Mindfulness in Action: Discovering How U.S. Navy SEALs Build Capacity for Mindfulness in High-Reliability Organizations (HROs)

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ABSTRACT

This study of US Navy Sea Air and Land (SEALs) commandos contributes to the research investigating mindfulness in High-Reliability Organizations (HROs) by identifying micro- and macro-level influences that allow SEALs to build capacity for mindful behaviors and flexible responses despite the complexity of their missions, unpredictability of their operating environments, and inherent danger of their work. Although HRO literature defines five hallmarks of mindfulness, how frontline people working in HROs create a state of collective mindfulness is not often investigated. This study addresses this gap through an empirical exploration of 'mindfulness in action' as a way to link individual mindfulness traits and organizational mindfulness influences, providing a more nuanced conceptualization of one hallmark of mindfulness—a preoccupation with failure—and offering a new sixth factor that allows HROs to perform in a near error-free manner: comfort with uncertainty and chaos. These discoveries open up new avenues of HRO research for a wide range of reliability-seeking organizations.

Keywords: mindfulness, failure, chaos, uncertainty, reliability-seeking organizations, High-Reliability Organizations (HROs), US Navy SEALs

For supporting media please see https://vimeo.com/153223681

INTRODUCTION

Although studies investigating performance reliability in organizations have a long history, research examining *High Reliability Organizations* (HROs) or organizations that perform in a near error-free manner despite their complex, unpredictable and dangerous operating environments is more recent (La Porte, 1996; Roberts, 1989; Rochlin, LaPorte, & Roberts, 1987; Weick, 1987). Aircraft carriers, nuclear power plants, and air traffic control towers are known for their standardized procedures, checklists, and other routinized organizing processes. Yet research by Weick and Roberts (1993), among others, reveals that these HROs' consistent performance results less often from routines and more often from 'organizational mindfulness' processes—that is a capacity to detect and correct errors and adapt to unexpected events before small factors develop into catastrophic failures. Weick and Sutcliffe (2006, p. 516) further define HRO's "mindfulness" as a "rich awareness of discriminatory detail" coupled with a "capacity for action".

Weick and Sutcliffe (2001, p. 10) observe successful HROs share five hallmarks of mindfulness: a preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience, and deference to expertise. Building on this, Weick and Sutcliffe (2006, p. 516) provide a more detailed explanation:

> Small failures have to be noticed (*preoccupation with failure)* and their distinctiveness retained rather than lost in a category (*reluctance to simplify).* People need to remain aware of ongoing operations if they want to notice nuances that portend failure (*sensitivity to operations*). Attention also is crucial for locating pathways to recovery (*commitment to resilience*) and the expertise to implement those pathways (*deference to expertise*).

However, despite definitions such as these in the literature, we know little about how mindfulness is operationally achieved by frontline people working in HROs; a process that Weick (2011) notes, must be continuously re-accomplished in situ. That is, how do individual mindfulness traits and organizational mindfulness processes mesh to sustain reliable performance?

In this study we provide novel empirical evidence regarding how mindfulness is enacted in a distinctive context. Through this exploration we extend the conceptualization of mindfulness paying greater attention to how mindfulness manifests itself at individual and organizational levels and through this analysis expand Weick and Sutcliffe's (2001; 2006) hallmarks of mindfulness. Weick, Sutcliffe, and Obstfeld (2008) observe that HROs warrant closer attention in mainstream organizational theory because they are harbingers of organizational adaption in increasingly complex environments and can serve as role models of how mindful processes can foster organizational effectiveness and suppress tendencies towards inertia.

Supporting this observation, HRO theories have been applied in less risky, 'reliability-seeking' organizations such as a US business school (Ray, Baker, & Plowman, 2011), software firm (Vogus & Welbourne, 2003), and German manufacturer (Gebauer, 2012). The commonality in this research centers on recognition that, regardless of industry, no one can predict when or how the next unexpected challenge will emerge, or where Weick and Sutcliffe (2007, p. 90) note "ugly surprises are most likely to show up". It is just universally agreed that they will. Therefore, a wide range of organizations can benefit from a clearer sense of how mindfulness is continuously re-accomplished in situ.

Navy SEALs

To investigate this phenomenon, our research team conducted a novel multi-modal study of an elite military community: United States Navy Sea Air and Land commandos called SEALs. The Navy SEAL community was established by President John F. Kennedy in 1962 to enhance the US military's unconventional warfare capability following the success of Underwater Demolition Teams on Normandy beaches and Pacific coral reefs during World War II. Named for the three environments in which they operate—Sea, Air and Land—SEALs provided a flexible maritime counterpart to the Army 'Green Berets', quickly establishing themselves as one of the toughest Special Operations Forces (SOF) in the world (Dockery, 2004). By researching Navy SEALS we are able to examine mindfulness at an individual level within an organization that demands near error free action.

Central to SEAL training and development is completion of Basic Underwater Demolition/SEAL training known simply as BUD/S: an arduous, thirty week training course held at the Naval Special Warfare Training Center in Coronado, California where much of the present study's research was conducted. A highlight of the BUD/S program is 'Hell Week', an event designed during World War II to quickly prepare frogmen for the Normandy beach landing, and includes five days of continuous training exercises in hypothermic environments along with intense sleep deprivation. The training objective of Hell Week is for SEAL candidates to demonstrate a 'never quit' attitude, regardless of assignment difficulty. Nonetheless, Hell Week is so demanding that about 75% of each BUD/S class typically quits by week's end (Doolittle, 2004). Training culminates with a graduation ceremony where candidates become authorized to wear the coveted *Trident* pin, and the class elects its 'Honor Man': the trainee who most inspired others to overcome adversity to succeed. Even

for retired SEALs, a sense of pride and camaraderie as a navy commando remains deeply engrained and dozens often make the pilgrimage back to the Coronado training facility six times per year for SEAL graduation, our research team observed.

HIGH-RELIABILITY ORGANIZATIONS (HROS) AND MINDFULNESS

Karlene H. Roberts (1989) was perhaps the first scholar to propose that existing organizational theory offered little assistance deciphering the nearly error-free organizing processes of hazardous industries. Building on Perrow's (1984) 'normal accident' theory identifying the vulnerabilities of highly technical, tightly coupled and interactively complex systems, Roberts (1989) coined the term '*High Reliability Organization*' after she and her UC Berkeley colleagues noted how risky organizations sustained excellent performance over long periods despite the inherent danger of their work. Organizations were categorized as HROs based on how often they could have failed with catastrophic implications, yet did not. Roberts (1989, p. 113) noted, "If the answer is 'repeatedly,' the organization qualifies for membership in the 'high reliability' group".

Initially some HRO theorists, such as Weick (1987), characterized HROs based on their total elimination of mistakes and inability to learn by trial-and-error due to the severe implications of failure. Yet, this stance was later reassessed to allow for the inevitability of error, preoccupation with failure, and the importance of trial-and-error learning, albeit in a limited way (Weick et al., 2008). Another early HRO researcher, La Porte (1996) further defined HROs as organizations that must continuously operate at a very high level of efficiency using complex and hazardous advanced technologies without major failure while maintaining the capacity to address unpredictability. Similarly, Carroll's (1998) HRO study found nuclear power

and chemical processing plants employ a unique organizational learning process cycle to avoid errors, limit the consequences of problems, and learn from near-misses and minor incidents. Other early studies cited HROs fixation on safety as the source of their reliability. Yet more recent research recognizes HROs actively pursue multiple objectives to achieve peak performance (Weick et al., 2008).

What was novel about these pioneering studies was that prior to this time, studies of complex operations in hazardous industries often adopted an engineering presumption that performance reliability resulted from clear hierarchy, stable environments, unambiguous functions, and routinized procedures. In this paradigm, human operators were seen as a potential weakness and that vulnerability was controlled through engineering design, managerial supervision, and routinization. For instance, once a nuclear power plant was built and debugged, nuclear utilities and governmental regulators assumed the plant would simply run safely. Nuclear accidents were deemed too unlikely to worry about until the Three Mile Island meltdown in 1979 proved this logic flawed (Carroll, 1998).

In contrast, early HRO researchers recognized that a new paradigm was needed in which reliability was equated with organizational flexibility, resilience, and responsiveness to the unexpected. As such, resilience resulted from organizational slack that allowed operators to continually manage small fluctuations and uncertainties, not from organizational invariance and tight managerial control (Schulman, 1993). Although Weick et al. (2008) observe HRO's reliable outcomes are now understood to be the result of stable processes of cognition that detect and adapt patterns of activity in order to manage unexpected events, we still do not know how this is achieved exactly. Therefore to better understand how organizations organize for reliability, Weick et al. (2008) suggest, researchers should specify what

is done repeatedly and what varies in the service of discovery and correction of errors and unexpected events capable of escalation.

