leadership was of limited use.

Bass and colleagues eventually developed and formalized the emerging theory of transformational leadership into the full range leadership (FRL) model (Avolio & Bass, 1998), also known as the six factor model (Avolio, Bass, & Jung, 1999). The FRL model includes the following six leadership factors: charismatic-inspirational leadership,

intellectual stimulation, and individualized consideration, which are components of transformational leadership; contingent reward and management by exception, which are components of transactional leadership; and laissez-faire leadership, which is the absence of any leadership. In conjunction with developing the FRL model, they simultaneously created, modified, and validated an instrument to measure the FRL spectrum, the Multifactor Leadership Questionnaire (MLQ).

Transformational leadership has a moral component that enables leaders to influence followers by appealing to moral considerations beyond mere self-interest (Bass, 1985, 1990, 1999; Burns, 1978, 2003). It is possible, however, for leaders to demonstrate qualities that superficially seem transformational, yet in reality are based on corrupted moral considerations. Bass and others have addressed and clarified these considerations (Bass & Steidlmeier, 1999; Price, 2003). These theorists considered leader characteristics when determining whether leaders are *authentic* transformational leaders or whether they are *pseudo*-transformational leaders. When making this determination, Bass and Steidlmeier (1999) considered the following factors: whether the leaders engage in self-important behavior and the degree to which the leaders manipulate followers, the degree to which leaders empower followers, the degree of propaganda contained in the moral appeal, and whether leaders treat followers simply as a means to an end. Price (2003) considered the degree to which leader behavior is aligned with stated leader values and also the degree to which leader values are either altruistic or self-centered. Leaders who focus on the needs of others, value their followers, and act in accordance with their stated altruistic values are authentic transformational leaders. Price considered others to be pseudo-transformational leaders.

Development of Authentic Leadership Theory

In 2003, Avolio and colleagues proposed a new leadership construct, authentic leadership theory (Luthans & Avolio, 2003). Luthans and Avolio (2003) stated that in the chaotic circumstances post 9/11, leaders were most effective when showing a leadership competence that was distinct from transformational leadership. Drawing from their separate backgrounds in positive psychology and in leadership, they developed a positive leadership theory they named authentic leadership. They stated that in the dramatic changes driven by technology and global conflict, and where the context of operations is ambiguous, leaders need to rely less on established rules and more on internal processes. Authentic leaders are driven by values and are strongly rooted in their self-concept (Avolio & Gardner, 2005). Maslow's hierarchy (Maslow, 1943, 1969) is especially important to authenticity, focusing as it does on fully actualized individuals, who are the most authentic leaders. The final development of ALT contained four factors of leader self-awareness, leader transparency, an internalized moral perspective, and balanced processing (Walumbwa et al., 2008). Leader self-awareness is the self-knowledge of strengths and weaknesses coupled with an awareness of how the leader processes and makes sense of information. Transparency is presenting the leader's genuine self to those around him or her. An internalized moral perspective is an internal self-regulation that is guided by moral standards and requires an advanced level of moral development. Balanced processing is the ability to objectively and impartially analyze information. Authentic leaders rely on their own deep seated values coupled with an awareness of their beliefs and mental processes to navigate complex and uncertain situations.

Given Avolio's close association with Bass and the apparent similarities between transformational and authentic leadership, Avolio and colleagues discussed the distinctions between the two theories at length (Avolio & Gardner, 2005; Luthans & Avolio, 2003; Walumbwa et al., 2008). One important distinction is that transformational leadership transforms followers into leaders by an appeal to their moral values. Authentic leadership, however, is not necessarily focused on changing followers into leaders. Rather, it is concerned with developing followers as authentic in their own right. Also, instead of making a moral appeal to followers, an authentic leader sets a personal example and is strongly self-aware. Another difference is that one of the six factors of transformational leadership is charisma, and authentic leaders need not be charismatic. Finally, authentic leaders display congruence between stated beliefs and demonstrated actions. They convey a genuine message to their followers. Transformational leaders, however, relying largely on personal charisma, may on occasion manipulate their followers by communicating a message they do not personally believe.

Development of the *In Extremis* Leadership Model

The United States Military Academy (USMA, or West Point) is a regionally accredited educational institution that awards bachelor's degrees to its graduates. Its purpose is to educate and train graduates to become commissioned officers in the U.S. Army, each of whom is a potential IEL. In order to maintain its accreditation, West Point periodically conducts a self-assessment as part of the re-accreditation process. In the late 1990s, its institutional self-assessment stated that "USMA has no clearly articulated 'learning model' or theory for the development of leaders of character [the text of the original was bolded to provide emphasis]" (USMA, 1999, p. 53). The assessment went

on to emphasize the need to "articulate" a theory of leader development, although that was in reality code for the need to develop a theory. The assessment further emphasized the need to add a developmental aspect to the education and training cadets received. The absence of this developmental aspect was subsequently confirmed by West Point's Dean, Brigadier General Daniel Kaufman, who said in 2005, "We used to have an attrition model. We would set up 400 obstacles to graduation and if you made it, you made it. If you didn't, you didn't. Now we have a development model" (Offstein, 2006, p. xviii).

It was against this background of an absent theoretical base coupled with the need to add development to the cadet experience that Kolditz and colleagues set out to update their knowledge of combat cohesion for use in their combat leadership course. They conducted battlefield interviews with both U.S. and captured Iraqi soldiers during the 2003 invasion of Iraq (Wong et al., 2003). The goal of these interviews was to determine what motivated soldiers to fight. The final document reporting their findings was used as a text for the course (Kolditz, 2007).

When Kolditz and colleagues deployed to Iraq, which was at the time an active combat theatre, they interviewed combatant soldiers who had been recently removed from the battlefield (Wong et al., 2003). Their conclusions were that soldiers fight for two primary reasons: first, because of strong feelings of loyalty to their fellow soldiers; second, for principle-based motivations such as freedom and democracy. Subsequent to these battlefield interviews, Kolditz (2007) continued to investigate leadership and leader behavior in dangerous circumstances, labeling leadership in dangerous circumstances *in extremis* leadership, or leadership at the point of death. Kolditz interviewed law

enforcement SWAT team chiefs, mountain climbing guides, leaders of expeditions engaged in photographing tigers in the wild, leaders of large formation skydiving events, and combat leaders from both conventional and unconventional forces in the U.S. Army. Kolditz also studied the Military Academy's sport parachute team and sent a team to participate in, and observe training at, the Army's military freefall parachute training program. His conclusion was that transactional leadership, with its focus on reward and punishment and the unwillingness of the transactional leader to make decisions or assume responsibility, loses effectiveness in situations where the very survival of the participants is uncertain. Of what use is a future promotion or the promise of a medal when the future itself is in question? Effective IELs necessarily display authentic leader behaviors.

Although Kolditz focused his research on leadership in extreme contexts, these contexts might appear superficially similar to crises. Kolditz (2007) differentiated a crisis from an extreme context. Leaders in a crisis find themselves suddenly and involuntarily thrust into an "extreme challenge, disaster or circumstance" (p. xvi). In contrast, IELs train to enter extreme circumstances voluntarily while leading others with them. Schuster and colleagues (Schuster, Chartier, & Chartier, 2011) defined a crisis as a "low probability, high consequence [event]" (p. 249). They stated that crises typically take one of four forms: accidents, scandals, product safety incidents, or employee related issues. IELs might find themselves in circumstances superficially resembling an accident; however, in extreme environments, such as combat, dangerous events are not low probability, but rather the expected outcome of routine operations. Moreover, IELs might not wait passively for circumstances to become dangerous. In many instances, IELs *create* dangerous circumstances by conscious decision-making and purposeful

action. Consider combat again: an ambush is a deliberately planned action that creates mortal danger for both the ambusher and the ambushed. Similarly, a law enforcement officer (LEO) pursuing a criminal or firefighters entering a burning building all voluntarily create or enter the dangerous circumstances in which they operate. Further, IELs not only go there themselves, they also lead others there, making decisions and issuing orders that have life and death consequences for all those present, including themselves. *In extremis* leaders operating in extreme contexts might appear similar to leaders thrust into position during a crisis, but there are important differences between the two circumstances that distinguish one leader from the other.

The implications of these conclusions were important to Kolditz (2007), who stated that he continued the initial research of Wong et al. (2003) to more fully understand leaders in dangerous contexts and to improve the Military Academy's leadership and management programs. If effective IELs are authentic, the institutional focus of the Military Academy then becomes how best to develop authentic leaders, and Kolditz provided a detailed plan for developing IELs. The development of the *in extremis* leadership model thus allowed for further improvements in the training of military officers. Moreover, Kolditz described the application of authentic leadership principles to circumstances that are not dangerous, such as corporate leadership. He stated that leadership principles that are effective in combat will be similarly effective in business, suggesting that to improve performance, business executives should develop authentic leadership skills themselves and foster the development of authentic leadership skills among their employees.

When Kolditz and colleagues (Kolditz, 2007; Wong et al., 2003) conducted their interviews and completed their case studies, their goal was to describe and identify the behaviors of leaders in dangerous circumstances. Separately, Fisher and colleagues used interviews coupled with archival data to investigate both positive and negative leader behaviors among Australian soldiers in combat (Fisher, Hutchings, & Sarros, 2010). While Kolditz focused on effective leadership and identified positive leader behaviors, Fisher et al. (2010) additionally identified corrupt leader behaviors. Both of these avenues bear further investigation. Although it is important to identify positive leader behaviors, these positive factors tell only half the story. To complete the picture, it is also necessary to identify negative leader behaviors to devise leader development strategies that avoid them or to remove leader trainees from development programs if they show corrupt tendencies.

More recently, Dixon (2014) used mixed methods to investigate leaders in law enforcement, firefighting, and the U.S. military. Initially, she used grounded theory interviews to investigate the experiences of U.S. Army commissioned and non-commissioned officers in combat, determining that these combat leaders engaged in a simultaneous process of evaluating dangerous circumstances (sense-making) and of communicating instructions to others (sense-giving). Following this study, Dixon surveyed individuals in the U.S. military to investigate which factors influenced positive outcomes in extreme circumstances. Situational awareness and self-efficacy of IELs were the biggest predictors of operational success. Interestingly, prior experience in extreme environments was not significantly related to operational success. Finally, Dixon surveyed LEOs, firefighters, and military personnel to investigate which individual

characteristics influenced situational awareness and self-efficacy, determining that mental flexibility, a sense of duty, and self-esteem were related to both characteristics, although sometimes inversely. These results further indicated there are clear differences between types of IELs and their motivations for serving—both LEOs and firefighters (identified as protectors) protected the public welfare, whereas the military (identified as vanquishers) defeated enemies. The differing focus of their missions resulted in differing assessments of acceptable risk during operations.

Further research linking *in extremis* leadership to authentic leadership theory will strengthen both fields. In particular, quantitative research into leader behavior in dangerous sports using the ALQ is an avenue that has so far remained uninvestigated. See Table 1 for a summary of this prior research.

Table 1

Prior Research Into In Extremis Contexts

Year	Author(s)	Participants	Methods	Results
2003	Wong et al.	U.S./Iraqi soldiers recently in combat	Interviews	Soldiers fight because of loyalty to comrades and for ideals
2007	Kolditz	*In extremis* leaders	Interviews/case study	*In extremis* leaders are authentic
2010	Fisher et al.	Australian Army Vietnam combat veterans	Interviews/archival data	Identified both positive and corrupt leader behaviors
2014	Dixon	Law enforcement, firefighters, U.S. military	Grounded theory interviews, surveys	Identified IEL characteristics

Recreational Scuba Diving as an Extreme Context

The focus in the current study was to investigate the leader behaviors of recreational scuba instructors. Particularly important was the question of whether scuba diving is an extreme activity, taking place in an environment in which participants risk death or injury. Kolditz (2007) described IELs as operating in environments where they risk death simply by being there. The question then becomes whether scuba diving is a potentially lethal activity.

