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The role of mindfulness and resilience in Navy SEAL training

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ABSTRACT

Mindfulness and resilience are thought to be essential qualities of the military's special operations community. Both are tested daily in Special Operations Forces (SOF) assessment and selection efforts to prepare candidates to persist through grueling training and complex combat situations; but these qualities are rarely measured. While military leadership places value on the concepts of mindfulness and resilience, there is minimal empirical research examining the role that they play in the completion of training. This longitudinal study followed three classes of SEAL candidates at Basic Underwater Demolition/SEAL (BUD/S) training over their six-month selection program. We estimated logit models predicting successful completion of BUD/S and specific types of failure in that training environment with indexes of mindfulness and resilience at the start of the program as predictors of completion. The results indicate that (1) mindfulness is unrelated to completion, while (2) resilience is positively related to completion, and (3) The results indicate that mindfulness is generally unrelated to completion, while resilience generally predicts completion.

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What is the public significance of this article?—This study suggests that mindfulness, as measured by certain instruments, may not play an important role as initially theorized in high-stress training, such as the U.S. Navy SEAL assessment and selection program known as BUD/S. Additionally, it highlights a predictable relationship between resilience and successful completion of SEAL training.

Mindfulness and resilience are argued to be key attributes of members of the special operations community, who often experience intense combat stress and austere working conditions (Couch, 2003). Through incredibly demanding training, both mindfulness and resilience are challenged daily, if not hourly, in Special Operations Forces (SOF) assessment and selection courses to prepare candidates to persist through extreme adversity. These qualities are rarely measured, however. Further, while a current emphasis in the military is on mindfulness and its role in generating resilience (Jha et al., 2017), there is minimal empirical research that has examined the role that mindfulness and resilience simultaneously play in the completion of high-stress training (Rice et al., 2013).

To address this gap, the present research examined how mindfulness and resilience may affect one's ability to withstand the rigors of the U.S. Navy Sea, Air, and Land (SEAL) training program. Using previously validated measures for both mindfulness and resilience, we examined whether these psychological factors increase the probability that SEAL candidates successfully complete Basic Underwater and Demolition/SEAL school (BUD/S). The rare opportunity to gather data in this context gave us a glimpse into high-risk training in which there is a dearth of research (e.g., Baran & Scott, 2010; Campbell et al., 2010; Dixon et al., 2016; Smith, Young et al, 2020).

BUD/S training involves daily, intense adversity, continuous discomfort, and incredibly challenging obstacles that test the physical and mental resolve of SEAL candidates. It is a six-month course in which mindfulness techniques are implicitly emphasized by instructors beginning on the first day and throughout the entire course (A. Ledford, personal communication, n.d.). Graduating from BUD/S, which has 65% to 80% attrition (Taylor et al., 2006), requires candidates to remain in the moment, and focus their efforts day by day, often hour by hour, and at times minute by minute, for six months (Couch, 2003; Luttrell & Robinson, 2013), all elements of mindfulness. Thus, mindfulness is an essential aspect of successful completion of BUD/S although it is not formally stated or an aim of training by instructors (A. Ledford, personal communication, n.d.).

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Starting in the first few hours of the course and continuing for the next 6 months, instructors leverage stress and uncertainty to compel candidates to behave and react mindfully under duress. The desired reaction to stress is to remain calm ("non-reactivity" in the mindfulness literature; Anicha et al., 2012) despite the experience of intense emotions of fear and doubt; to develop hyper-awareness to sensations and feelings experienced especially during undersea operations to mitigate diving maladies ("observing" in the mindfulness literature); and to concentrate intensely in the moment, such as in live-fire shooting drills or in working with explosives underwater, without distraction ("attentiveness to the present" in the mindfulness literature).

BUD/S candidates are all superior athletes and have passed demanding physical screening tests to enter the course; yet, they invariably have difficulty in completing the training. One's effectiveness in navigating this incredible adversity in a resilient manner may influence whether they graduate or fail the course. Successful graduates of the training are those who, in the face of such high attrition rates, are effective in not allowing the daily dread of 6 months of constant adversity consume their thoughts and motivation, essentially being mindful. Thus, we predicted that greater mindfulness and resilience may be significant predictors in completing BUD/S.