Much of the recent research in the field has been applying the HRO concepts in the study of less dangerous workplaces. Termed 'reliability-seeking organizations', studies include a broad set of organizations in which human fatality is unlikely however their unpredictable operating environments nonetheless mean that small failures can amplify into organizational mortality (Vogus & Welbourne, 2003). Studies such as these have led scholars to observe that "organization literature has, on the one hand, been abuzz about the concept of organizational mindfulness," Ray et al. (2011, p. 191) noted, "but relatively quiet when it comes to empirical demonstrations of the idea". We aim to change that through this study of US Navy SEALs.

MINDFULNESS IN ACTION DEFINED

Weick et al. (2008, p. 37) explain that although there has been ample recognition that diverse cognitive processes are associated with high reliability functioning, how these diverse processes interrelate in a state they call "collective mindfulness" is less often investigated. To understand collective mindfulness, they note, it is important to consider not only where individual's limited attention is allocated and what is noticed at the micro-level, but also how autonomous those individuals are empowered to be and what action is taken at the macro-level as a result. Therefore collective mindfulness involves inquiry, interpretation, sense-making, framing and reframing processes, and challenging assumptions within a repertoire of action capabilities (Fraher, 2011). As Weick et al. (2008, p. 37) note, "The richness of a state of mindfulness is determined by the richness of the action repertoire." Yet we know little

more about what links individual processes at the micro-level and organizational processes at the macro-level to achieve this collective mindfulness in HROs.

HRO literature explains that mindful organizing only exists to the extent that it is collectively enacted and continuously reconstituted, and this process is a function of the behaviors of organizational members (Vogus & Sutcliffe, 2012). As such, achieving organizational mindfulness involves both individual characteristics and organizational phenomenon within a given context. Yet, how these two levels interrelate is largely unaddressed in HRO studies. Through this study we address this gap by introducing 'mindfulness in action' as a way to link two previously distinct levels of mindfulness analysis: traits of individual mindfulness (See for example, Fiol, Pratt, & O'Connor, 2009; Kabat-Zinn, 1994; Langer 1989, 2000; Weick & Sutcliffe, 2006) and a state of collective mindfulness at the organizational level (Weick & Roberts, 1993; Weick & Putnam, 2006; Weick & Sutcliffe, 2001; Weick et al, 2008). Mindfulness in action occurs when HROs achieve an attentive yet flexible focus capable of incorporating multiple, sometimes competing realities in order to assess alternative solutions and take action in dynamic situations. Mindfulness in action is developed through attention to Weick and Sutcliffe's (2001) five hallmarks of mindfulness as well as a new sixth factor: comfort with uncertainty and chaos. As such, mindfulness in action is a dynamic co-creational process between individuals, the organization, and the wider context and environment (See Figure 1).

Micro-Level Influences

Langer (2000, p. 220) offers one of the most often cited definitions of individual mindfulness: "mindfulness is a flexible state of mind in which we are actively engaged in the present, noticing new things and sensitive to context". In addition, Kabat-Zinn's (1994) observes that individual mindfulness involves paying attention in

a present, purposeful nonjudgmental way. More recently Fiol, Pratt, and O'Connor (2009) added that achieving mindfulness depends on individual's openness to new information, ability to create new categories of meaning, and awareness of multiple, sometimes competing realities. In sum, individual mindfulness is based on several, often overlapping characteristics: 1) attention to detail; 2) engagement in the present; 3) a flexible state of mind; and 4) openness to multiple emerging realities.

In addition, quantitative researchers have studied other individual characteristics that may contribute, albeit in an oblique manner, to mindfulness such as the big five personality traits (BFF) (Goldberg, 1990), grit (Duckworth, Peterson, Matthews, & Kelly, 2007; Duckworth & Quinn, 2009), emotional intelligence (Bar-On & Parker, 2000; Goleman, 1995; Salovey & Mayer, 1990), and resilience (Smith et al., 2008; Windle, Bennett, & Noyes, 2011), among others. For example, grit involves perseverance and passion for long-term goal achievement thereby creating a sense of purpose while resilience is a more immediate, short-term process of adapting to challenges and staying motivated. Both involve aspects of emotional intelligence which is an individual's ability to understand and use emotional information to guide thinking and behavior. The point here is that mindfulness in action crystalizes a range of individual characteristics at the micro-level.

Insert Table 1 About Here: Table of Terms

Macro-Level Influences

On a macro-level, HRO theory demonstrates that HROs achieve their high reliability through heedful performance, heedful interrelating, and other mindful organizing processes. For example, Weick and Roberts (1993) note heedful interrelating is an ongoing social process in which HROs capitalize on individual know-how to meet unexpected situational demands by identifying small failures before they build into

catastrophe. And heedful performance is the outcome of training and experience linked with thinking and feeling that allows HROs to flexibly apply knowledge in ambiguous situations. Yet how these important micro-and macro-level factors are linked to achieve high performance in HROs has been largely unexplored. Mindfulness in action crystalizes this range of micro- and macro-level influences demonstrating how overlapping traits such as grit, resilience, and emotional intelligence at the individual level, combine with organizational phenomenon such as heedful performance and heedful interrelating on the macro-level, to support collective mindfulness in HROs.

Insert Figure 1 About Here: Unpacking Mindfulness

Military mindfulness training

Mindfulness has been previously studied in a military context, yet in a limited way. Following civilian studies such as Brown and Ryan (2003) which found that mindfulness training (MT) such as yoga, meditation, and reflexive exercises with undergraduate students often created a greater sense of focus and well-being, military researchers examined whether mindfulness training could similarly impact soldiers' performance. For example, Stanley, Schaldach, Kiyonaga, and Jha (2011) tested whether MT prior to Iraq assignment could bolster U.S. Marines' psychological resilience as a prophylaxis against deployment stressors. Jha et al. (2015) examined whether MT could reduce U.S. Army soldiers' attention lapses and mind wandering. Meland, Fonne, Wagstaff, and Pensgaard (2015) investigated whether MT with pilots and mission support personnel in a Norwegian F-16 squadron could reduce anxiety and improve concentration. All of the studies reviewed reported success, albeit minimal, by measuring military members' perceptions of the impact of MT on their individual thoughts and feelings (e.g. 'The training has really opened my eyes'; 'I

have become more calm and relaxed'; 'I feel I can concentrate more easily'). Yet, none of this military research addressed the aim of the present study to examine how HROs such as US Navy SEALs build capacity for the mindfulness required to succeed in the complex unforgiving environments in which they operate.

Insert Figure 2 About Here: Overview of Multimodal Research Design

RESEARCH DESIGN

This qualitative study used a multi-modal research design consisting of three phases: ethnography, text analysis, and videography (See Figure 1). Perhaps as far back as Campbell and Fiske (1959), authors recommend researchers employ several different methods as part of a validation process that ensures that the study's findings are the result of the reported phenomenon. Torrance (2012) notes mixed methods research attempts to consider multiple viewpoints thereby providing novel opportunities for validation by offering ways to compare interpretations across data sources in order to triangulate research findings. Following Denzin (1978), we adopted four triangulation methods: (a) data triangulation using a variety of data sources; (b) investigator triangulation using three different researchers; (c) theory triangulation combining multiple theories to interpret findings; and (d) methodological triangulation adopting a multi-modal research design. Several scholars have recently argued multimethod research is so popular it should join quantitative and qualitative approaches as a 'third methodological community' because of these advantages (Johnson, Onwuegbuzie, & Turner, 2007; Tashakkori & Teddlie, 2010; Torrance, 2012).

Phase One

The first phase of our study investigated how mindfulness is developed by analyzing data gleaned from semi-structured interviews with US Navy SEALs; exploratory unstructured interviews with SEAL instructors, SEAL candidates, and SEAL spouses and other family members; and observations of several training evolutions and a graduation ceremony at SEAL training facilities, after which detailed field notes were recorded. Twelve semi-structured interviews were conducted with three active duty, three reserve, and six retired US Navy SEALs in California. Interviews ranged from 56 minutes to almost two hours in duration, and resulted in the creation of fifteen and a half hours of transcription data. Extensive field notes were treated as additional yet no less significant empirical data.

Contact with study participants was initially made via an email introduction by a mutual colleague of the first author, a retired SEAL now working in academia, and then through 'snowball sampling' other participants were identified (Goodman, 1961). Informants were all volunteers interviewed by the first author between May and December 2013, during their off-duty time. After providing informed consent, interviews were digitally recorded and then fully transcribed.