In the United States, the UK, Australia, and New Zealand, each of which has diving fatalities numbering among the highest in the world (Buzzacott et al., 2016), governmental organizations recognize scuba diving, including recreational diving, as a hazardous activity. Within the United States, OSHA (2017) recognizes that commercial scuba diving is a hazardous activity, exposing commercial divers to a variety of environmental hazards that can cause injury or death. OSHA publishes guidelines that regulate commercial diving, but specifically excludes recreational scuba instruction and recreational scuba diving from these regulations (Occupational Safety and Health Administration, 2011). This exclusion is primarily the result of the logistical difficulties related to having an onsite recompression chamber present during recreational diving, which is required of commercial diving operations, rather than as a statement that recreational diving is less hazardous than commercial diving. Separately, the United Kingdom Health and Safety Executive (HSE), the UK's national governmental organization responsible for preventing injury, sickness, or death in the workplace, states that diving is a "high hazard activity" that can be deadly (United Kingdom Health and Safety Executive, n.d., para. 3). Similar to OSHA, the HSE publishes guidelines for the

safe conduct of scuba diving, although unlike the United States, the UK regulates recreational scuba instruction (United Kingdom Health and Safety Executive, 2014; United Kingdom Government, 1997). Similarly, WorkSafe New Zealand, New Zealand's governmental agency responsible for health and safety in the workplace, classifies underwater activities as inherently hazardous (Diving Industry Advisory Group, 2019) and includes recreational scuba instruction in the category of occupational diving (WorkSafe, 2018). WorkSafe also publishes guidelines for the safe conduct of occupational diving in general, including recreational scuba instruction (New Zealand Department of Labour, 2004). The Australian Diver Accreditation Scheme, the governing body for commercial diving standards in Australia, does not regulate recreational scuba instruction but does consider both recreational and occupational diving to be risky, stating they are a "high risk activity" potentially leading to injury or death (Australian Diver Accreditation Scheme, n.d., para. 1). Four nations with significant coastlines and scuba diving activity as well as significant numbers of annual diving injuries each consider recreational scuba diving to be hazardous, and two of them regulate recreational instruction in some manner.

Although governmental agencies in several nations consider recreational diving to be hazardous, an objective measure of risk is useful in determining the hazardous nature of the activity. When investigating diving fatalities, a number of variables complicate this process. Unknowns include the total number of active divers and the number of dives made annually. Variables that affect risk include weather, current, individual diving skills and physical condition, depth, underwater visibility, the possibility of equipment failure, and the difficulty of the dive. Denoble et al. (2008) discussed annual

fatality rates among insured members of DAN from 2000 to 2006 and reported that the average annual fatality rate (AFR) was 16.4 per 100,000 insured individuals. Further, Denoble and colleagues (Denoble, Marroni, & Vann, 2011) analyzed scuba diving fatalities reported from a variety of sources. In addition to reiterating the earlier finding from Denoble et al. (2008), they estimated that for the U.S. diving population as a whole, the AFR was between three and six per 100,000 individuals. They suggested that though there is no obvious reason for the difference in AFRs, divers who purchase DAN insurance may dive either more frequently or more aggressively than the general diving population, which would tend to increase the risk for DAN insureds. For comparison, the authors noted that high risk activities have AFRs of about 1,000 per 100,000 individuals (originally reported as 1%), and low risk activities have AFRs of about 0.1 per 100,000 individuals (originally reported as 0.0001%). Most people will generally not participate in an activity with an AFR of greater than 100 per 100,000 individuals (originally reported as 0.1%). An AFR of 16.4 for DAN insureds does not approach the participation cutoff, but means scuba diving is clearly much more risky than low risk activities. The authors noted diving risks are "not negligible" (p. 82). Lippman (2008, 2009, 2011) examined scuba diving deaths in Australia from 2002 to 2006, finding that for Australian resident divers, the AFR was 8.5 per 100,000 individuals and 0.7 per 100,000 scuba dives among Australian residents. Lippman (2008) also provided an estimated AFR for the UK for 2006 of 0.80 per 100,000 scuba dives. Richardson (2011) examined deaths occurring in training programs from 1989 to 2008, either those offered by the Professional Association of Diving Instructors (PADI) or non-PADI programs supervised by a PADI professional, finding that the cumulative fatality rates were 1.765

per 100,000 individuals and 0.482 per 100,000 scuba dives. Cumming, Peddie, and Watson (2011) examined diving fatalities in the UK from 1998 to 2009, reporting an AFR for members of the British Sub-Aqua Club (BSAC) of 0.54 per 100,000 scuba dives and 1.03 per 100,000 scuba dives for non-BSAC members. The authors suggested the difference in rates is largely the result of the nature of the BSAC organization, which is focused on local diving clubs where local instructors train club members. This results in more extensive training, more leaders diving with students in training, and a large pool of experienced divers to partner with newly certified divers at the conclusion of their training, all of which results in a better trained and safer student than other training models. Kojima (2015) examined insured Japanese DAN members from 2004 to 2012 and found an AFR of 6.9 per 100,000 individuals (originally reported as 0.69 per 10,000 member-years). Buzzacott et al. (2016) stated that around two per 100,000 individual divers die each year, and noted this number has remained fairly stable over time.

Separately, with respect to mountain climbing, Abegg (2011) used U.S. National Park Service (NPS) data to investigate climber fatalities on Mount Rainier, a volcanic peak 14,410 feet high that lies just over 100 miles southeast of Seattle (NPS, 2019). Abegg's analysis showed that climbers on Rainier between 1950 and 2010 had an average AFR per decade between 39 and 12 per 100,000 (originally reported as 3.9 to 1.2 per 10,000).

Investigating mountain climbing fatalities carries many of the same uncertainties related to investigating scuba diving fatalities. Unknowns include the total number of climbers, the number of individual ascent attempts, and the number of individuals attempting ascents, and variables that affect risk include the weather, individual climber

skills and physical condition, altitude, and the difficulty of the climb. The Mount Rainier National Park, however, has tracked fatalities both within the park boundaries in general and of climbers on the mountain specifically since 1897, as well as the yearly total of climbing parties since 1950, which allows for an analysis with accuracy beyond that which is possible in many other locations (Abegg, 2011). Further, although a challenging and sometimes dangerous climb, the ascent does not fall into the realm of technical mountain climbing. For example, within the United States, the Yosemite Decimal System (YDS) is often used to describe the difficulty of a climb (Parks, 2019). The YDS is a five-level scale rating climbing from Class 1, which is walking on a flat trail, to Class 5, which is the technical level of climbing that requires climbers to rope up, belay each other, use fall protection installed in the climbing surface, and where a fall may be fatal. Class 5 ascents are further categorized into an additional 15 levels. The NPS route guide for the Disappointment Cleaver route to the Rainier summit indicates 75% of climbers each year use this route, and that at its most difficult it is Class 3 or Class 4 (NPS, 2017). Class 3 routes require climbers to use their hands to climb a steep hillside and possibly carry a rope, and falls may possibly be fatal. Class 4 ascents are steeper yet, with most climbers using a rope to protect against falls, which might easily be fatal. The route guide lists the following skills with which each climber should be proficient: land navigation, including using a map, compass, and GPS; self and team arrest; travelling on a rope; and crevasse rescue. These skills are similar in scope to the more advanced recreational scuba diving skills that allow divers to dive deeper and in more challenging circumstances, yet stop short of the skills that are equivalent to those used in technical diving. Thus, given the similarity of relative skill levels required to climb Mount Rainier

compared to those needed to dive at the limits of recreational diving, the AFR for climbers on Mount Rainier is an appropriate comparison for evaluating the relative risk between the two activities.

When considering sport parachuting, many of the uncertainties related to scuba diving and mountain climbing are mitigated by regulations governing aircraft and airspace use. Parachute associations in the United States, Britain, and Sweden track both the number of their members and the number of parachute jumps made by these members, as well as the number of fatalities resulting from a jump. Within the United States, data from the United States Parachute Association (USPA, 2019) showed that between 2000 and 2018, the AFR ranged from a high of 1.35 per 100,000 jumps in 2001 to a low of 0.39 per 100,000 jumps in 2018 (originally reported as 0.0135 and 0.0039 per 1,000 jumps). Most AFRs were between 0.5 and 0.8 per 100,000 jumps in that period. In the UK, the British Parachute Association (BPA) data showed that between 1999 and 2018, the fatality rate was 0.8 per 100,000 jumps, although this figure was based on total fatalities during that time period rather than an annual fatality rate (British Parachute Association, 2020). When investigating Swedish parachuting fatalities, Westman and Bjornstig (2005) determined that the mean AFR between 1994 and 2003 was 28 per 100,000 skydivers, while during the same period there were 0.8 fatalities per 100,000 jumps, again based on the total fatalities during that time period rather than on annual figures. These fatality rates are similar to those of scuba diving when considering the per jump figures; however, the risks are roughly two to three times those of scuba when considering the per participant risk. The risks are similar to those climbers experience on Mount Rainier.

To gain perspective on the risks associated with scuba diving, it may be useful to compare these numbers with the risks experienced by soldiers in combat. Goldberg (2010) investigated U.S. military casualties in Operation Iraqi Freedom through January 10, 2007. He found that the AFR of military deaths as a result of enemy action was 335 per 100,000 soldiers, substantially higher than the AFR of scuba diving, mountain climbing, or parachuting.

When looking at the risks for scuba diving, some are given in terms of the number of individual divers, whereas others are given in terms of the number of scuba dives conducted per year. Because it is possible for a given diver to complete more than one dive in a year, and on many occasions substantially more, there are many more scuba dives than there are divers, which accounts for the lower per scuba dive rates when compared to the per individual diver rates. When looking at the rates for Australian diving, the per-dive rate is similar to that of the UK in 2006, greater than that of PADI training and BSAC divers and less than that of non-BSAC divers. From these comparisons it is likely possible to make the same observations about the per individual rate for these populations. When doing that, the AFR for the cited studies ranges from about two to 16.4 per 100,000 individuals, with several clustered around eight per 100,000 individuals. Given the uncertainties in fatality data collection, the number of dives conducted, and the size of the diving population, it is unsurprising that these estimates vary widely. What is clear, however, is that even assuming an AFR of eight per 100,000 individuals, diving is still much more hazardous than low risk activities that have an AFR of 0.1 per 100,000 individuals. Data from the cited research are presented in Table 2.

Table 2

Annual Fatality Rates for Reported Studies

Category	AFR per 100,000 individuals	AFR per 100,000 scuba dives /parachute jumps	Source
High risk activities	1,000		(Denoble et al., 2011)
Combat, U.S. forces in Iraq 2003-2007	335		(Goldberg, 2010)
Cutoff for participation by general public	100		(Denoble et al., 2011)
Mountain climbing on Mount Rainier, decade averages between 1950 and 2010	39-12		(Abegg, 2011)
United States Parachute Association 2000-2018	[~8.5]	0.39-1.35	USPA, 2019
British Parachute Association 1999-2018		0.8*	BPA, 2020
Swedish Parachute Association 1994-2003	28	0.8*	(Westman and Bjornstig, 2005)
DAN U.S. insured divers 2000-2006	16.4		(Denoble et al., 2008)
Non-BSAC members (UK) 1998-2009	[8.5+]	1.03	(Cumming et al., 2011)
UK divers 2006	[~8.5]	0.8	(Lippman, 2008)
Australian resident divers 2002-2006	8.5	0.7	(Lippman, 2008, 2009, 2011)
BSAC members (UK) 1998-2009	[8.5-]	0.54	(Cumming et al., 2011)
DAN Japan insured divers 2004-2012	6.9		(Kojima, 2015)
U.S. general diving population	3-6		(Denoble et al., 2011)
U.S. general diving population	2		(Buzzacott et al., 2016)
Divers in PADI training programs 1989-2008	1.765	0.482	(Richardson, 2011)
Low risk activities	0.1		(Denoble et al., 2011)

Note. Numbers in brackets are estimated based on per event fatality rates. * These figures are based on the total number of deaths and jumps in the respective periods, rather than on yearly fatalities. These numbers are not annual fatality rates.

Providing a separate measure of relative risk, Blastland and Spiegelhalter (2014) use the MicroMort (MM), a one-in-a-million chance of death, normalizing it so the average person faces a 1MM risk per day. Using data on all levels of UK divers from BSAC from 1998 to 2009, they concluded a scuba diver faces a risk of 8MM per dive. For comparison, using data from the USPA from 2000 to 2010, they stated that parachuting incurs a risk of 10MM per jump, a rate comparable to scuba diving. They also calculated risks in combat, stating that U.S. military personnel in Afghanistan incurred about 1MM per hour (22 per day) in 2010, whereas in 2009 they incurred 17MM per day. In 2007, U.S. forces in Iraq incurred 17MM per day. Between May and October of 2009, British forces in Afghanistan incurred 47MM per day. These figures for U.S. and UK forces in Afghanistan and Iraq apply to all of the military forces in the respective combat zones. Soldiers actively engaged in combat face markedly higher risks. Looking at World War II, Royal Air Force bomber crews on missions over Germany incurred about 1MM per second (or 25,000MM per mission). These figures are shown in Table 3.