Mindfulness

Mindfulness has been described as a unique combination of the ability to pay particular attention and be present without judgment while maintaining enhanced awareness (Brown & Ryan, 2003; Kabat-Zinn, 2009). Mindfulness is considered both a state and a trait (Glomb et al., 2011; Mesmer-Magnus et al., 2017) that enables one to question the interaction of knowledge and routines while being able to appropriately question expectations and navigate complicated social, technological, and physical settings (Weick et al., 1999). The state perspective, implying a malleability that can be nurtured, focuses on examining mindfulness-based interventions that reduce negative physical and mental health outcomes (e.g., Eberth & Sedlmeier, 2012; Piet & Hougaard, 2011; Virgili, 2015). The trait perspective, implying a more static nature, suggests that individuals can have a greater capability for mindfulness (Glomb et al., 2011). However, studies have found that one's capability for mindfulness (mindfulness from a trait perspective) can be increased through mindfulness training and practice (e.g., Goldberg et al., 2016; Menezes de Sousa et al., 2021; Quaglia et al., 2016); thus, indicating that there is some malleability with the trait perspective as well.

Mindfulness has been practiced in Buddhist traditions for centuries (Keng et al., 2011) and has been studied for its role in affecting a variety of outcomes, including performance (e.g., Lyddy et al., 2021), well-being (e.g., Schutte & Malouff, 2011), and retention and/or turnover intentions (e.g., Dane & Brummel, 2013; Reb et al., 2017). In studies examining mindfulness as a trait in the workplace, higher mindfulness has been found to reduce turnover intentions (Dane & Brummel, 2013; Reb et al., 2017). In a study of physical educators, mindfulness as a trait was positively associated with resilience and negatively associated with turnover intentions (Lee et al., 2021). In other studies, mindfulness practices and interventions have been linked to higher retention rates (Black & Amaro, 2019; Braun et al., 2020; Bühlmayer et al., 2017). In general, studies have consistently found that mindfulness is related to one's willingness to remain in a particular position or role.

In the military, mindfulness was a common practice in ancient warrior cultures, such as that of Shaolin warrior monks and Samurai (French, 2016). As increasingly more military members (up to 35%) return from wars in the Middle East seeking mental health services, mindfulness training has moved to the forefront of combat training (Hoge et al., 2006). Research suggests that mindfulness training may reduce the need for mental health services, providing warriors a way to recover from stressors of post-conflict life (Brewer, 2014; Stanley et al., 2011). Notably, Johnson et al. (2014) trained Marines in mindfulness to build resilience prior to deployment and demonstrated that mindfulness training had a positive effect on stress recovery following deployment. Other military studies suggest mindfulness training can improve attention (Jha et al., 2015), reduce anxiety (Meland et al., 2015), reduce suicides among combat veterans (Thomas & Taylor, 2015), and enhance performance of Special Operations Operators such as SEALs (Fraher et al., 2017). In a qualitative study of SEALs, Fraher et al. (2017) found that individual mindfulness appears as: paying attention to detail; actively engaging in the present; having a flexible and open mind-set; and creating new meanings (changing mind-set and perception).

Despite findings that mindfulness may provide positive outcomes for military members (e.g., Jha et al., 2015; Meland et al., 2015), scant research on mindfulness has focused on its potential importance for Special Operation Forces (Fraher et al., 2017). Since there is indication that some individuals have a greater capability for mindfulness (Carpenter et al., 2019; Mesmer-Magnus et al., 2017), it is important to investigate how one's natural capacity for mindfulness (mindfulness as a trait) contributes to persisting through arduous situations, such as BUD/S.

Resilience

Whereas mindfulness refers to remaining in the present moment and maintaining enhanced awareness (Brown & Ryan, 2003; Kabat-Zinn, 2009), resilience is broadly described as one's ability to adapt in a positive manner while facing difficulty (Luthar et al., 2014). It is the internal capacity to spring back into shape after facing challenges (Britt et al., 2013). Resilience has been considered to be a personality trait (Connor & Davidson, 2003), a dynamic process (Masten, 2001), and a behavioral response (Happer et al., 2017) in the literature. This conceptual variation, and its subsequent differential operationalization in studies limits meta-analytic study of the construct (Hu et al., 2015). Yet, even with such variation, research has linked the presence of resilience to performance (e.g., Fletcher & Sarkar, 2012; Sarkar & Fletcher, 2014), turnover intentions (e.g., Smith, Emerson et al., 2020), lower attrition (e.g., Udell et al., 2018), and retention (e.g., Doney, 2013; A. K. Ledford et al., 2020; Underdahl et al., 2018).