Participants were all men, in ranks from Master Chief (E-9) to Captain (O-6), ranging from 34 to 70 years in age, with between eight and thirty years of military service. Although six participants (50%) began their careers as enlisted men all except for one were officers at the time of the interview. Five had earned a direct officer commission, four had attended the Naval Academy, and two were commissioned through Reserve Officer Training Corps (ROTC). Four participants (25%) had served during the Vietnam-era, or shortly thereafter, the remaining eight (75%) had recent experience in Iraq and/or Afghanistan warzones. In sum, informants were all senior

military members with extensive experience in Naval Special Warfare, half of whom had worked their way up from the lowest enlisted military ranks to earn an officer commission.

Informants were articulate, outspoken, eager to tell their stories, and interested in the study topic and research findings. The first author's years of experience as an H-46 helicopter pilot—an aircraft often used for SEAL transport—provided common ground. As a result a sense of trust quickly developed and informants were candid, reflective, and detailed when sharing information. Like many professionals discussing their career with a fellow professional, they responded with enthusiasm and, at the end of the interviews, spontaneously offered additional insights and raised numerous questions of their own. The initial scope of the study sought to explore how professionals working in high-risk fields made sense of unusual and potentially escalating crisis situations. A semi-structured interview schedule was used as a guide but overall interviews were non-directive and participants were encouraged to talk about their lives, careers, families, feelings, and other experiences both inside and outside the military.

In order to ensure a high level of reliability and validity in the study, all transcripts were fully transcribed and manually coded using the Nvivo computer software program. The textual dataset totaled over 133,000 words and analysis took the form of an interpretive thematic coding, drawing on elements of grounded theory (Glaser & Strauss, 1967). Using an inductive research approach, the research team identified the key themes that the informants themselves emphasized as important in coping with extreme contexts and coded these quotes using informants' own words such as 'learning through failure' and 'quitting is not an option'. To maintain the integrity of the original texts, several readings of the data were undertaken and the

codes and sub-codes that were adopted were discussed extensively within the research team in order to ensure inter-rater reliability. In sum, our approach was consistent with the emerging reflexive approach in qualitative inquiry in which researchers seek to question their own values and assumptions, their active role in the field work, and the stake they have in the findings and interpretations (Cunliffe, 2003).

Phase Two

Through this process, two broad themes clearly emerged from the dataset: 'comfort with uncertainty and chaos' and a 'positive orientation towards failure'. The aim of phase two of the study was to discover more about these two themes. Our research team wondered: Is comfort with uncertainty and chaos and a positive orientation towards failure an inherent trait of those selected as SEAL candidates or does SEAL training create—or at least heighten—this characteristic? To investigate this question, a *Freedom of Information Act* (FOIA) request was submitted to the Naval Special Warfare Command in Coronado in March 2014 requesting access to all government studies investigating SEAL recruitment, selection, and training processes. In response, twenty seven documents were provided totaling over 600 pages of empirical material. Our research team reviewed these documents using a text-based analysis approach during phase two of our study (See Table 2).

Insert Table 2 About Here: Freedom of Information Act (FOIA) Request

Although some areas of these documents were redacted as 'protected under the deliberate process privilege' and 'for internal use only', the data available was nonetheless revealing. We found that several SEAL candidate screening measures are in use, yet none screen for attitudes towards uncertainty, chaos, or failure, or similar HRO mindfulness characteristics.

Phase Three

With our interest further piqued, our research team went back to the drawing board to consider the availability of other empirical materials to help us investigate the ways uncertainty, chaos, and failure might emerge during BUD/S training. We discovered that over six hours of government sponsored SEAL marketing and recruitment videos were publically available on the internet. Designed to provide potential SEAL candidates with accurate information about BUD/S training and expectations, we realized that these real-world documentaries could prove to be a fruitful data source. Therefore, phase three of our study included an analysis of these videos (See Table 3).

Insert Table 3 About Here: Sources of Videography

'Re-purposing' of video footage, that is adopting pre-existing videos from television broadcasts, 'home-made' videos, CCTV, or internet websites for use as a data source has increased as the availability of recording devices has spread (Jewitt, 2012). Several researchers note the need to expand contemporary research practices to include more visual research and that a linguistic turn may have gone too far in establishing the primacy of language in empirical studies of organizations (See for example, Bell & Davison, 2013; Lefsrud, Graves, & Phillips, 2016; Liu and Maitlis, 2014). In response, the use of publically available web-based videos from sources such as youtube has emerged as a viable research area. However, extant studies predominantly focus on the various characteristics, practices, and motivations of the websites' users rather than offering methods of analysis of the videos themselves (Adami, 2009; Soukup, 2014).

Smets et al. (2014) report important advantages in using video as an empirical data source such as allowing researchers to study individuals in their natural setting without being present thereby reducing the potential for observer bias and enhancing

accessibility to hard-to-reach populations. Admittedly, the Navy videos used here were created from documentary-like footage for marketing purposes so the material available was not unbiased. Yet, research supports that re-purposed video data such as this nonetheless offers researchers the advantage of being a durable, malleable, shareable record that can be repeatedly viewed and edited in multiple ways. These advantages become particularly important for studies involving dangerous or restricted contexts such as the present study, shining light on previously off limit environments such as SEAL training.

Although there were not many models to follow from organization studies for the analysis of our re-purposed video, other fields provided some guidance. For example, visual design research in the field of visual sociology analyses a range of human-made artefacts as a data source, including videos. Margolis and Pauwels (2011) observe visual research serves two purposes: to help observers make sense of the surrounding world and to provide a lens into the design process itself, providing a variety of visual and tactile means of doing research. In addition, Knoblaunch and Schnettler's (2012) hermeneutical model from the communication field informed our inductive process.

First, we repeatedly watched approximately six hours of online video footage listed in Table 3. Then, using an inductive research approach, similar to the coding process described in phase one, we identified video segments representing uncertainty and failure. The final stage of our analysis process required reviewing the coded material to identify patterns and three concepts emerged as the basis for categorization: physical failure, mental failure, and team failure. Short video segments were identified, copied and spliced into one larger video using Camtasia, a video editing computer software program. Overtime, sixteen minutes of key video clips

were identified as representational (Please see https://vimeo.com/153223681). This multi-stage process enabled our research team to observe both the physical and verbal reactions of Navy SEAL candidates and their instructors during the BUD/S training process. Through this sequential video analysis technique, "the temporal unfolding of action produces meaning situationally"(Knoblaunch & Schnettler, 2012, p. 354).

DISCOVERIES

Text-Based Analysis

The text-based analysis phase of our research predominantly draws on the FOIA materials as well as several Special Operation Force studies conducted by military officers at the Naval Postgraduate School in Monterey California (See for example, Allman, Fussell, & Timmons, 2012; Doolittle, 2004); Ferguson, 2012; Hoffman, 2003; Mourouzis, 2011; Swierkowski, & Burrell, 2002) and secondary sources such as newspaper articles, professional military magazines, and internet resources. Reviewing this material, our research team discovered that after September 11th 2001 Special Operation Forces were extensively deployed to Iraq, Afghanistan, Yemen and other volatile regions because many of the highly specialized missions of the *Global War on Terror* could not be accomplished by conventional military forces (NSW Center Public Affairs, 2010). In response, the Pentagon doubled the Special Operations budget to $10.5 billion and the Navy aimed to expand the SEAL community by 15%.

Although increased efforts have been made to actively recruit skilled candidates and better prepare them for the challenges of BUD/S, the attrition rate has nonetheless remained stubbornly high. Of the 900 candidates recruited to attend BUD/S annually, only about 25% will successfully pass to become SEALs at a cost of

approximately $350,000 per trainee (Taylor, Miller, Mills, Padilla, & Hoffman, 2006). High attrition rates, coupled with an ever-increasing demand for Special Operations personnel in the operational theater, present a unique and significant human resource challenge for the SEAL community. Yet there has only been a modest investigation into the key mental characteristics predicting performance success of BUD/S candidates.

As far back as the 1950s research focused on easily quantifiable measures in what was then called 'frogman' training, examining physical characteristics and fitness levels in an attempt to establish a predictive statistical model for graduates and drop-outs. Fifty years later studies continue to focus on age, weight, swim score and run time reporting that older, heavier recruits with faster run times and better swimming skills were more likely to graduate from BUD/S; but only by about 10 percent (Aleton, Cohen, Cummings, & Gray, 2002). This led researchers to deduce that mental characteristics must play a more important role than they previously suspected and researchers attempted to develop methods to screen BUD/S candidates.