Table 3

MicroMorts for Dangerous Environments

Category	Risk	Time period
RAF Bomber crews over Germany	25,000MM per mission	1939-1945
UK forces in Afghanistan	47MM per day	May-October 2009
U.S. forces in Afghanistan	22MM per day	2010
U.S. forces in Afghanistan	17MM per day	2009
U.S. forces in Iraq	17MM per day	2007
Parachuting	10MM per jump	2000-2010
Scuba diving	8MM per dive	1998-2009

Note. Taken from Blastland and Spiegelhalter (2014).

Further, when looking at MicroMorts, it appears scuba diving is roughly as hazardous as parachuting, which Kolditz (2007) classified as an extreme activity, and a diver who conducts between two and six dives incurs about as much risk as does a soldier during 1 day in a combat zone. Using these numbers, based on relative risk it seems scuba diving is an activity in which participants risk death or injury, meeting the description of an extreme activity.

Summary

Though management as a practice has existed for thousands of years, it was not until the early 20th century that Fayol published the first coherent theory of management. Subsequently, management thought developed to focus primarily on organizational efficiency, viewing workers primarily as cogs in a machine who were valued for their ability to create a product. After World War II, management thought began to consider workers in a more humanistic manner, beginning to view them with intrinsic value. This shift in perspective gave rise to the development of leadership theory, where organizational leaders focused on organizational goals and direction rather than primarily on efficiency. Leadership theory developed from transactional, where workers and leaders worked together in an exchange of value, to transformational, where leaders transformed followers into leaders themselves by appealing to their morals and values. Building on transformational leadership, authentic leaders set the example for followers, encouraging them to become authentic themselves. When examining the behavior of leaders in dangerous circumstances, Kolditz (2007) developed the *in extremis* leadership model, stating that IELs display authentic leadership. Kolditz extended the dangerous context from combat to extreme sports, investigating both sport parachuting and

mountain climbing. The current research examined scuba instructors and took the position that scuba diving is a dangerous sport similar in risk to both parachuting and mountain climbing. This position is supported by the psychology literature, which considers all three sports to be of the same magnitude of risk. Similarly, when looking at AFRs, each sport has similar fatality rates. When looking at MicroMorts, scuba diving and parachuting have similar levels of risk. Thus, investigating the behavior of scuba instructors is appropriate because the risks in scuba diving are similar in magnitude to those for both parachuting and mountain climbing.

Chapter 3

Methods

Answers are the easy part, questions raise the doubt.

–Jimmy Buffett, *Off to See the Lizard*

The post 9/11 environment was both complex and dangerous and leaders were most effective when using an internally based leadership style, which theorists have named authentic leadership (Avolio & Gardner, 2005; Luthans & Avolio, 2003). While investigating leadership in combat and other dangerous circumstances, Kolditz (2007) determined that successful IELs displayed authentic leadership. Kolditz investigated leaders in the sports of mountain climbing and parachuting, claiming that leaders in these and other dangerous sports also are IELs who display authentic leader behaviors. The current research used the ALQ (Mind Garden, n.d.) to investigate the leader behaviors of recreational scuba instructors, leaders in the dangerous sport of scuba diving.

Research Design and Rationale

This research consisted of a single stage cross-sectional survey administered to the instructor members of SDI worldwide. The survey instrument was the ALQ, a 16-question self-report instrument that measures authentic leadership behavior in the four areas of self-awareness, transparency, leader ethical/moral grounding, and balanced processing (Mind Garden, n.d.; see Appendix H for sample ALQ questions).

A single stage survey was appropriate because it was possible to send survey invitations to the majority of instructor members of SDI via email to ensure nearly complete sample coverage, and because the survey instrument has previously been developed and validated by researchers (Avolio, Gardner, & Walumbwa, 2018; Avolio,

Wernsing, & Gardner, 2018; Walumbwa et al., 2008). Electronic distribution of the survey link and collection of the responses was appropriate because the majority of SDI members have email accounts and conduct business with SDI electronically; because by using an online based distribution and response system, the research timeframe was expedited; and because it limited the possibility of researcher error as a result of misentering a subject's response when digitizing responses from another type of data gathering technique.

A researcher-generated set of 15 questions related to instructor background and experience was added to the front end of the ALQ (see Appendix F for these questions). The researcher ran a pilot study of the front-end questions with a sample of 30 scuba instructors to ensure the questions were in a form that was easily understood and to validate that they provided the desired information. Feedback was solicited from the pilot study participants and modifications to the questions were made to address respondent comments and researcher needs.

ITI sent its monthly newsletter to each of its members worldwide via email. This newsletter included a notice advertising an opportunity for SDI instructors to participate in scuba research (see Appendix B for the newsletter notice). This notice included a radio button that took participants to the survey invitation page, which included an introduction letter from the president of SDI encouraging SDI instructors to take the survey and referring them to the survey invitation. The survey invitation letter from the researcher contained a link to the informed consent page of the survey (see Appendix C for the invitation page). This link was a no-login link that allowed subjects to go directly to the front page of the survey that contained the informed consent notice (see Appendix

D for the informed consent notice). Though this method allowed anyone who had the link to answer the survey, there were minor protections built in to the method. This method allowed only one response per browser type per computer. Thus, once a subject answered the survey, they could not provide a second set of answers without launching a new browser type, clearing the computer's cache, or changing computers. This method was a tradeoff between requiring subjects to create an account in order to respond, which causes a barrier to response yet is secure, and removing the barrier, allowing anyone to answer, and perhaps allowing some subjects to submit more than one response or preventing subsequent subjects from answering on the same computer using the same browser without either first clearing the browser cache or launching a different browser.

The no-login link took participants to the informed consent page that also contained the button to enter the front-end questions allowing progress to the ALQ. Mind Garden collected the responses and the researcher downloaded the responses in a data file. The responses were analyzed to determine the relationships, if any, between the constellation of instructor experience factors and the four factors measured by the ALQ as well as the ALQ composite score. Supplemental analysis was completed to determine whether any demographic or other experience factors were related to the leader behavior displayed by the respondents. This supplemental analysis investigated whether there were differences in the composite authenticity score between genders, between those who had completed the SDI Instructor Development Course/Instructor Evaluation Course (IDC/IEC) and those who completed an administrative crossover, between those who were actively teaching diving and those who were not, between those who had completed leadership training with other recreational agencies and those who had not, between those

who had completed non-recreational diver training and those who had not, between those who had completed training for operations in dangerous environments and those who had not, and between those who participated in dangerous sports and those who did not.

Instructor experience was operationalized by a constellation of five experience factors: the number of open water dives the instructor had completed, the number of years the instructor had been diving, the number of students the instructor had certified, the number of divers the instructor had supervised, and the number of years the instructor had been teaching scuba. An instructor with more dives was considered to have more experience than one with a lesser number of dives; the relationship was similar for each of the experience measures. The scores for each factor of the ALQ, as well as the composite score, were calculated for each subject. The mean for each factor was calculated, and the low, mean, and high scores were then converted to population percentile rankings as shown in the ALQ manual (Avolio, Gardner, et al., 2018).

Participants and Site

Scuba instructors were an appropriate population for this research because they are IELs. They voluntarily seek training, first to learn to dive and then to supervise other divers in the risky diving environment. They consciously plan to enter the water to perform a dive and then purposely enter the water taking students with them. This context, consciously prepared for and voluntarily entered, defines scuba instructors as IELs.

The survey population consisted of all SDI instructors. The sample frame consisted of all members of ITI worldwide who had an email address on record and who had not opted out of receiving the monthly newsletter. The sample frame included

instructor members of SDI worldwide, the population of interest, as well as instructors of TDI, ERDI, and AAUS and divemasters for each of these agencies. The sample consisted of 10,742 ITI members who were each sent an electronic message requesting they participate in the survey.

SDI was selected as the professional association because it is an RSTC member and its instructor-level training programs comply with international standards for instructor training. This makes generalizing the findings to any other RSTC member much easier, and it is also likely that the results are generalizable to international members of the World Recreational Scuba Training Council. SDI instructors consist of both men and women who are at least 18 years of age. SDI standards, as well as RSTC standards, require that divers be at least 18 years of age before being certified as an instructor (RSTC, 2004; SDI, 2019).

Overview of Instruments for Measuring Authenticity

Researchers have developed a number of instruments to measure authenticity. Gardner, Cogliser, Davis, and Dickens (2011) stated the first measure was developed by Henderson and Hoy (1982, 1983). This instrument, the Leadership Authenticity Scale, was developed to measure the perceptions teachers had of school principals. Kernis and Goldman (2005, 2006) developed the Authenticity Inventory Version 3 to evaluate individual authenticity. Though this is a self-report measure, it measures authenticity rather than authentic leadership. Lagan (2007) developed the Authentic Leadership Scale, which measures employee perceptions of their supervisor's authenticity. Tate (2008) developed the Authentic Leadership Measure, a self-report of authentic leadership. This instrument is based on the 5-factor construct of authentic leadership

developed by George (2003) that is practitioner-based, derived from George's experience leading others. This lack of theoretical support for the construct makes using Tate's instrument problematic. Walumbwa et al. (2008) developed the ALQ, a self-report of authentic leadership. This report measures the four factors of the authentic leadership construct used in this research. Neider and Schriesheim (2011) developed the Authentic Leadership Inventory (ALI). Although this instrument is based on the ALQ, it measures follower perceptions of a leader. Beddoes-Jones (2013) developed the RAF Authentic Leadership Questionnaire 360, a 360-degree assessment of a leader. Levesque-Cote and colleagues (Levesque-Cote, Fernet, Austin, & Morin, 2018) developed the Authentic Leadership Integrated Questionnaire, an instrument based on both the ALQ and ALI. Originally developed in Canadian French, this instrument measures follower perceptions of a leader. Though there are a number of instruments that measure authenticity, and even two that are self-report measures of authentic leadership, the ALQ is the only self-report instrument that has a sound theoretical base. These instruments are summarized in Table 4.

Table 4

Instruments for Measuring Authenticity

Name	Year	Author	Type	Notes
Leadership Authenticity Scale	1982, 1983	Henderson and Hoy	6-point Likert; 3 factor construct; 32 items	Measures teachers' perceptions of principal's behavior
Authenticity Inventory	2005, 2006	Kernis and Goldman	5-point Likert; 4 factor construct; 45 items	Self-report of authenticity, not leadership
Authentic Leadership Scale	2007	Lagan	7-point Likert; 4 factor construct (similar to Walumbwa et al.); 19 items	Measures respondent's perception of supervisor leadership
Authentic Leadership Measure	2008	Tate	5-point Likert; 5 factor construct (George, 2003); 18 items	Self-report of authentic leadership
Authentic Leadership Questionnaire	2008	Walumbwa et al.	5-point Likert; 4 factor construct; 16 items	Self-report of authentic leadership
Authentic Leadership Inventory	2011	Neider and Schriesheim	5-point Likert; 4 factor construct (based on Walumbwa et al.); 14 items	Measures respondent's perception of supervisor leadership
RAF Authentic Leadership Questionnaire 360	2013	Beddoes-Jones	5-point Likert; 3 factor construct (reduction of Walumbwa et al.); 15 items	Measures a leader's authenticity using a 360-degree evaluation
Authentic Leadership Integrated Questionnaire	2018	Levesque-Cote et al.	5-point Likert; 4 factor construct (Walumbwa et al.); 14 items	Measures respondent's perception of supervisor leadership; based on ALQ and ALI; original is in Canadian French

Description of the Authentic Leadership Questionnaire

Walumbwa et al. (2008) described the development and validation of a measurement tool for authentic leadership. The final survey instrument, the ALQ, consists of 16 questions, each answered on a 5-point Likert scale, that measure the four factors of self-awareness, transparency, internal moral perspective, and balanced processing. Tested and validated on five samples drawn from three international locations (i.e., China, the United States, and Kenya), the ALQ showed consistency across these varied samples, which indicates the findings may be generalizable. Their results showed incremental validity for ALT over transformational leadership theory, indicating they are distinct constructs.

To ensure construct validity, Walumbwa et al. (2008) performed a confirmatory factor analysis (CFA) with a group from the United States and a group from China. They assessed predictive validity with two samples drawn from U.S. universities, additionally using these studies to further verify construct validity. They further assessed construct and predictive validity with a sample drawn from local workers at Kenyan offices of U.S. firms. Cronbach alphas, a measure of internal consistency reliability, were measured for all studies. In all cases, alphas were above 0.7 for all four measures on the ALQ. Alpha values above 0.7 are generally considered acceptable (Tavakol & Dennick, 2011).

Although Walumbwa et al. (2008) presented a detailed description of their methods when developing the ALQ, the instrument has come under critical scrutiny. Peus and colleagues (Peus, Wesche, Streicher, Braun, & Frey, 2012) suggested the ALQ should extend the characteristics it measures to include how leaders handle disclosing their personal vulnerabilities and weaknesses to their subordinates. Separately, Crede

and Harms (2015) examined 44 journal articles that used CFA to develop higher order constructs, claiming to find errors in many, including that of Walumbwa et al. (2008). Crede and Harms claimed some of the reported statistical values used to justify the ALQ were mathematically impossible.

In response to the critical analysis of Crede and Harms (2015), Avolio and colleagues (Avolio, Wernsing, et al., 2018) addressed each point of criticism. Avolio, Wernsing, et al. (2018) reported additional details of their original analysis that were omitted from the original publication and that led to subsequent questioning of the ALQ. They acknowledged that they did not report certain details of the structural equation modeling (SEM) analysis used. These omitted details could have caused the mathematical impossibilities in the CFA that Crede and Harms identified. Avolio, Wernsing, et al. admitted the reporting error that could have caused the identified mistakes and provided the original data to allow independent verification of the ALQ.

In spite of criticism leveled at the ALQ, several investigators examined its foundation and found it acceptable. While conducting their investigation, Peus et al. (2012) administered a German translation of the ALQ to respondents in Germany, validating both the German version of the ALQ and the ALQ itself. Separately, Randolph-Seng and Gardner (2013) tested the ALQ on college students, validating the self-report version. In India, Datta (2015) administered the ALQ to business executives, confirming the construct validity in an Indian context.

Though some critics have claimed the ALQ is flawed, others have independently validated the instrument in a variety of contexts. Further, in response to the critical evaluation of Crede and Harms (2015), Avolio and colleagues (Avolio, Wernsing, et al.,

2018) provided detailed response to each point. The examination of the CFA used to develop the ALQ was beyond the scope of this research, though the bulk of evidence indicates that in spite of those who have concerns, the ALQ is a valid instrument.

Procedures for Data Collection

ITI designated a single member of its staff to assist the researcher with coordination within the organization. The method of data collection was similar to that described by Dillman, Smyth, and Christian (2014) for web surveys. ITI members were sent the monthly ITI newsletter that included a notice of the research, encouraging SDI instructors to participate. The notice included a radio button that took participants to the invitation page. The invitation page contained an introductory letter from the president of SDI introducing the researcher and encouraging SDI instructors to participate. Dillman et al. stated a pre-notice is rarely used in web surveys, although in cases where the survey is being conducted by an entity that is different than the sponsor, an introduction may be useful. In this research, the researcher had no preexisting relationship with most of the subjects, and an introductory letter from the president of SDI, serving the same function as a pre-notice, introducing the researcher to the subjects served to transfer the necessary authority and legitimacy to the researcher.

The survey invitation included a number of elements suggested by Dillman et al. (2014) to increase the response rates. These elements included specifying how the results might be useful, identifying the sponsorship by SDI, asking the respondents for their help with the research by completing the survey, showing regard for the respondents and their investment of time, thanking the respondents for their efforts, stating that opportunities to respond were limited, providing a token to enhance response rates, and including the link

to the survey. Additionally, the survey invitation contained other elements designed to establish trust with the respondents, such as reassuring them of the confidentiality of their information and approaching the respondents as a fellow diving professional. The link in the invitation took participants to the informed consent page that included the link to the front-end questions and the ALQ itself. At the completion of the ALQ, participants were directed to a Thank You page that included a link to the incentive token, a page that allowed them to download the U.S. Navy diving manual and other diving references (see Appendix G for the Thank You page).

Five days after sending the survey invitation, a follow-up letter from the researcher was sent to all ITI members who had not responded to the survey to remind them of the survey and ask them to participate if they had not yet done so (see Appendix E for the reminder letter). This reminder also included a direct link to the survey. Six days after the reminder letter was sent, the survey was closed to further responses. Survey responses went directly to Mind Garden for compilation. The researcher downloaded the data file at the conclusion of the survey.

Ethical Considerations

This research was reviewed and approved by the George Fox University Human Subjects Review Committee (HSRC; see Appendix A for HSRC approval). The risk to survey participants was minimal and there was little likelihood of harm coming to any of them as the result of their participation in this research. Responses to the survey were anonymous, ensuring participant confidentiality. Further, all participants were informed of the nature and purpose of the research and voluntarily consented to answer the survey questions. This informed consent notice included the six elements Fowler (2014)

recommended: identifying the name of the organization, any financial sponsorship of the research, a brief description of the research, assurance of confidentiality, statement that their participation was voluntary, and statement that they could skip any question they wanted.

Data Analysis

The responses were cleaned as described by Altman and Bland (2007), Fowler (2014), and Israel (2018). Where it was possible to impute missing data, that was done. Next, any incomplete responses were removed. Then, inconsistent responses were removed, such as those with fewer than 100 open water dives, which is the minimum required to be certified as an SDI instructor (SDI, 2019). Then the data were characterized based on subject demographics (e.g., age, gender, years diving, students certified, etc.). Once the data were characterized, the results were analyzed to investigate the relationships between the ALQ factors and the constellation of experience factors. Supplemental analysis was conducted to determine whether there were differences between groups within the sample. All analyses were completed using XLSTAT, a statistical add-on to the Microsoft Excel program (xlstat.com, 2020).

Summary

This research consisted of a single stage cross-sectional survey of SDI instructors worldwide. It used the ALQ in combination with a researcher-generated set of front-end demographic questions to investigate possible relationships between instructor experience and instructor authenticity. The data were first cleaned and then characterized based on subject demographics. The relationship between authenticity and experience was

investigated using XLSTAT, a statistical add-on for Excel. Supplemental analysis investigating differences between groups within the sample was conducted.

Chapter 4

Results

Now we're cooking with charcoal!

–Terry Pratchett, *The Last Continent*

The operational environment post 9/11 was both ill-defined and dangerous. Leaders in this environment were most effective when relying on an internally centered leadership style that allowed them to make effective judgements in chaotic circumstances rather than relying on externally centered rule-based frameworks. This internally based style of leadership has been named authentic leadership by researchers (Avolio & Gardner, 2005; Luthans & Avolio, 2003). When investigating leadership in dangerous circumstances, Kolditz (2007) stated effective leaders in these environments display authentic leadership. This research used the ALQ (Mind Garden, n.d.) to investigate the leader behaviors of scuba instructors, who lead scuba students in the dangerous underwater environment.

Cleaning the Data

The data were initially reviewed to identify incomplete responses and to correct errors where possible (Israel, 2018). When there were missing answers to ALQ questions, the survey responses were omitted from analysis and these responses were considered incomplete and unusable. When answers were missing from front-end questions that were not used in this research, the response was not removed from analysis for this reason and the missing answers did not cause the response to be considered incomplete. Front-end questions not used in this research related to the date of the most recent open water dive and the date of the most recent diver certification.

In cases where it was possible to impute missing answers based on other answers in the response, this was done (Altman & Bland, 2007). These responses were considered incomplete but usable. Examples of this included respondents omitting an answer for whether they had additional recreational diving leadership training, additional non-recreational diving training, or training for operations in dangerous environments, and then providing examples of additional training. In these cases, the missing answer was added. In cases where a response identified additional training but did not then identify the specific training, the response was included in analysis and aggregated into the unspecified category. These responses were considered incomplete but usable.

There were a few cases where respondents miscategorized their experience and background and these were corrected (Fowler, 2014). Typical examples were listing sport parachuting training as non-diving training in dangerous environments rather than as participation in dangerous sports, or listing military parachuting as participating in dangerous sports rather than as training in non-diving dangerous operations. The difference was one of context rather than an omission. These responses were considered complete and usable because all necessary information was included in the survey answers. In cases where respondents omitted answers to front-end questions that were used in this research and where it was not possible to impute the missing data, the response was omitted from analysis and considered incomplete and unusable.

The number of years diving and teaching scuba were calculated by the following method:

$$\text{\# years diving} = 2019 - (\text{year first certified to dive})$$

$$\text{\# years teaching scuba} = 2019 - (\text{year first certified as instructor})$$

Finally, three ineligible responses were removed from the analysis (Fowler, 2014). These included one respondent whose answers indicated they had been an instructor longer than they had been a diver; one whose stated number of open water dives did not meet the minimum number required to be certified as an instructor; and one who stated they had issued zero diving certifications, but then subsequently said they had issued a certification on the previous weekend. These responses were removed from the analysis and were also removed from the sample frame as ineligible.

Estimating the Response Rate

This research used the framework published by the American Association for Public Opinion Research (AAPOR, 2016) when categorizing responses in preparation for calculating the response rate. The AAPOR provides frameworks for categorizing responses to several types of surveys, one of which is "Internet Surveys of Specifically Named Persons." This is a survey administered online to a sample frame identified by email addresses, the same method used in this research. The responses received from these surveys can be categorized into the following four groups: 1.0 - Returned Surveys, which are either complete or incomplete but usable; 2.0 - Eligible, no returned survey, which are responses that receive partial or no answers and that could not definitively be classed as ineligible; 3.0 - Unknown Eligibility-no survey returned; and 4.0 - Not-eligible, survey returned. These categories are further broken down into sub-categories to be used as necessary.

This researcher distributed invitations to 10,742 members of ITI worldwide. There were 184 responses returned by participants, of which 25 were removed from analysis for missing data, three were screened as ineligible, 19 were partially complete

and usable, and 137 were complete and usable. A total of 213 invitations bounced back from invalid email addresses. No response was received from 10,345 invitations. These categories are shown in Table 5.

Table 5

Survey Response Categorization

Category	Name	Number of respondents	Total
1.0	Returned survey		
	1.1: Completed survey	137	
	1.2: Partially complete with sufficient information	19	
	Total 1.0		156
2.0	Eligible, not surveyed		
	2.1 Refusal and breakoff		
	2.1121: Logged on to survey, no answers	2	
	2.12: Partial response, insufficient information	23	
	Total 2.1	25	
	2.2: Eligible, unable to complete survey	0	
	2.3: Other: eligible, not completed	0	
	Total 2.0		25
3.0	Unknown eligibility, no survey returned		
	3.1: No information known about respondent or address	10,345	
	3.3: Invitation undelivered, bounced email address	213	
	Total 3.0		10,558
4.0	Not-eligible, returned	3	3
Total invitations			10,742

Once the responses were categorized, the response rate was estimated. The AAPOR (2016) provides six methods for calculating response rates. This research used calculation method #4 for the response rate (RR4). RR4 includes usable responses,

whether complete or partial, and allows the researcher to estimate what portion of unknown eligibility are eligible. The method of calculating RR4 is:

$$RR4 = (I + P) / [(I + P) + (R + NC + O) + e(UH + UO)]$$

Where

I = Complete response (1.1) = 137

P = Partial usable response (1.2) = 19

R = Refusal or breakoff (2.1) = 25

NC = Non-contact (2.2) = 0

O = Other (2.3) = 0

UH = Unknown (3.1) = 10,345

UO = Unknown other, bounced email (3.3) = 213

e = estimated proportion of unknown cases who are eligible

The sample frame of this research contained an unknown number of ineligible participants. These included AAUS instructors who were not SDI instructors; TDI and ERDI instructors who were not SDI instructors; and divemaster (DM) members of SDI, TDI, and ERDI who may have received the initial invitation. Though ITI released the total number of recipients, the actual breakdown of recipients is proprietary information. Because of this, it was not possible to calculate a definitive response rate, although it was possible to estimate the response rate from the known data.

By looking at the responses from those who indicated they had completed recreational dive leader training with other agencies, it was possible to estimate the fraction of ineligible divemasters in the sample frame. Considering the breakdown for PADI, SSI, and NAUI, which are the three recreational agencies with which respondents

identified having additional training in the greatest numbers, the number of divemasters and instructors is shown in Table 6.