For example, McDonald, Norton, and Hodgdon (1988) administered the Hogan Personality Inventory and found that successful SEAL recruits scored higher than drop outs in self-confidence, composure under pressure, amicability, courteousness, and even temperedness. Braun, Prusaczyk, Goforth, and Pratt (1994) administered a five factor survey (NEO Personality Inventory) comparing SEAL recruits to males in the general population in five categories: conscientiousness, neuroticism, extraversion, agreeableness, and openness. Findings revealed that SEALs scored lower than the general population on neuroticism, indicating they are less prone to feelings of depression and vulnerability, and higher on aspects of extraversion such as excitement seeking and assertiveness. Another quantitative study

compared SEAL candidates to other navy recruits and found that successful SEAL trainees had greater confidence, motivation, estimation of their abilities, commitment to the service, and support from family and friends (Harris et al., 2007).

In 2010, a $500,000 Gallup study reported that successful SEAL candidates conducted extensive research about the SEAL community such as reading SEAL books and memoirs, watching documentaries and fictional military movies, and conducting internet research. In contrast, unsuccessful SEAL trainees reported that they thought they would give BUD/S 'a try' and came in less physically fit and mentally prepared (Gallup, 2010). Gallup also found that young men who grew up in New England, played water polo, enjoyed chess, and personally knew someone from Special Operation Forces were the most likely candidates to succeed in SEAL training.

In response, new recruitment strategies and mentoring programs were developed, and new recruit screening measures were evaluated (Ferguson, 2012; Steele, March 5, 2010). For example, Mills and Held (2004) correlated military entry criteria such as scores on the Armed Services Vocational Aptitude Battery (ASVAB) and physical fitness tests with BUD/S graduation rate. More recently, the Navy Computer Adaptive Personality Scales (NCAPS) was developed to assess thirteen personality traits in order to screen all navy recruits into a range military occupations. Oswald, Shaw, and Farmer (2015) report NCAPS is still in the testing phase however, once approved as the navy's occupational screening tool, it may prove to be the best selection instrument for future Navy SEALS. Although researchers reported "that existing training predictors are too low in validity and/or important predictors of training success are not being accounted for in the selection process" (Mills & Held, 2004, p. 3), new predictive models have been slow to emerge. As a result, finding and

training the right individuals for the job continues to prove challenging and the SEAL community remains critically undermanned as they struggled with a new role: marketing their elite commando program for the first time in history (Allman, Fussell, & Timmons, 2012; Mourouzis, 2011; Swierkowski & Burrell, June 2002).

In sum, quantitative studies repeatedly demonstrated, perhaps unsurprisingly, that SEALs differ from other men in specific ways such as self-confidence, composure, even temperedness, motivation, commitment, excitement seeking, and assertiveness. Yet, researchers concede, it is difficult to discern the roots of these findings. The lure of excitement and danger might attract SEAL recruits who are predisposed to succeed in the challenging BUD/S environment. Conversely, SEAL training and the military environment might influence recruits' personality, for example, building their confidence, assertiveness, and thrill-seeking. New quantitative measures exploring SEAL candidates' orientation towards uncertainty, chaos, and failure might prove to be helpful screening tools, allowing the navy to identify and select recruits with a higher propensity to survive BUD/S training and become successful SEALs. In addition, a clearer focus on identifying and developing mindfulness skills might reduce attrition by helping recruits hone their abilities during training. Nevertheless, little attention has been paid in quantitative studies thus far to the individual mindfulness characteristics identified as essential to success in HROs.

Interviews

A pivotal finding early in the ethnographic phase of our research was that it is widely accepted amongst SEALs that their success is less dependent on individual physical prowess and more dependent on mental characteristics. For example, every informant mentioned dedication, determination, motivation, and resilience as essential to SEALs' success. Yet, not one informant mentioned physical attributes such as

running speed, swimming endurance, or weight lifting strength as critical. One SEAL explained it this way:

> People usually think being a SEAL is this intense physical challenge, which there certainly are components of. But most guys who graduate from BUD/S are not physical specimens. I mean, they are above average physically. But all the guys who I went through training with who were the fastest runner, the fastest swimmer, the strongest—all of the really elite athletes—college quarterbacks, Olympic athletes…Those guys usually dropped out fairly early in the program and it wasn't at all because they were physically exhausted or challenged…What I think that points to is more mental characteristics than physical.
>
> [SEAL 3]

This discovery caused our research team to wonder: if outstanding physical skills were not the key to SEAL success then what qualities were.

After reviewing the field notes, we noted that the SEALs we studied confided, reflected, and self-analyzed, candidly expressing strong opinions while also unabashedly sharing stories full of paradox, ambiguity, and inconsistencies. Untroubled by these contradictions, informants were comfortable discussing chaotic, confusing, and complex situations with little need for tidy closure or rational conclusions. In addition, field notes documented common SEAL slogans that reflect the contradictions inherent in SEAL operations: "Get comfortable being uncomfortable" and "Embrace the suck".

We discovered that by acknowledging these contradictions, SEALs were able to mentally prepare for the uncertainty and danger of their work and consider the ramifications of completing the tasks required of them in a mindful way before

embarking on their mission. One SEAL explained his mental preparation process this way:

> You have to be comfortable with yourself [to succeed as a SEAL]…I didn't just go through that training and then go 'OK, what's the next thing another 4 mile run'? I went home and spent days contemplating, imagining, going through scenarios [considering what I might be asked to do]…You may be asked to put a garrote around some guy's neck just because he's in the way and we have to get through the fence…He could be a great guy. But I'm sorry you're in the way….I want to be okay with that now, so I don't have to deal with that after…Mentally and Spiritually.
>
> [SEAL 5]

Therefore, a key to SEALs' ability to accomplish their missions is that they were unencumbered by feelings of trepidation or mental angst that might preclude them from being fully present. Applying Weick and Sutcliffe's (2006, p. 516) mindful definition, we found SEALs demonstrated a rich awareness of discriminatory detail and a capacity for action by mentally preparing for and acknowledging the wide variety of challenges that they might encounter during the course of their work.

Insert Tables 4, 5 & 6 About Here: Unpacking the Attributes

Analysis of our data revealed a range of ways in which mindfulness was enacted by SEALs and subsequently played a role in achieving high reliability. Of the themes identified (See Tables 4,5 and 6) , the strongest evidence was in relation to embracing, and even thriving, under uncertainty and chaos and viewing failure as a learning opportunity. Nearly every SEAL described how unpredictability and chaos

had a calming influence over them, signaling a need to shift focus to the challenges of the immediate present:

> I can predict that something will unpredictably happen here shortly…That's the way life is, you can't stop it. Something is going to happen, so if it's going to be outrageously bad then you have to deal with it [now]…Suddenly it rockets you into this chaos but it's [comforting]…I have nothing else to worry about. There's no other priority. I don't have to worry about getting my taxes done on time [laugh] because it doesn't matter.
>
> [SEAL 2]

Expecting unpredictability, SEALs readily acknowledged that the best made plans are nonetheless just "a basis for change", as one SEAL described it. Therefore, when things go wrong SEALs are unflustered. In fact, several SEALs described how they thrive on the challenge of unpredictability. For example, when asked to provide a specific example of how he deals with chaotic environments, one SEAL described his tour of duty during the Arab Spring in 2011:

> In Yemen, it was just this constant process of not knowing what's going on in this kind of evolving situation where every day—minute by minute, hour by hour things were changing…We evacuated all non-essential personnel but maintained a small presence [at the Embassy]…You had no idea what was going to happen next….I don't know how to characterize this but *I thrive on change*. I would prefer to be in an environment that is chaotic or changing or uncertain because I think that it presents an opportunity to do something, to excel, or to respond probably in a place where a lot of people are going to struggle and be frustrated with it.
>
> [SEAL 3]

What is important to emphasize is that SEALs are not put-off by unpredictable challenges but rather calmly reorient by recognizing not every contingency can be anticipated and chaotic environments present their own unique opportunities to excel. One SEAL provided an example from his Afghanistan deployment experience:

> Most SEALs are adaptable and this is one of the greatest qualities of the SEAL community above other special operations units and above conventional units…I say that confidently, just having observed it…They say, "Oops, we need to send half of your platoon to Afghanistan; a third of them are going to Yemen and the other—the remainder is going to hang out in Iraq. But we're going to marry you up with an East Coast SEAL team and you guys are just going to have to figure it out". So I think SEALs adapt well and it is one of our greatest strengths to think outside the box and deal with anything.
>
> [SEAL 12]

As one senior SEAL training officer explained, adaptability and comfort with uncertainty is developed early in SEALs when they are encouraged to innovate in their training. This philosophy is, paradoxically, reinforced through repeated exposure to failure:

> The way we inculcate a [SEAL] mindset and ethos is through failure. We are allowed to fail, in a controlled environment. You know the old expression: you learn more from your failures than your successes? That's very much part of the culture. You fail a lot [laugh]. And you're intended to fail. Because part of it is, how do you measure up? Can you bounce back from it?
>
> [SEAL 10]

Another senior SEAL officer described how he thought about failure and mindfulness:

> That's happened to me a couple of times, when things were not going right and it looked like I was going to fail. At that point I got really focused—these are the things that aren't going right. And I've got to really put my energy into it…I'm afraid of failure because I didn't prepare well. I'm not afraid of failure if I did the best I could….And if I do fail, am I going to have done the best I could and learn from it?
>
> [SEAL 1]

In sum, we found that SEALs' develop the mindfulness required to excel in their complex operating environments because they possess a high level of comfort with uncertainty and chaos that allows them to innovate, experiment, and even fail as long as they prepared as much as possible, gave their best effort, and learned from the experience. Learning from failure implies a willingness to take risks and embrace unconventional thinking; another important skill reported by nearly every informant. As one senior SEAL officer characterized it, a key SEAL skills is "the ability to look at a situation and say what can go wrong?" and then build potential solutions while simultaneously recognizing that these plans will likely change.

Videography

The last phase of our research capitalizes on the Navy's efforts to expand their marketing materials after 2001 by using publically available documentary style SEAL recruitment videos (See Table 3). Our research team discovered that during SEAL training, candidates were forced to grapple with failure on a daily basis, contributing to their emerging comfort with chaos and uncertainty. We suspect that this experience taught SEAL trainees how to learn from non-fatal failure in a controlled training environment as a way to avoid fatal failure in their future operating environments.

Over time three categories emerged: 1) physical failure; 2) mental failure; and 3) team failure.

Physical failure

The first category in which SEAL candidates are pushed to learn from failure is based on individual challenges such as timed runs, swims, and other physical demands. In addition to meeting prescribed time limits, students are urged to continually beat their own 'personal best' times and compete with each other to win races in order to show steady improvement. Although it may not seem surprising to expect continuous progress, physical tests continue to be administered under increasingly challenging conditions such as during Hell Week with its intensive sleep deprivation. Failing to meet minimum standards, no matter what the context, will result in a drop from SEAL training. It is not uncommon for an individual to excel in one area such as running and struggle in others such as calisthenics or swimming and SEAL instructors are quick to notice any mental weakness when candidates' physically falter (See video segment).

Mental failure

The second category in which SEAL candidates are pushed to learn from failure is based on mental challenges during which students are forced to struggle with their individual doubts and insecurities. For example, SEAL instructors may confront a student for 'not demonstrating leadership' or 'not putting out' and giving 100 percent effort. Employing slightly different tactics, instructors might ask if a SEAL candidate officer was 'worthy of leading men' or suggest that 'there are other programs out there' which the student might consider, since he appears not up to the standards of being a SEAL.

Team failure

The third category in which SEAL candidates are pushed to learn from failure in a controlled setting is based on the challenge of working within a team under duress. Examples in this category are boat crews' inability to follow directions, coordinate activities and execute as a team, not meeting timed evolutions, and the constant pressure to beat other boat crews at whatever the assigned challenge. First place finishers are 'winners', and often get to rest, while second place finishers are merely the 'first loser' and join the other losers for more exercises.

Although each of the failure categories is described separately, it is important to emphasize that they are not experienced as stand-alone events by participants. For example, a SEAL candidate may be urged to quit BUD/S by a SEAL instructor who observes that the student is 'too weak' to complete his push-ups (failure 1), 'not putting out' (failure 2), and letting his boat crew down by making them wait for him to finish (failure 3). The SEAL candidate develops an increased ability to tolerate uncertainty by this experience because he is unsure himself if, in fact, he has the strength and stamina to complete more push-ups and if his boat crew will continue to respect him if he makes them late. In contrast to a 'preoccupation with failure', the SEAL candidate is forced to focus on providing his best effort in the moment and not fixate on the 'what-ifs' of his potential failures.

Examples of learning through failure such as these abound in BUD/S. For instance, SEAL candidates must jump into a swimming pool, flip underwater, and then complete a timed 50 meter underwater swim without kicking off the wall or taking an additional breath. Students are closely monitored by divers because in several cases automatic reflexes take over causing the swimmer to inhale water and pass out. To successfully pass in the time allocated (overcome failure 1), SEAL

candidates must learn to control their anxieties about drowning (overcome failure 2) and trust instructors will monitor their safety (overcome failure 3).

In sum, a review of the video data in phase three reveals SEALs likely develop comfort with uncertainty through repeated exposure to non-fatal failure in training as a way to avoid fatal failures on the frontline. Overtime, SEALs develop a calmness and focus during uncertainty and chaos that contributes to a positive orientation towards failure suggesting one way HROs may develop mindfulness in uncertain environments.

DISCUSSION

The aim of this study was to identify the ways in which Navy SEALs develop the mindfulness required by their complex, unpredictable and dangerous operating environments. We discovered that risky, chaotic and ambiguous HRO environments which would cause most people to become anxious, frustrated, and fearful, signal SEALs to become mindful, shifting their attention to the immediate present and heightening their sense of alertness for the unanticipated and awareness of multiple, sometimes competing realities. During this shift, the priority becomes achieving only the most immediate goal; one more evolution, one more push-up.

Previous HRO research identified the connection between HROs and chaos at the organizational level. Yet, nearly all researchers assumed chaos potentially undermined reliability and performance and therefore needed to be contained. For example, Roberts (1990, p. 168) referred to the aircraft carrier flight deck as "organized chaos" because flight operations involved tightly coupled systems operating with extreme interdependence in uncertain environments making them vulnerable. Similarly, Vidal and Roberts (2014, p. 18) noted how US firefighters use

Incident Management Teams "to bring 'order to chaos'" and French firefighters described their job as "organizing chaos". Comments such as these reflect a sense that chaos should be organized and contained not embraced, lest it influence the reliability of high-risk teams' performance. In contrast, discoveries in this study support that mindfulness in action allows Navy SEALs to live comfortably and even thrive with chaos, uncertainty, and change, without the need to 'bring order' and resolve inconsistencies. For SEALs, chaotic environments seem to trigger mindfulness in action in ways that improved performance and reliability by allowing them to focus intensely on the present, disregarding outside distractions.

Similarly, we discovered that embedded within SEALs mindful organizing processes is the freedom to innovate, experiment, and even fail in a controlled environment, as long as they gave their best effort and learned from the experience. Most HRO studies note how the catastrophic repercussions of mistakes in the HRO environment prohibit learning from trial-and-error and instead emphasize how organizational reliability is increased through a 'preoccupation with failure'. Typical examples of this preoccupation include an organizational willingness to reward the discovery of error, a proactive reporting of 'bad news', and an ability to keep small mistakes from escalating (Gartner, 2013; La Porte, 1996; Ray et al., 2011; Weick & Sutcliffe, 2001).

However, what was discovered in this study was a different preoccupation—a focus on *learning through failure and then moving on.* SEALs learned though repeated failure in a controlled setting how to adapt to an uncertain situation and impending failure triggers mindfulness processes that have not previously been discussed in HRO research. For example most HRO studies support Weick et al.'s (2008, p. 39) observation that "worries about failure are what give HROs much of

their distinctive quality" and by that they note "HROs are preoccupied with something they seldom see". Yet, SEALs in this study failed often and were not preoccupied with avoiding failure in that manner. Rather, SEALs intense focus on learning in the present allowed them to shrug off failure and move on to the next event.

For example in our videography, a SEAL instructor chastises a recruit who just failed an important timed run. The bare-chested recruit is standing at attention, completely covered in sand, and the instructor calmly explains:

> "It looks like the only thing out of this timed run that you're going to end up benefiting from is the fact that now you know what it means to be wet and sandy… You know it now, because you failed the run and we got you sandy. So you'll still end up benefitting in one little way."

This discussion helps reveal how SEALs can be both attentive to failure yet not become immobilized by the potential repercussions of failing—a connection that has not been extensively investigated in HRO theory. Instead, observations that HROs are 'preoccupied with failure' have been largely unchallenged in part because it is so difficult to separate individual and collective characteristics in the analysis.