Table 6

Frequency of Divemasters and Instructors in the Top Three Most Numerous Recreational Training Agencies

Agency	DM	Instructor
PADI	11	45
SSI	2	18
NAUI	2	13
Total	15	76

The fraction of divemasters (f_{DM}) in these agencies is:

$$f_{DM} = 15 / (15 + 76) = 0.165$$

By assuming the fraction of ITI divemasters was similar and incorporating a small fraction of non-SDI instructors in the sample frame, it was reasonable to assume that a 20% fraction of the unknowns in the sample frame was ineligible. Thus, e was assumed to equal 0.8. Using an e of 0.8, the response rate, RR4, was 1.8%.

Compared to traditional survey methods such as mail surveys, this response rate is low. Dillman et al. (2014) noted seven mail surveys conducted between 2007 and 2012, six of which had response rates between 53% and 59% and the seventh had a response rate of 70%. Phone survey response rates were at 9% in 2012 and email surveys had response rates less than 10%. Separately, Fowler (2014) noted response rates between 74% and 85% for mail surveys, between 60% and 80% for in-person surveys, widely varying response rates for phone surveys of between 15% and 65%, and rates of between 30% and 60% for Internet surveys. Manfreda and colleagues (Manfreda, Bosnjak, Berzelak, Haas, & Vehovar, 2008) investigated the response rates of Internet surveys

versus other modes in 24 papers. Their investigation showed Internet surveys had response rates of between 82% and 11%, although nearly half (i.e., 11) had response rates below 30%. More recently, Pan and colleagues (Pan, Woodside, & Meng, 2013) sent out eight email invitations to an online survey and had response rates between 5.9% and 9%, and LaRose and Tsai (2014) noted that response rates for online surveys are in the single digits. Though the response rates of other survey modes tend to be higher than in this research, more recent research indicates single digit response rates for online surveys are not unusual.

Descriptive Statistics

A total of 156 usable responses were received ($N = 156$). The majority of the sample was men ($n = 136$) who had been diving for an average of 22 years (range 1 to 54 years) and teaching scuba for an average of 11 years (range 0 to 41 years; there were a number of new instructors who answered the survey). They were likely to be older than not, with the median age being between 41 and 50 ($n = 44$). They were experienced divers, having completed a substantial number of dives (median = 1,500 to 1,999, $n = 13$). They had done a substantial amount of teaching (number of certifications issued, median = 150 to 199, $n = 8$) and tended to have extensive experience supervising divers (number of divers supervised, median = 300 to 399, $n = 7$). Most of these instructors had been previously certified as an instructor through another certification agency ($n = 101$) and were actively teaching scuba at the time of the survey ($n = 135$ in active teaching status). Most had received leadership training at some level through other recreational certification agencies ($n = 129$) and just over half had received non-recreational diving training of some type ($n = 90$). About half had training in non-scuba operations in

dangerous environments (n = 81) and a third participated in other dangerous sports (n = 50).

Given the nature of recreational diving activities, which are largely unregulated in most areas, it is difficult to determine either the composition of the diving population in general or of the instructor population in particular. Further, the competitive nature of the scuba certification industry tends to incline certification agencies to maintain data on their membership as proprietary information. There is, however, some information available about certain segments of the population. PADI, the largest diver certification agency in the world (PADI, 2019) and an RSTC member, identifies several characteristics of its members worldwide (excluding Japan). According to this information, PADI's membership is 133,059 individual members who are primarily male (83%). This membership information makes no distinction between DMs and instructors, but if the gender distribution is approximately equal across these categories, then their instructor population is 17% female, which is similar to the percentage of women sampled in this research (12.8%). The median age of their members is between 30 and 39, which is slightly younger than that of this sample (median = 41 to 50, n = 44). Thus, the gender distribution in this research sample seems similar to that of a comparable instructor population and the median age of the sample is only slightly older. Given these similarities between the research sample and a separate, similar RSTC member population, it seems likely that the results of this research will generalize to other RSTC instructor populations and be representative of the SDI instructor population in particular. These results are summarized in Table 7 through Table 11.

Table 7

Characteristics of the Sample

Category	Response	Value	% of sample
Years scuba diving	Minimum	1	
	Mean	22.1	
	Maximum	54	
Years teaching scuba	Minimum	0	
	Mean	11.5	
	Maximum	41	
Certification method	IDC/IEC	55	35.3
	Crossover	101	64.7
Instructor status	Teaching	135	86.5
	Non-teaching	21	13.5
Gender	Male	136	87.2
	Female	20	12.8
Other recreational diving leadership training	Yes	129	82.7
	No	27	17.3
Non-recreational diving training	Yes	90	57.7
	No	66	42.3
Training in dangerous operations	Yes	81	51.9
	No	75	48.1
Participate in other dangerous sports	Yes	50	32.1
	No	106	67.9

Table 8

Number of Open Water Dives Completed by Participants

Number of dives	*n*	Number of dives	*n*
100 - 199	3	1,500 - 1,999	13
200 - 299	6	2,000 - 2,999	24
300 - 499	14	3,000 - 3,999	9
500 - 999	32	4,000 - 4,999	5
1,000 - 1,499	21	5000 +	29

Note. The minimum number of dives required to be certified as an instructor is 100.

Table 9

Age of Participants

Age	*n*	Age	*n*
18 - 20	1	41 - 50	44
21 - 30	10	51 - 60	39
31 - 40	35	61 +	27

Note. The minimum age to be certified as an instructor is 18.

Table 10

Number of Diving Certifications Issued by Participants

Number of certifications	*n*	Number of certifications	*n*
0	7	400 - 499	7
1 - 49	36	500 - 699	9
50 - 99	13	700 - 999	12
100 - 149	14	1,000 - 1,499	7
150 - 199	8	1,500 - 1,999	6
200 - 299	17	2,000 - 2,499	2
300 - 399	10	2,500 +	8

Table 11

Number of Divers Supervised by Participants

Number of divers supervised	*n*	Number of divers supervised	*n*
0	0	400 - 499	3
1 - 49	21	500 - 699	7
50 - 99	15	700 - 999	8
100 - 149	12	1,000 - 1,499	22
150 - 199	11	1,500 - 1,999	7
200 - 299	12	2,000 - 2,499	7
300 - 399	7	2,500 +	24

A total of 129 respondents stated they had additional recreational dive leader training. Many participants had more than one qualification, often with more than one organization, and only the most advanced credential with an agency is listed if an instructor had more than one with a given agency. Additionally, one Federation of Australian Underwater Instructors (FAUI) instructor and two unspecified National Association of Scuba Diving Schools (NASDS) dive leaders are aggregated with Scuba Schools International (SSI), as both agencies subsequently merged with SSI. Further, two Fédération Française d'Études et de Sports Sous-Marins (FFESSM) divemasters and three unspecified FFESSM dive leaders are aggregated with CMAS, the parent organization. Only agencies with four or more participants listing training with them are listed individually. A further 16 agencies each with three or fewer participants listing training with them are aggregated. Three participants stated they had completed additional recreational training but listed no agency. These instructors are included in the unspecified aggregate category. Training agencies have differing levels of dive leader qualification, and rather than list the various levels organic to each agency, this research

used two basic leader categories and an unspecified category that was used when a participant listed an organization but did not specify the level of training they had completed. The first leader category is DM, which includes divemasters, assistant instructors, and their equivalents, who are instructional assistants and dive leaders, but who are not qualified to independently teach and certify divers. The second leader category is instructor, which includes all levels of recreational instructor above the DM, including instructor trainers. Several participants listed dive training that was other than recreational in response to this question, and these responses are captured in the characterization for non-recreational dive training. These responses are listed in Table 12.

Table 12

Additional Recreational Leadership Training

Agency	Level	*n*	Agency total
Professional Association of Diving Instructors (PADI)	DM	11	90
	Instructor	45	
	Unspecified	34	
Scuba Schools International (SSI)	DM	2	29
	Instructor	18	
	Unspecified	9	
National Association of Underwater Instructors (NAUI)	DM	2	18
	Instructor	13	
	Unspecified	3	
Confederation Mondiale des Activites Subaquatiques [World Underwater Federation] (CMAS)	DM	2	16
	Instructor	4	
	Unspecified	10	
International Association of Nitrox and Technical Divers (IANTD)	DM	0	12
	Instructor	7	
	Unspecified	5	
National Academy of Scuba Educators (NASE)	DM	1	7
	Instructor	2	
	Unspecified	4	
American Canadian Underwater Certifications International (ACUC)	DM	0	4
	Instructor	2	
	Unspecified	2	
British Sub-Aqua Club (BSAC)	DM	2	4
	Instructor	2	
	Unspecified	0	
Aggregate	DM	1	26
	Instructor	13	
	Unspecified	12	

A total of 90 respondents identified they had additional non-recreational diver training. When identifying non-recreational training programs, respondents often identified only a training agency and sometimes simply reported they had additional non-recreational diving training without identifying either the training organization or the level. Both of these are aggregated into the unspecified category. Many respondents identified several levels of training with a single agency and in this case, only the highest level identified is shown in the table. Many of those who had non-recreational diving training had training in more than one type of non-recreational diving, and in this case, each type is shown in the table. Because respondents often did not specify whether their diving qualification was as a diver or as an instructor, no distinction is made between these levels in the table. The table aggregates responses into types of non-recreational diving without distinguishing between training organizations. This is due to the number of training organizations, number of training levels within each organization, many of which have no direct equivalent with levels in other organizations, and the number of types of non-recreational diving identified. Thus, all diver training which trained divers to plan and complete staged decompression diving using air or enriched air as backgas is aggregated into one category regardless of the maximum depth limit of the training regimen required for the certification, and similarly with other levels and types of training. These responses are identified in Table 13.

The training agencies that participants most often listed included the technical diving programs of TDI, IANTD, and PADI; public safety diving programs of Dive Rescue International, ERDI, and the Royal Canadian Mounted Police; cave diving programs of TDI, NSS-CDS, NACD, and IANTD; scientific diving programs of AAUS,

the Canadian Association for Underwater Science, and the Nautical Archaeological Society; and military diver training with the U.S. Navy, the U.S. Army, the U.S. Marines, the British Army, and the Brazilian Navy.

Table 13

Non-Recreational Diver Training

Level of training	Sub-level of training	*n*
Technical open circuit diving using planned staged decompression	Using air/enriched air and accelerated decompression	23
	Using mixed gases and accelerated decompression	14
Rebreather technology	Closed circuit rebreathers	10
	Semi-closed circuit rebreathers	2
	Unspecified	2
Overhead environments	Cave or cavern diving	16
	Wreck penetration diving	2
Specialized open circuit techniques	Sidemount diving	3
Scientific diving		14
Public safety diving		13
Military diving		10
Commercial diving		7
Unspecified		45

A total of 81 participants identified they had completed training for operating in non-scuba dangerous environments. Many of those who identified they had this type of training had completed several such training programs. Often, these training programs were completed with local training agencies and had no direct equivalents with other training programs elsewhere. These programs were consolidated into larger categories when possible, and those programs with four or fewer identifiable participants that were not able to be otherwise classified were consolidated into an aggregate category that included more than 10 distinctly identifiable types of training. Additionally, some

participants identified they had additional training in non-scuba dangerous environments and neglected to specify the type of training. These responses were consolidated into an unspecified category. Where the type of training was not evident from the category, some typical examples are listed. Unique examples are also listed, where appropriate. The types of training identified by participants are shown in Table 14.

Table 14

Training in Non-Scuba Dangerous Environments

Category of training	Examples	*n*
Medical	First responder/EMT/ Paramedic/Military field surgeon	30
Rescue operations	Swift water rescue, search and recovery, disaster response	21
Military operations	U.S. Army, U.S. Marine Corps, Israeli Army, British Army, New Zealand Navy, French Navy	19
Law enforcement	Bomb threat identification	16
Firefighting (including shipboard)		15
Military parachuting	Military Advanced Freefall training	8
Unspecified		8
Aggregate	Mountaineering, lifeguard, vessel boarding procedures	19

Fifty respondents indicated they participated in dangerous sports. These sports were consolidated into larger categories where possible. Eight sports, each with three or fewer participants, were consolidated into an aggregate category, as were two participants who stated they participated in dangerous sports and then listed no sports. Where the type of sport was not apparent from the category, representative examples are given. Unique examples are also listed where appropriate. The sports in which the respondents participated are shown in Table 15.

Table 15

Participation in Dangerous Sports

Sport Category	Examples	*n*
Climbing	Rock, ice, mountaineering	20
Skydiving	Sport parachuting, wing suiting, BASE jumping	16
Skiing		8
Motorcycle riding/racing		7
Bicycle riding/mountain biking		7
Kayaking/rafting	White water	7
Aggregate	Horse breaking, free diving, surfing, motor racing, rugby	15
Unspecified		2

The ALQ scores for the sample are characterized in Table 16. Low, mean, and high scores are shown for the four factors as well as the composite score. Percentile rankings for each score are drawn from the ALQ manual (Avolio, Gardner, et al., 2018). In cases where the tabulated percentiles in the manual did not match the factor scores, the percentile nearest to the actual score is reported.

Table 16

ALQ Scores of the Sample

ALQ Factor		Score	Percentile
Transparency	Low	1.8	22
	Mean	3.2	84
	High	4.0	98
Self-Awareness	Low	1.0	11
	Mean	3.1	79
	High	4.0	97
Ethical/Moral	Low	2.0	30
	Mean	3.5	87
	High	4.0	95
Balanced Processing	Low	1.7	31
	Mean	3.2	86
	High	4.0	97
Composite	Low	2.0	36
	Mean	3.2	84
	High	4.0	97

The mean scores for each factor of the ALT construct were well above the average of the general leader population. Means for three of the four factors, as well as the mean for the composite score, were in the mid-80th percentile, and the mean for the fourth factor (self-awareness) was at the 79th percentile. Given these data, it seems the SDI instructors were more authentic than the general leader population.

Predictive Statistics

The research question was: What is the correlation between recreational scuba instructor scores on the ALQ and their experience as operationalized by their number of years diving, their number of years teaching, the number of open water dives completed, the number of student divers certified, and the number of divers supervised while diving.

These relationships were analyzed using multiple regression with a 95% confidence interval and the correlation coefficient, r. Results were considered significant at $p \leq 0.05$.

Research question 1. What is the relationship between instructor experience and transparency? The correlation matrix is shown in Table 17.

Table 17

Correlation Matrix for Experience Versus Transparency

	Yrs diving	Yrs teaching	# OW dives	# Certs	# Supv
Yrs diving	**1**				
Yrs teaching	0.638	**1**			
# OW dives	0.508	0.625	**1**		
# Certs	0.413	0.708	0.742	**1**	
# Supv	0.284	0.536	0.661	0.704	**1**
Transparency	0.085*	-0.109*	0.019	-0.063	-0.059

* $p \leq 0.05$.

The factor of years diving significantly predicted transparency ($\beta = 0.24$, $p = 0.03$) as did years teaching ($\beta = -0.31$, $p = 0.02$). No other factors were statistically significant.

Research question 2. What is the relationship between instructor experience and self-awareness? The correlation matrix is shown in Table 18.

Table 18

Correlation Matrix for Experience Versus Self-Awareness

	Yrs diving	Yrs teaching	# OW dives	# Certs	# Supv
Yrs diving	**1**				
Yrs teaching	0.638	**1**			
# OW dives	0.508	0.625	**1**		
# Certs	0.413	0.708	0.742	**1**	
# Supv	0.284	0.536	0.661	0.704	**1**
Self-Awareness	0.112	0.076	0.106	0.098	0.063

No experience factors predicted self-awareness at a statistically significant level.

Research question 3. What is the relationship between instructor experience and ethical framework? The correlation matrix is shown in Table 19.

Table 19

Correlation Matrix for Experience Versus Ethical Framework

	Yrs diving	Yrs teaching	# OW dives	# Certs	# Supv
Yrs diving	**1**				
Yrs teaching	0.638	**1**			
# OW dives	0.508	0.625	**1**		
# Certs	0.413	0.708	0.742	**1**	
# Supv	0.284	0.536	0.661	0.704	**1**
Ethical	0.290*	0.108	0.143	0.122	0.137

* $p \leq 0.05$.

Regression analysis indicated the constellation of experience factors accounted for about 11% of the variance in ethical framework, $R^2 = 0.11$, F (5, 150) = 3.70, $p <$ 0.01. The factor of years diving predicted ethical framework at a statistically significant level ($\beta = 0.40$, $p < 0.01$). No other factors predicted ethical development at a statistically significant level.

Research question 4. What is the relationship between instructor experience and balanced processing? The correlation matrix is shown in Table 20.

Table 20

Correlation Matrix for Experience Versus Balanced Processing

	Yrs diving	Yrs teaching	# OW dives	# Certs	# Supv
Yrs diving	**1**				
Yrs teaching	0.638	**1**			
# OW dives	0.508	0.625	**1**		
# Certs	0.413	0.708	0.742	**1**	
# Supv	0.284	0.536	0.661	0.704	**1**
Balanced Processing	0.117	0.042	0.063	0.035	0.061

No experience factors predicted balanced processing at a statistically significant level.

Research question 5. What is the relationship between instructor experience and the composite authenticity score? The correlation matrix is shown in Table 21.

Table 21

Correlation Matrix for Experience Versus Composite Authenticity

	Yrs diving	Yrs teaching	# OW dives	# Certs	# Supv
Yrs diving	**1**				
Yrs teaching	0.638	**1**			
# OW dives	0.508	0.625	**1**		
# Certs	0.413	0.708	0.742	**1**	
# Supv	0.284	0.536	0.661	0.704	**1**
Composite	0.189*	0.028	0.097	0.055	0.059

* $p < 0.05$.

The factor of years diving predicted composite authenticity at a statistically significant level ($\beta = 0.29$, $p < 0.01$). No other factors were statistically significant.

Supplemental Analysis

Although not directly related to the research questions, the data collected provided an opportunity to investigate differences in authenticity between several categories of respondents. In particular, whether there was a significant difference between genders, between those who had completed the SDI IDC/IEC to become an instructor and those who became an instructor through training with another agency and then completed an administrative crossover, between active teaching status instructors and instructors who were not actively teaching, between those who had completed leadership training with other recreational scuba agencies and those who had not, between those who had completed scuba training with non-recreational organizations and those who had not, between those who had completed non-scuba training for operations in dangerous environments and those who had not, and between those who participated in other dangerous sports and those who did not.

When considering differences between groups such as divers who had additional recreational diving leadership training and those who did not, all who identified they had additional leadership training were considered equally trained as a group. No effort was made to evaluate the differences in type or amount of additional training. That investigation was beyond the scope of this research. The same was true of other categories where participants disclosed differing types and amounts of training or experience.

The composite authenticity scores of the various groups were compared using a two-sample *t* test. The results were considered significant at the $p \leq 0.05$ level. Two groups showed statistically significant differences. Those who had non-recreational

diving training ($M = 3.29$, $SD = 0.36$) had higher composite authenticity scores than those who did not ($M = 3.17$, $SD = 0.39$), $t\ (154) = 2.07$, $p = 0.04$. Those who had training in non-diving dangerous operations ($M = 3.34$, $SD = 0.35$) had higher composite authenticity scores than those who did not ($M = 3.13$, $SD = 0.37$), $t\ (154) = 3.67$, $p < 0.01$. No other categories of respondents showed statistically significant differences in composite authenticity scores. Surprisingly, there were no differences in composite authenticity scores between those who participated in non-scuba dangerous sports and those who did not.

Summary

The survey invitation was distributed by email to more than 10,000 ITI members worldwide. From this sample frame, 156 usable responses were received for an estimated response rate of about 2%. Compared to traditional survey methods such as phone, mail, or in-person surveying, this rate was low, although recent research into Internet surveys indicated single digit response rates are not unusual (LaRose & Tsai, 2014; Pan et al., 2013).

The results of the front-end survey painted a picture of the typical SDI instructor as male, between 41 and 50 years old, has been diving for more than 2 decades, and has been actively teaching scuba for more than 10 years. He is an experienced diver and instructor, having completed between 1,500 and 1,999 dives; certified between 150 and 199 students; and supervised between 300 and 399 divers. He is likely to have previously completed instructor training with one or more recreational scuba agencies prior to becoming an SDI instructor via an administrative crossover, and is about as likely as not to have completed either additional non-recreational diving training or training in

operating in non-scuba risky environments. About a third of the sample participated in non-scuba risky sports.

Analysis of the ALQ indicated the typical SDI instructor is much more authentic than the average leader. The scores of the four ALT factors and the composite authenticity score clustered around the 80th percentile of the general leader population. Given these results, it is surprising that the constellation of experience factors influenced none of the authenticity factors by more than 11%. Of the experience factors, the number of years an instructor had been diving influenced transparency, ethical/moral framework, and the composite authenticity score to a statistically significant level, whereas the number of years an instructor had been teaching influenced transparency to a statistically significant level. The experience factors of the number of dives an instructor had completed, the number of diving certifications an instructor had issued, and the number of divers an instructor had supervised influenced no authenticity factors to a statistically significant level, and no experience factors influenced self-awareness or balanced processing to a statistically significant level.

Supplemental analysis investigated possible differences between groups within the sample, revealing that instructors who had completed non-recreational diver training were more authentic than those who had not, as were those who had completed non-diving training for operations in dangerous environments, both at a statistically significant level. Surprising results were that those who participated in non-scuba dangerous sports were no more authentic than those who did not.

Chapter 5

Discussion

> The less a man makes declarative statements, the less apt he is to look foolish in retrospect.
>
> –Quentin Tarantino, *Four Rooms*

This research consisted of a single stage cross-sectional survey of scuba instructors to investigate their levels of authenticity and to determine whether their levels of experience affected their authenticity. Data were analyzed using multiple regression techniques to investigate the effect of the constellation of experience factors on the authenticity factors. Supplemental analysis was conducted using two-sample *t* tests to investigate differences between groups within the sample.

Summary of the Findings

Usable responses were received from 156 participants, with an estimated response rate of 1.8%. Analysis of the ALQ answers showed the sample means for each factor and for the composite authenticity score were higher than for the general leader population. The factor means of transparency, ethical framework, and balanced processing as well as for the composite score each clustered around the 85th percentile, whereas the mean of the self-awareness factor was at the 79th percentile.

Regression analysis comparing the constellation of experience factors with each authenticity factor and with the composite authenticity score showed the constellation affected authenticity to a statistically significant level in one instance, that of ethical framework ($p < 0.01$). In this case, instructor experience accounted for about 11% of the variation in ethical framework. The individual experience factor of number of years

diving was statistically significant with regard to transparency, ethical framework, and the composite authenticity score, whereas the experience factor of number of years teaching was statistically significant with regard to transparency.

Supplemental analysis using a two-sample *t* test showed the mean authenticity score of those who had completed non-diving training in dangerous operations was higher than those who had not completed such training, and the mean authenticity score of those who had completed non-recreational diver training was higher than those who had not completed such training.

Interpretation of the Data

Investigation of the descriptive statistics for the sample indicated the sample is similar to another RSTC member population of recreational scuba instructors. The gender distribution and median age range age of the two samples are similar, which indicates the sample of this research is likely similar to the other population of recreational instructors, and therefore is likely representative of the population of SDI instructors.

Analysis of the authenticity factors of the ALQ showed the sample is much more authentic than the general leader population. The mean scores for three factors and of the composite authenticity score clustered around the mid-80th percentile, and the fourth factor was at the 79th percentile. This suggests that SDI instructors are much more authentic than the general leader population, supporting Kolditz's (2007) assertion that IELs are authentic, and also suggesting SDI instructors are likely to be successful IELs.

Investigation of the experience factors showed two factors were statistically significant, those of number of years diving and number of years teaching, and the

constellation as a whole was statistically significant in one instance, that of ethical framework. The effect sizes were small in these cases, indicating the factors likely had a small impact in the real world. Thus, it seems that though there are relationships between experience and authenticity that are statistically significant, they are likely not relevant when considering their impact in the real world, especially when coupled with the nearly complete absence of statistical significance of the experience constellation as a whole.

Considering the supplemental analysis, when looking at differences in mean authenticity scores between groups, there was no difference between those who had first completed instructor training with SDI and those who had first completed instructor training with another organization. This indicates the effect of instructor training on authenticity tends to remain the same regardless of the source of the training, as participants indicated receiving instructor training with more than eight other recreational organizations.