One thing that is clear: SEAL recruits know that the likelihood of successfully completing BUD/S is extremely low. They know they will be repeatedly pushed to the brink and forced to fail, because the fastest runner may not be the strongest during calisthenics or swimming [see video for examples]. Yet, successful SEALs often report 'quitting was never an option'. What this indicates is that SEALs are not 'preoccupied by failure', as Weick and Sutcliff (2001; 2006) note. Rather they have a positive orientation towards failure as an opportunity to identify a weakness, learn,

and grow stronger. A subtle, yet distinctly different perspective that warrants further research.

Revisiting Weick and Sutcliffe's (2006, p. 516) explanation of the five hallmarks we add: Successful HRO's foster an organizational climate at the macro-level that allows individuals to develop comfort with uncertainty and chaos at the micro-level. Rather than being preoccupied with failure, we find that some HROs develop a positive orientation towards failure as an opportunity to identify a weakness, learn, grow stronger, and then move on; the opposite of preoccupation. For instance, SEALs in this study demonstrated that they can be both attentive to failure yet not become immobilized by the potential repercussions of failing. These developments are able to occur because, as Weick and Sutcliffe note, a reluctance to simplify, sensitivity to operations, commitment to resilience, and a deference to expertise.

CONCLUSION

Quantitative research has shown that individual traits such as grit, resilience, and emotional intelligence are important factors that contribute to individuals' success at the micro-level. In addition, HRO theory demonstrates that HROs achieve their high reliability through heedful performance, heedful interrelating, and mindful organizing at the macro-level. Yet how these important micro-and macro-level factors are linked to achieve high performance in HROs has been largely unexplored. This paper offers one of the first examinations of the ways that individual mindfulness traits at the micro-level and organizational mindfulness at the macro-level interrelate in HROs in a process we call mindfulness in action (See Figure 3).

Insert Figure 3 About Here: Unpacking Mindfulness

Through a study of US Navy SEALs, we provide a more nuanced conceptualization of one of Weick and Sutcliffe's (2001; 2006) five hallmarks of mindfulness—a preoccupation with failure—and identified a sixth hallmark of mindfulness that allows SEALs to perform in a near error-free manner despite the complexity, danger, and unpredictability of their operating environments: comfort with uncertainty and chaos. Most HRO studies observe that the catastrophic repercussions of mistakes prohibit learning from trial-and-error and instead emphasize how organizational reliability is increased through a 'preoccupation with failure'.

In contrast, findings in the present study reveal that embedded within SEALs mindful organizing processes is the autonomy to fail and move on, as long as they gave their best effort and learned from the experience. These findings parallel sports psychology studies which report that athletes who can put mistakes behind them report more effective coping skills and greater motivation than those that dwell on failures (Mouratidis & Michou, 2011). SEALs learned though repeated failure in a controlled setting how to adapt to uncertainty and chaos and during this process mindfulness processes are triggered in ways that have not previously been identified in HRO research. We discovered that SEALs ability to reconfigure mistakes into a learning experience ensures that they do not become immobilized by the potential repercussions of failing in their risky operating environments.

IMPLICATIONS AND NEW RESEARCH TERRITORY

Mindfulness is an important phenomenon to study because a wide range of organizations today must navigate complex, unpredictable environments that pose a

significant risk to the organization's survival. As such, Vogus, Rothman, Sutcliffe, and Weick (2014, p. 592) observed "mindful organizing is relevant to organizations of all kinds". Similarly, Gebauer (2012, p. 203) explained managers and management scholars can learn a lot from mindful organizing because, in contrast to rationality-based management paradigms, mindful organizing "provides the guiding principles and proactive managerial mind-set to build collective organizational capabilities for anticipating the evolution of unexpected events and acting resiliently in times of crisis". Therefore, the discoveries presented in this article open-up new territory for organizational research and practice with implications for a wide range of high-performing, reliability-seeking organizations (Vogus & Welbourne, 2003).

One of the most intriguing discoveries of this study is the fact that some individuals do not just succeed in ambiguous and chaotic contexts but positively thrive in them, seeking out uncomfortable situations that most of us try to avoid. Rather than focusing energy on containing the chaos in these environments, we discovered chaos-thrivers tap into cues which trigger an increase in mindfulness that fosters creative leadership processes that lead to innovative solutions. In contrast to a presumption that reliability results from stable hierarchical environments in which human operators are controlled through close supervision and rigid procedures, we discovered a flexible less hierarchical approach improved performance in ambiguous environments by enhancing mindfulness. Understanding the nature of these dynamics more clearly would not only expand HRO theory but perhaps help the Navy select more suitable candidates for SEAL training.

Although recent studies have applied HRO resiliency frameworks, particularly Weick and Sutcliffe's (2001) popular five hallmarks of mindfulness model in the study of less physically risky workplaces, the rich discoveries reported here support a

return to the study of high-risk fields in order to surface clues further identifying the links between reliability and mindfulness. After all, if we can manage to maintain high levels of safety, reliability, and success in HRO environments such as nuclear safety, aviation and, in this case Navy SEALs, it is likely that equivalent levels of high performance are achievable within a wide range of reliability-seeking organizations in less risky contexts.

LIMITATIONS

Although we believe that the multimodal research approach adopted here offers novel yet reliable insights about our research question, we recognize there are limitations in our research design. First, interview results were based on a small informant group of very experienced SEALs who volunteered for the study and were therefore not randomly selected. Second, some of the text-based materials analyzed in phase two were redacted for security purposes making some documents only partially usable. Third, although much of the video analyzed in phase three was documentary footage gathered during actual SEAL training, the footage was edited and narrated for a different purpose by the Navy and therefore not unbiased. In addition, some critics believe that the mere presence of a video recording device distorts social interaction to such a great extent, video as a data source is of little empirical value (Jewitt, 2012). That said, other researchers claim this issue is exaggerated and empirically unsubstantiated, and within a short time, the camera is hardly noticed by video participants (Heath, Hindmarsh, & Luff, 2010). In addition, video re-purposing is an emergent research approach with few models to refer to for guidance within the field of organization studies. Finally, although we adopted Weick and Sutcliffe's (2006) definition of HRO mindfulness as a rich awareness of discriminatory detail and a

capacity for action, we recognize that some readers may have difficulty accepting our application of mindfulness to military operations. For example, Kabat-Zinn's (1994, p. 7) popular definition based on Buddhist influences describes mindfulness as "gentle, appreciative, and nurturing", not likely descriptors for Navy SEALs.

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Term	Definition	Key References
Heedful Performance	Heedful performance is the outcome of training and experience linked with thinking and feeling, creating an ability to apply knowledge flexibly in ambiguous situations	Weick and Roberts (1993)
Heedful Interrelating	Heedful interrelating is an ongoing social process that capitalizes on individual know-how to meet unexpected situational demands by identifying small hard to see or believe failures before they build into catastrophe.	Weick and Roberts (1993)
Mindful Organizing	Mindful Organizing results from a preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience, and deference to expertise.	Weick and Sutcliffe (2001)
Individual Mindfulness	Mindfulness is active refinement of existing distinctions, creation of new categories, and nuanced appreciation of alternative ways	Langer (1989)
	Mindfulness is paying attention in a present, purposeful nonjudgmental way	Kabat-Zinn (1994)
	Mindfulness is flexible state of mind, actively engaged in present noticing new things	Langer (2000)
	Mindfulness requires high level of attentiveness and capacity to respond to unanticipated cues in order to carry out novel action in flexible manner.	Levinthal and Rerup (2006)
	Mindfulness is a rich awareness of discriminatory detail coupled with a capacity for action.	Weick and Sutcliffe (2006)
	Mindfulness depends on openness to new information, ability to create new categories of meaning, and awareness of multiple, sometimes competing realities.	Fiol et al. (2009)
Resilience	Resilience is process of negotiating, managing and adapting to change, stress or trauma while staying motivated.	Windle et al. (2011)
Reliability	Reliability is capacity to produce collective outcomes of certain minimum quality repeatedly and achieved through highly standardized routines.	Hannan and Freeman (1984)
Emotional Intelligence	Emotional intelligence is ability to understand your own emotions and those of others and use emotional information to guide thinking and behavior	Salovey and Mayer (1990); Goleman (1995)
Big 5 Personality Traits	Conscientiousness, neuroticism, extraversion, agreeableness, openness	Goldberg (1990)
Grit	Grit involves perseverance and passion for long-term goals.	Duckworth et al. (2007); Duckworth and Quinn (2009)