Results of the supplemental analysis that did show significant differences were between those who had completed non-diving training in dangerous operations and those who had not, and between those who had completed non-recreational diving training and those who had not. Though determining the reasons for these differences was beyond the scope of this research, it seems possible that the relative focus of the different types of training plays a role. As an example of non-diving dangerous operations, training in military combat arms operations teaches participants the techniques of using weapons and other methods of causing death or injury to adversaries, while also emphasizing methods of surviving similar efforts directed at themselves. It is common in this type of training for communication to be blunt about participant performance, the effectiveness

of the methods employed, and the relative likelihood of having survived the measures employed by the adversary. Similarly, with regard to non-recreational diver training, the emphasis of the training shifts. For example, training in technical diving covers many subjects, among which is a focus on surviving the myriad dangers that do not exist in recreational diving. It is not uncommon for technical diving training manuals to emphasize the dangers in an explicit manner and to actively discourage students who are not willing to accept those risks. Communication with students in technical training is frank and direct when addressing student performance. This is in contrast with communication with students in recreational classes, which tends to address the risks obliquely and provide positive rather than negative feedback on student performance (K. Chesnut, personal communication, December 5, 2019). Though these are just two examples illustrating much broader categories, it seems instructors who have participated in training that emphasizes direct communication about the risks of participating in an activity tend to be more authentic than those who have not had such training.

There were two surprising results in the data. First, when investigating the relationship between experience and authenticity, the results indicated a tenuous link at best. Two of the experience factors were statistically significant when related to the authenticity factors, yet the small effect sizes of the relationships suggest that they are likely not relevant in practice. Thus, instructor experience seems to have no practical impact on authenticity. This is similar to Dixon's (2014) findings, who said that experience in extreme environments is not related to successful operational outcomes in those environments. This suggests that factors that contribute to the development of authenticity lie elsewhere than in areas where they might initially appear to be.

Second, when comparing the composite authenticity score of those who participated in non-diving dangerous sports and those who did not, there was no difference between the groups. This initially seemed counterintuitive, as dangerous sports appear to be similar in type to dangerous operations and non-recreational diving. The key discriminator may be the nature of the activities themselves. It is possible to participate in dangerous sports, even those that appear manifestly dangerous such as parachuting, without assuming responsibility for others. Further, although front-end survey questions about training in dangerous operations and non-recreational diving referred to participation or training rather than leadership roles, the nature of these areas differs from sport participation. In dangerous operations, followers may become leaders in short order if those above them are killed or wounded. Followers must be prepared to assume leadership roles at any time. Separately, in technical diving as an example of non-recreational diving, each participant is responsible for planning his or her own dive in minute detail and then ensuring the dive plan for the group is sound. Each diver is intimately involved in the group planning, and once in the water each diver is separately empowered to end the dive at any time or to respond to emergencies as necessary. In non-recreational diving, participants assume de facto leadership even without formal leadership training. Given these considerations, the mindset of those engaged in dangerous operations or non-recreational diving may be different enough from that of those participating in dangerous sports to account for the difference in between-group comparisons. I can say from personal experience that the attitude of an infantryman on patrol in combat, engaged in dangerous operations, is different from that of a sea kayaker on the water, participating in a dangerous sport.

Conclusions

The sample is similar to another RSTC member instructor population, indicating the sample is likely representative of the SDI instructor population. Given this likelihood, the results are likely generalizable to both SDI instructors as a whole as well as other WRSTC members who meet international standards for instructor training.

This research indicated SDI instructors are more authentic than the general leader population, as Kolditz (2007) predicted they should be, although why that is remains unclear. Most of the experience factors were not statistically significant, and because of their small effect sizes are likely not relevant to the real-world development of authenticity. Though all instructors complete instructor training and pass an evaluation of their instructor skills, it seems training by one agency is much the same as another when considering its impact on authenticity. Among the sample, it appears those who had completed training in risky areas that emphasize clarity of communication about the risks involved were more authentic than those who had not completed such training.

Future research, then, should focus on extending the use of the ALQ among IELs to expand the data and provide additional information. Further studies using recreational instructors should continue in order to expand these results and further develop these conclusions. These studies should continue to investigate the impact of experience factors. Further research into experience would serve to strengthen the results of this research. Longitudinal investigations of both divers and instructors have the potential to show the development of authenticity, including potential catalyzing events that accelerate development. Additional research using the ALQ should occur using different leader populations as well as different diving populations using the ALQ and other

methods, as well as investigating the development of authenticity during diver training. Additional research into other leader characteristics should be completed to attempt to identify those characteristics that are relevant to the development of authenticity.

Considerations for Future Research

Further research using the ALQ and the front-end questions of this research should continue among recreational instructors. Additional data will serve to strengthen the results of this research, possibly illuminating areas where current results are not reflective of a larger data set.

One way to investigate developments in instructor authenticity is by a quasi-experimental paired sample survey. There are a number of educational institutions that provide packaged instructor training programs during which students are able to progress from non-divers to instructors over a period of months during which they undergo diver training, divemaster training, and finally instructor training (for example see Sairee Cottage Diving, n.d.). By administering the ALQ to these students before beginning diver training, then at milestones throughout the program, and finally after the successful completion of instructor training, it would be possible to track changes in authenticity as students progress from non-diver to instructor. These results could show the baseline authenticity of students beginning such programs, as well as whether there is a point during training that stimulates the development of authenticity.

It is possible that students who begin as a non-diver and progress to instructor in an integrated training program are not representative of the diving population in general, who may not be as directed and who may not have instructor certification as a goal. To investigate the recreational diving population, links to an online ALQ could be sent to

newly certified divers, either with their certification card or as a separate mailing. These results could show general trends of diver authenticity while also having the possibility to show a point at which diver authenticity begins to develop. For those already certified as dive leaders, an online link could be provided during their annual membership renewal in order to expand the data.

This research indicated instructors who had completed training in non-recreational diving were more authentic than those who had not, although it is unclear why this is so. To further investigate this difference, research into non-recreational populations could be helpful. This research could take the form of using the ALQ to survey commercial divers, both students and those working in industry. The ALQ could also be administered to scientific divers in the U.S. Antarctic Program or military divers operating in the arctic. These populations have the benefit of being distinct both from recreational divers and from each other. Further, the diving environments for commercial divers, divers in the arctic, and divers in the Antarctic provide distinct extreme environments that differ from those typically found in recreational diving. Commercial and military divers dive at times and locations dictated by mission requirements and are dependent on environmental considerations to a lesser degree than recreational divers who are diving for enjoyment. Similarly, scientific divers often dive in environments that are not generally accessible to recreational divers, some of which are extreme, such as in Antarctica. Military and scientific diving populations are much smaller than recreational populations, so while the ALQ could be administered to determine diver authenticity, the results may not be generalizable in light of the small sample sizes. To support the ALQ, an additional methodology should be employed. A grounded theory investigation, for

example, would support the ALQ by examining turning points in the diving experiences of military and scientific divers to help determine what factors aid in the development of authenticity.

The ALQ is based on ALT, which has its roots in positive psychology (Luthans & Avolio, 2003). The development of authentic leadership can be triggered by significant life events (Northouse, 2019), and effective leader development can occur as the result of failure (Mastroianni, Kimmelman, Doty, & Thomas, 2011). In this context, research into the negative experiences of instructors could be helpful in determining the role of these experiences in developing instructor authenticity. Structured interviews asking participants about incidents that involved themselves, incidents involving friends or colleagues, or incidents involving students could help to identify whether these significant events, which might occur to instructors as failures, play a role in developing authenticity.

Kolditz (2007) investigated mountain climbers and parachutists as examples of dangerous sports. Leaders in these populations could be investigated using the ALQ to provide a quantitative measure of authenticity among them and allow for a comparison with scuba instructors.

This research investigated authentic leadership in the context of *in extremis* leadership. Kolditz (2007) described IELs as authentic, but also listed leader competence as critical in developing follower loyalty and trust. Avolio said these areas are the direction that future research in the IEL field should take (B. Avolio, personal communication, January 29, 2019). Such research could take the form of structured

interviews of followers to investigate their perceptions of leader competence and how this perception influences the levels of trust and loyalty they feel toward the leader.

Research into other populations of IELs could be useful. The ALQ could be administered to leaders in the military, law enforcement, firefighting, and other populations. The results would expand the data set while at the same time improving the conclusions.

Limitations

The estimated response rate for this research was 1.8%, which compared to traditional survey methods was low. Given this consideration, caution should be used when generalizing the conclusions beyond the population of SDI instructors. Most of the experience factors were not statistically significant, and the two that were are likely not relevant to authenticity. This suggests that other factors, which are at this point unknown, are responsible for the development of authenticity. The ALQ was administered online to a group that was able to access the survey without logging in. There is no certainty that those who responded were SDI instructors or even the same individuals who received the invitation. Anyone who had the survey link could access and take the survey. This had the potential to skew the results in unknown ways if non-SDI instructors completed surveys. Because the ALQ is a self-report survey, it is possible that participants were untruthful in their responses. If this was the case, the potential exists that the results are skewed in unknown ways. Because this research investigated only scuba instructors and not other IEL populations, additional research into other populations needs to be conducted before generalizing these results to them.

Summary

This research was a cross-sectional single stage survey investigating the relationship between experience and authenticity in recreational scuba instructors. In the post 9/11 era, researchers observed that effective leadership in the confusing operational environment relied on internally centered, values-based leadership rather than on externally centered, rule-based leadership. This leadership style has been named authentic leadership (Avolio & Gardner, 2005; Luthans & Avolio, 2003). Separately, Kolditz and colleagues (Kolditz, 2007; Wong et al., 2003) investigated leadership in dangerous environments. Kolditz (2007) stated leaders in these life-threatening environments are authentic. This research investigated the authenticity of scuba instructors who lead their students in the dangerous underwater environment.

The results of this research indicated most of the experience factors had no impact on instructor authenticity, yet the sample was more authentic than the general leader population by a wide margin. Demographics of the sample are similar to a separate RSTC member instructor population, indicating this research is likely to reflect the characteristics of the SDI instructor population. SDI instructors, then, are likely to be much more authentic than the general leader population, which has positive implications for the effectiveness of SDI instructor leadership.

Though the sample was more authentic than the general leader population, the reasons for this are unclear. Further research investigating different diving populations such as military divers, scientific divers, commercial divers, recreational instructors in training, and recreational divers in training, as well as in different environments such as the arctic, the Antarctic, and industrial worksites, might yield valuable information to

advance this area of research. Possible research methods include using the ALQ survey to expand the data, using quasi-experiments to trace the development of authenticity, using grounded theory interviews to develop new theory, and using structured interviews to determine the impact of environmental and training factors. The ALQ should be administered to additional IEL populations such as parachutists and mountain climbers to expand the results and conclusions. Finally, further investigation of leader competence and its role in developing follower trust and loyalty has the potential to provide valuable information to those in the IEL field.

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Appendix A

Human Subjects Review Committee Approval Form

2183001

GEORGE FOX UNIVERSITY
HSRC INITIAL REVIEW QUESTIONNAIRE
Page 6

Title:

Leadership In Extremis: Authentic Leadership in Recreational Scuba Instructors

Principal
Researcher(s): Geoffrey E. Sutton

Date application completed: _____

COMMITTEE FINDING:

√ 1) The proposed research makes adequate provision for safeguarding the health and dignity of the subjects and is therefore approved.

____ 2) Due to the assessment of risk being questionable or being subject to change, the research must be periodically reviewed by the HRSC on a _____ basis throughout the course of the research or until otherwise notified. This requires resubmission of this form, with updated information, for each periodic review.