Table 1: Table of Terms

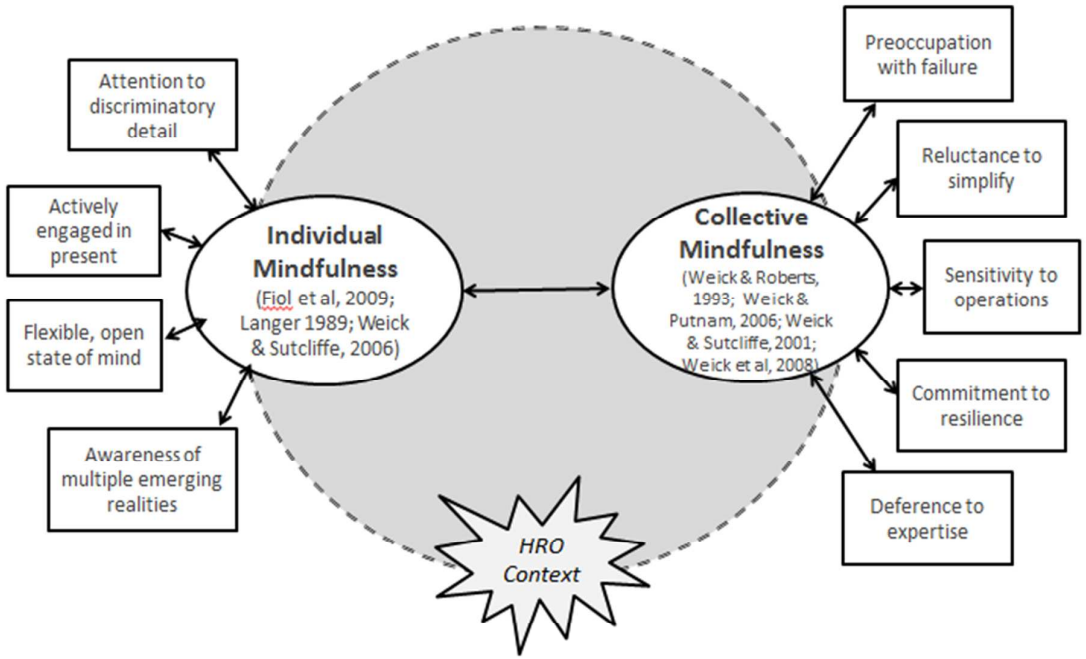

Figure 1: Unpacking HRO Mindfulness at Micro- and Macro-Levels of Analysis

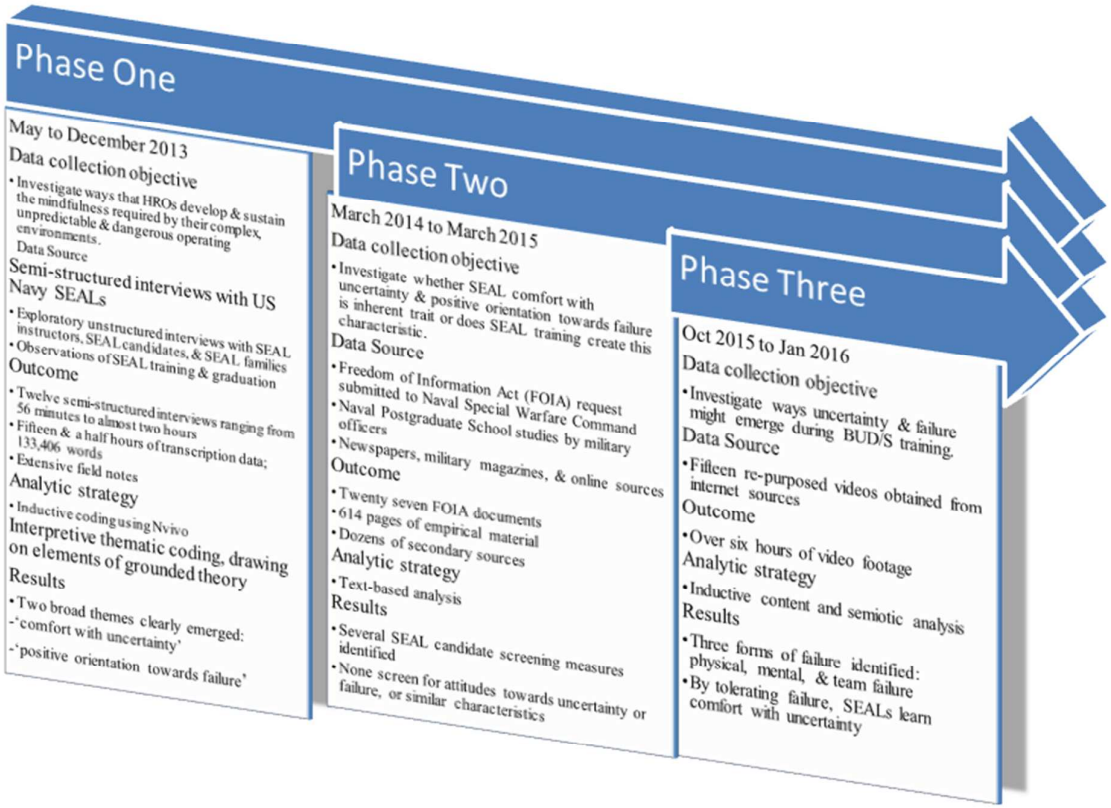

Figure 2: Overview of Multimodal Research Design

	Topic	Year	Total pages
1	NSWC Pre-Training Questionnaire	Unknown	8
2	Selection & Training of BUD/S Instructors	1979	40
3	SEAL Training Profile Questionnaire	1990	10
4	Training Success in US Navy Special Forces	1990	8
5	Profiles of Exercise History and Overuse Injuries among US Navy SEALs	1994	6
6	So You want to be a Frogman? Determining what it takes to become a US Navy SEAL	2002	10
7	NSWC Consulting Report on SEAL Database Analysis	2002	34
8	Individual characteristics related to SEAL training success	Unknown	14
9	Metacognition in BUD/S training	2003	14
10	BUDS Attrition A Review of Past Research and Current Practices	2002	26
11	Point Paper - Costs to Train a SEAL Operator	2005	4
12	USN SEALs Candidate Profile Study	2005	20
13	CENSEALSWCC - BUDS Candidate Histories	Unknown	38
14	The Thomas Group - Macro Assessment Outbrief - CFTs	2006	3
15	Prediction of BUDS Retention Using the ExamCorp Assessment Process	2006	6
16	SEAL Production Process Improvement Program	2007	48
17	NSW Final Research Findings (Gallup)	2009	48
18	NSW Psych Description Successful BUDS Students	2010	25
19	Appendix High Potential BUDS Candidates	2009	48
20	Importance of Activities Preparing you for SEALs	2009	34
21	Profiles of Exercise History and Overuse Injuries Among SEAL Recruits	1994	8
22	Thermal and Physiological Responses of BUDS Students to a 5.5 Mile Open Ocean Swim	1993	26
23	Personality Profiles of US Navy SEAL Personnel	1994	20
24	Adaptations to the Three Weeks of Aerobic Anaerobic Training in West Coast US Navy SEALs	1994	20
25	The Effect of Hypoxia and Cold at Rest on Human Thermoregulation	1996	16
26	Determinants and Effects of Training Success in US Navy Special Forces	1988	20
27	Physical Demand of US Navy SEAL Operations	1995	60
			614

Table 2: Freedom of Information Act (FOIA) Request Empirical Material

Title	Description	Weblink	Time
Navy SEAL Life After the Teams	Interview with Professor, former US Navy SEAL	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	5:28
Navy SEAL Life After the Teams	Interview with Astronaut, former US Navy SEAL	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	3:47
BUD/S Class 224	Videography of BUD/S instructors and Navy SEAL recruits in training	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	14:52
BUD/S-1st Phase	Videography of BUD/S Day One Selection events	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	1:47
BUD/S-1st Phase	Videography of BUD/S first phase of training	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	2:41
BUD/S-1st Phase	Videography of BUD/S Hell Week	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	2:26
BUD/S-2nd Phase	Videography of BUD/S Combat Diving training	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	1:30
BUD/S-3rd Phase	Videography of BUD/S Land Warfare training	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	2:02
BUD/S Class 274	Videography of BUD/S instructors and Navy SEAL recruits in Land Warfare training	http://www.SEALswcc.com/navy-SEALs-videos.html#.VjdFmytK4zF	3:40
Navy SEALs BUD/S Class 234	Part 1 – 'Welcome To BUD/S': Videography of BUD/S instructors and Navy SEAL recruits	https://www.youtube.com/watch?v=wQFRePXMI9M	45:58
Navy SEALs BUD/S Class 234	Part 2—'It pays to be a winner': Videography of BUD/S instructors and Navy SEAL recruits	https://www.youtube.com/watch?v=vdV3tsH1GB4	45:58
Navy SEALs BUD/S Class 234	Part 3—Two weeks and one long day	https://www.youtube.com/watch?v=Il16BaBAuv0	45:58
Navy SEALs BUD/S Class 234	Part 4—Hell Week	https://www.youtube.com/watch?v=2CiYEksYQq0	49:54
Navy SEALs BUD/S Class 234	Part 5—The only easy day was yesterday	https://www.youtube.com/watch?v=c2hS1TYYfA0	49:08
Navy SEALs BUD/S Class 234	Part 6—The home stretch	https://www.youtube.com/watch?v=goE_tJaSplk	49:17