____ 3) The proposed research evidences some unnecessary risk to participants and therefore must be revised to remedy the following specific area(s) of non-compliance:

_____

_____

_____

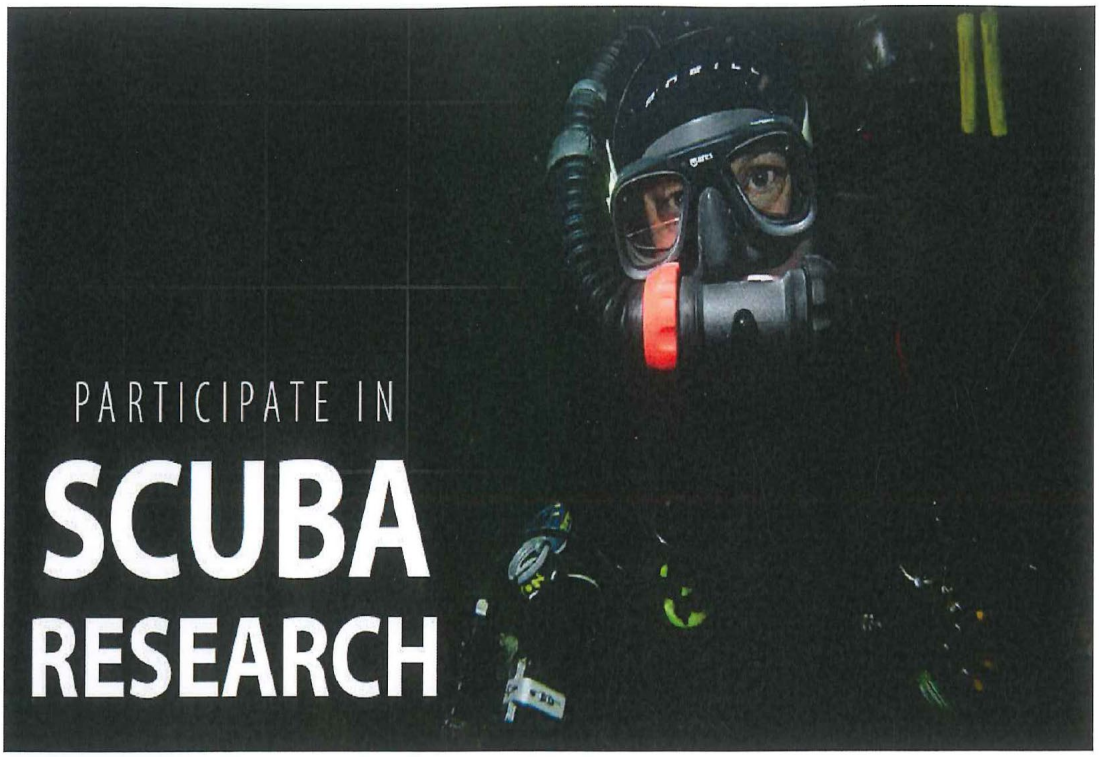
_____

____ 4) The proposed research contains serious and potentially damaging risks to subjects and is therefore not approved.

Chair or designated member _____ Date 5/3/19

Appendix B

Survey Notice in the ITI Newsletter



Instructors! An exciting opportunity to participate in scuba research!

For all SDI instructors, we have an exciting opportunity to participate in research into scuba diving leadership. This important research has the potential to impact leadership training in scuba diving, the military, public safety and other areas. Any SDI instructor member can take the survey, whether in teaching or non-teaching status. We urge you to take a few minutes to complete the survey today!

LEARN MORE »

Appendix C

Introduction Letter from SDI and Invitation from Researcher

INSTRUCTORS! AN EXCITING OPPORTUNITY TO PARTICIPATE IN SCUBA RESEARCH!

Dear SDI Instructor,

A few years ago, Geoff Sutton, an SDI Instructor Trainer, approached me about helping him with a scuba diving research project for his Doctoral dissertation with George Fox University. Happy to help, I'm writing to tell you about this exciting opportunity to participate in the research that will only take a few minutes of your time.

This important research will not only help the diving industry but has the potential to impact areas far beyond scuba diving.

We at SDI support Geoff's efforts, and I encourage you to take this short survey today. You can read more about it and find the link to the survey in Geoff's invitation below.

Safe Diving!

Brian Carney

President, Scuba Diving International

Dear Fellow SDI Instructor,

My name is Geoff Sutton. I am a doctoral candidate at George Fox University, and an SDI instructor trainer. I am investigating leadership behavior in recreational scuba instructors for my dissertation research, and I ask that you take a few minutes to help me by answering a brief survey about your own leadership style.

This research is designed for instructors, so I ask that you complete the survey only if you:

• **Are an instructor**

• Have 10 to 15 minutes available to complete it, and

• Are able to read English.

To go to the survey, click on the link below.

Take Survey
(https://transform.mindgarden.com/survey/28839/b94)

It is only through the investment of a short amount of time by yourself and other dedicated SDI professionals that I will be able to complete this important research. Thank you in advance for your willingness to help out.

As a small gesture of appreciation for your time, once you complete the survey you will be given a link to a page of US Navy diving references, including the 2018 edition of the US Navy Diving Manual, all of which are **free to download**.

This research is important not just to myself, but also to SDI and to others. I am investigating leadership in dangerous circumstances, specifically related to recreational scuba diving. It is quite possible that the results of this research could be used to improve the quality of diver leader training as well as leadership training in other organizations which operate in dangerous environments such as the military or firefighting.

The survey consists of 15 questions relating to your background, training, and experience, and 16 questions relating to your own leadership style. The questions are

primarily multiple choice, and you should easily be able to complete them in 10 to 15 minutes.

The opportunity to take the survey is limited, so I ask that you respond as quickly as you can.

I appreciate your willingness to spare a few moments to help with this important research.

I wish you the best in both your personal and professional diving endeavors.

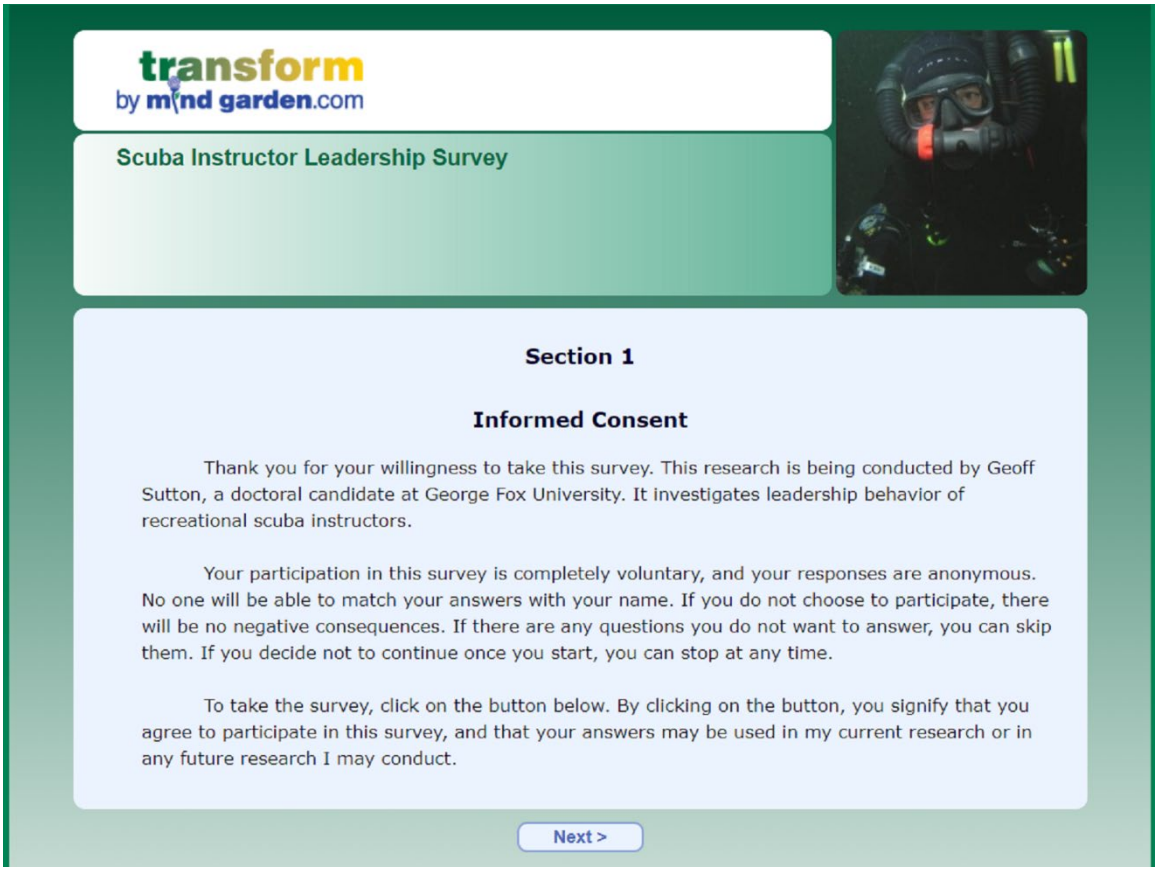
Geoff Sutton

Doctoral Candidate

George Fox University

Appendix D

Informed Consent Form



Appendix E

Reminder Letter from Researcher

Dear SDI Instructor,

My name is Geoff Sutton, and I am currently working on scuba related doctoral research. The last SDI newsletter you received included an invitation to participate in a survey to further this research. Many of you responded, and to those of you who have, I say ***thank you***!

If you have not yet responded, I ask that you take a few minutes today to help with this research and take the survey. SDI fully supports this research and has encouraged each of you to participate. It is only with your help that it will be successful.

This research is designed for instructors, so I ask that you complete the survey only if you:

- Are an instructor, and
- Have 10 to 15 minutes available to complete it, and
- Are able to read English.

To take the survey, click on the link below:

I know that as scuba instructors, you have many demands on your time, so I appreciate your willingness to spare a few minutes to help with this important research.

I wish you all the best!

Geoff Sutton

Geoff Sutton
Doctoral Candidate
George Fox University

Appendix F

Front End Subject Background Questions

The following questions relate to your background, training, and experience both in scuba diving and in other areas.

1. What year were you first certified as a scuba diver?

2. What year were you first certified as a scuba instructor?

3. SDI diver standards define open water as a body of water similar to regional diving conditions other than a swimming pool, such as an ocean or lake, etc.

How many dives in open water have you completed (please provide your best estimate if you don't know the exact number)?

99 or less

100-199

200-299

300-499

500-999

1,000-1,499

1,500-1,999

2,000-2,999

3,000-3,999

4,000-4,999

5,000+

4. On what date did you complete your most recent open water dive?

5. SDI requires new instructors to complete both the Instructor Development Course (IDC) and the Instructor Evaluation Course (IEC) before being certified as SDI Open Water Scuba Diver Instructors (OWSDI). SDI will also allow instructors certified by other agencies to become SDI OWSDIs by completing an administrative crossover. Did you complete the IDC/IEC or a crossover to become an SDI instructor?

    IDC/IEC

    Crossover

6. Are you an Active Status SDI instructor?

    Yes

    No

7. What age were you on your last birthday?

    17 or younger

    18-20

    21-30

    31-40

    41-50

    51-60

    61+

8. What is your gender?

    M

    F

9. How many scuba diving certifications have you issued which required students to complete open water dives (please provide your best estimate if you don't know the exact number, including all agencies you teach through)?

0

1-49

50-99

100-149

150-199

200-299

300-399

400-499

500-699

700-999

1,000-1,499

1,500-1,999

2,000-2,499

2,500+

10. On what date did you issue your most recent certification that required open water dives?

11. How many scuba divers have you supervised while diving, either certified divers or those in training, not including those to whom you issued certifications (please provide your best estimate if you don't know the exact number)?

0

1-49

50-99

100-149

150-199

200-299

300-399

400-499

500-699

700-999

1,000-1,499

1,500-1,999

2,000-2,499

2,500+

12. Have you completed diving leadership training with recreational agencies other than SDI?

yes

no

12a. If yes, please list the agency and the leadership level:

13. Have you completed diving training with non-recreational organizations such as technical, military, commercial, or scientific diving?

Yes

No

13a. If yes, please list the organization and training level:

14. Have you completed non-diving training related to operations in dangerous environments, such the military, law enforcement, firefighting, disaster response, first responder or dangerous sports such as parachuting or mountain climbing?

yes

no

14a. If yes, please identify the training programs:

15a. Do you participate in dangerous sports other than scuba diving, such as parachuting or mountain climbing?

Yes

No

15b. If yes, please list the sports.

Appendix G

Thank You Page

Thank you for helping me with this important research by completing this survey.

The information gained from your responses has significant potential to help improve leader training programs in many areas.

As an acknowledgement of your valuable time, here is a link to a page of US Navy diving references, including the 2018 edition of the US Navy Diving Manual, all of which are free to download:

https://www.navsea.navy.mil/Home/SUPSALV/00C3-Diving/Diving-Publications/

Appendix H

Sample Authentic Leadership Questionnaire Items

As a leader I….

say exactly what I mean

demonstrate beliefs that are consistent with actions

solicit views that challenge my deeply held positions

seek feedback to improve interactions with others