Table 3: Sources of Empirical Video Material

Level of analysis	Link to attributes in extant literature	Inductive codes	Indicative quotations
Individual Mindfulness	***Attention to discriminatory detail*** *(Weick & Sutcliffe, 2006)*	*'Constant focus'*	- *'One of the keys to being successful in the SEALs is a disciplined, constant focus'* - *'A distracted SEAL is a great concern for our community and our instincts or intuition'* - 'You're at work and all of a sudden you get a phone call, and somebody's been killed. All of a sudden you've got to drop what you're doing and get a focus on fixing that" (R2)
		Rapidly shifting focus	- 'Being able to process it, lay it out, make the call, shift and collect the problems as they're unfolding' (R4) - 'So then you shift, you click, and then you focus and you have to be tuned to your senses' (R11) - 'I guess it's a constant re-evaluation. So you're constantly trying to reorient and observe, how am I going to deal with this new piece of information' (R9)
		'Slow is fast'	- 'So telling them to slow down and keep an eye on what's going on and figure things out…Um, it's basically—one of the things that SEALs say in all these sorts of environments is 'slow is fast'. Slow it down' (R2)
	Actively engaged in present *(Kabat-Zinn, 1994; Langer, 2000)*	*'Ability to switch/ compartmentalize'*	- "The fact that your mind operates in such a way that you can compartmentalize concepts, ideas, information, relationships, people, events. How I act at home maybe different than at work and you can be almost a different personality" (R1) - 'And then suddenly it rocketed you into this chaos but it's very clear—people go oh it's chaos. Once again I have to bring it back to the same point. It's becoming clearer and clearer to me that I have nothing else to worry about. There's no other priority. I don't have to worry about getting my taxes done on time [laugh]'
	Creating new categories of meaning *(Fiol et al, 2009; Langer, 1989)*	*'Changing your mindset & perception'*	- *'…When I'm talking about flexibility I'm not talking about oh we'll just change the plan. I'm talking about changing your mind-set, changing your perception'* - *'So you have to have this constant play in this challenging environment to come up with a new idea. Just being determined, butting your head up against the wall with the same failing attempt every time isn't going to find success. You have to at some point be able to step back and figure out, have a new outlook and a new way to get around the problem'*
	Flexible state of mind *(Langer, 1989 and 2000; Levinthal and Rerup, 2006)*	*'Macgyver mentality'*	- *'To differentiate SEALS from other special forces, what I refer to is a Macgyver mentality and they do have that. The guys have to be flexible. It's very rare that a big huge muscular guy makes it through training'*

Table 4: Attributes of Individual Mindfulness linked with Extant Literature—Template Coding

Level of analysis	Link to attributes in extant literature	Inductive codes	Indicative quotations
Individual Mindfulness			
		Decisiveness	-*'Once I learned more about [SEALs] I realized that they work in fast-paced dynamic environments and I, as a leader, have far more autonomy and decision making authority at a very junior level. That really appealed to me'.* -*'Another quality that I think is very important is decisiveness. When the time comes you have to be able to make a decision and stick with it. But then at the same time another quality is recognizing when you're wrong'.*
		Comfort with uncertainty	- *'Whatever's going to happen is going to happen, and let's do our best, to do our best"* (R8) - *"I can predict that something will unpredictably happen here shortly. I can guarantee you that. It's a constant'* (R7). - *'Sort of with a calmness, but a calmness with a fear in your stomach'* (R2). - '*I think SEALs are as well trained to deal with the uncertain environments encountered on the battle field and prepared mentally, physically, and in all ways, to succeed in ambiguous situations—in ambiguous hostile environments*' (respondent I).
		Confidence in own intuitive thoughts	- *'I have experienced that tingly feeling, that spidey senses often and what's interesting to me is sometimes you get that feeling and nothing happens...What is it that starts that reaction in the body. Is it a sympathetic response in the nervous system that we now feel; this fight or flight situation is upon us?'* - *'In that particular op, I would say, that was intuition. Something went through my mind to say 'No those guys are leaving the beach'* - *'But if it's art, then that means the solution is going to involve some kind of artwork and then it's going to require me to think or act or feel this out—respond'*

Table 5: Attributes of Collective Mindfulness from Interview Data – Emergent Coding

Collective Mindfulness	***Preoccupation with failure*** (Weick, Sutcliffe & Obstfeld, 2008)	*I just won't quit (even if I fail)*	*- 'In the training, when you go to the training, you have to know that you cannot quit. So I think that particular mindset has to stay with you. That you can never quit. I could never quit, no matter what's thrown at you' (R9)* *- '...I was cold but I didn't have another uncontrolled shiver, I was speaking properly and um. But that's just -- it's the attitude going in. Like quitting is not an option'* (R11) *'You always want to win. No matter what you're doing and even if you know you're not the fastest runner you're going to run as fast as you can' (R12)*
		Failure as learning opportunity	*'The ability to look at a situation and say what can go wrong? Not what does the book say and this is where in aviation, you might have a protocol, steps to follow for a left engine failure. We don't have those exact steps. We deal with it 'well, here's the operation, here's the things we expect to encounter, here are the might not go so well things.' And then you have to go to another level if you want to maximize your chances for success. ... I believe that is inculcated from the earliest stages dealing with failures' (R4)* *- 'We got through it together and let's learn from that'—if it was a mistake. Or if things went as well as they could have, let's log that. Next time we won't make the same error. It's always an evolution' (R9)*
		'Buddies'	*- 'I wasn't worried about getting shot, I was only worried about whether I was going to shoot one of my buddies'*
		'Intuition bubble'	*- 'The team that you're working with is very important. It's part of creating that intuition bubble or whatever it is [that] allows that to evolve. So if you're distracted by outsiders it stops that feeling as you sort out what's really going on here'* *- 'There better be something in the relationships I have with the people I'm with that makes me just glad to be here doing it with them regardless of what we do or don't accomplish'*

Table 6: Attributes of Collective Mindfulness from Interview Data - Template & Emergent Coding

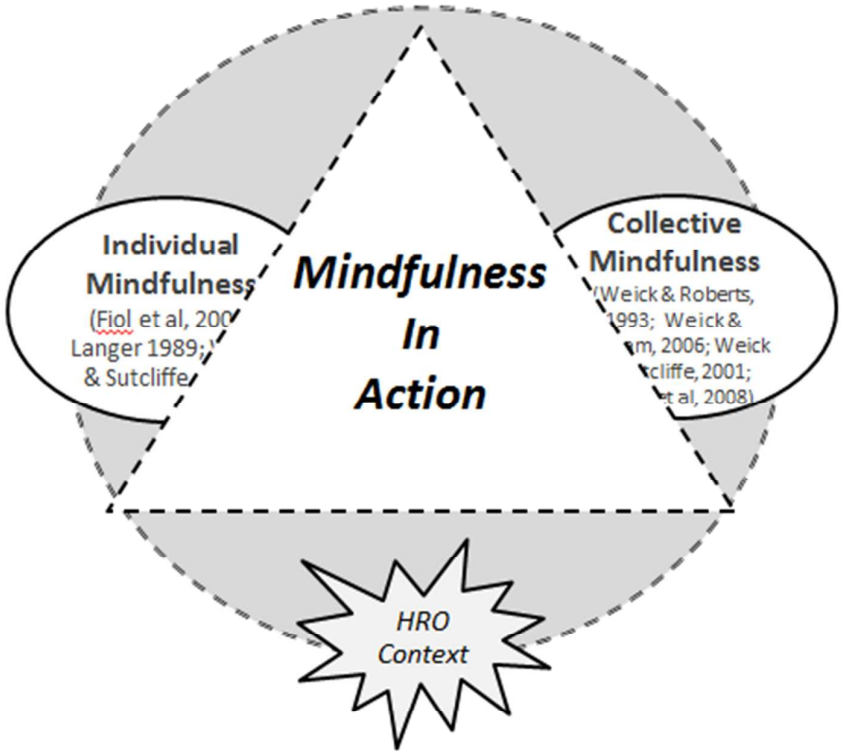

Figure 3: Mindfulness in Action