In the Special Operations Community, there is an ongoing emphasis on ways to both assess and train resilience (Greene & Staal, 2017). Resilience has been critical in warfare historically, where national strategy is often to "compel our enemy to do our will." (Clausewitz, 1989, p. 75). Within military communities, research suggests that one's resilience is essential in mitigating combat stress, reducing post-traumatic stress disorder (PTSD), reducing some instances of suicide, and improving emotional, social, and spiritual fitness (Kuehn, 2009; Maheshwari & Kumar, 2016). Most recently, a study has shown that higher resilience provides psychological tolerance for persisting through the rigors of the first Phase of BUD/S (A. K. Ledford et al., 2020).

Connections between mindfulness and resilience

Beyond a focus on how resilience may be important for warfighters, military communities have been particularly interested in examining the relationship between mindfulness and resilience (e.g., Jha et al., 2017; Rice et al., 2013). There are indications that higher mindfulness and resilience enable an individual to withstand stressors (Galante et al., 2021; Neufeld et al., 2020). Specifically, research has suggested that greater mindfulness may enhance, predict, and generate greater resilience (e.g., Anasori et al., 2020; Christopher et al., 2018; Lin et al., 2020). Joyce et al.'s (2018) meta-analysis of ways to improve individual resilience indicated that mindfulness techniques play a role in enhancing resilience. Mindfulness training has been found to contribute to the physiological and psychological resilience in professions that operate in high-stress environments, such as firefighting and law enforcement (Christopher et al., 2018). In a sample of Marines, mindfulness training was found to be related to physiological resilience (Johnson et al., 2014). Other studies (e.g., Anasori et al., 2020; Lin et al., 2020; Pérez-Aranda et al., 2021) indicate that mindfulness as a trait has a relationship with psychological resilience.

A growing focus of research is to examine resilience as a mediator of the relationship between mindfulness (e.g., Bajaj & Pande, 2016; Charbonneau, 2019; Kaplan et al., 2017; Lin et al., 2020; Pérez-Aranda et al., 2021) and outcomes. Some studies have focused on mindfulness training to assess how resilience mediates the relationship between mindfulness and a particular outcome (e.g., Kaplan et al., 2017; Liu et al., 2021), while others have focused on how resilience mediates the relationship between mindfulness as a trait and the focal outcome (e.g., Bajaj & Pande, 2016; Charbonneau, 2019; Lin et al., 2020). In a sample of university athletes, resilience partially mediated the effects of mindfulness training on flow (intense concentration in competition; Liu et al., 2021). In a study of first responders, Kaplan et al. (2017) found that after undergoing resilience-based mindfulness training, resilience partially mediated the relationship between mindfulness and burnout.

Resilience has been found to mediate the relationship between the mindfulness as a trait and several outcomes, including life satisfaction (Bajaj & Pande, 2016), job satisfaction (Lin et al., 2020), positive and negative affect (Charbonneau, 2019), and self-compassion relative to depression (Pérez-Aranda et al., 2021). These studies illustrate an interest in continuing to examine the role of resilience as a mediator between mindfulness and outcomes. However, despite acknowledgment of the importance of mindfulness in generating greater resilience for those who operate in high-stress environments, there has been less focus on how resilience mediates the relationship between mindfulness as a trait and retention outcomes, such as the completion of high stress training like BUD/S.

Research questions

In this study, we addressed three primary questions. Research has found that mindfulness may positively influence the ability to accept chaos and challenge (e.g., Fraher et al., 2017; Weick et al., 1999). Thus, we predicted that candidates with higher levels of mindfulness will be more likely to complete BUD/S than their less mindful fellow candidates. Similarly, the literature on psychological resilience suggests those with higher levels of resilience may have a greater tolerance for the rigors

of BUD/S (e.g., A. K. Ledford et al., 2020). Thus, we predicted that BUD/S candidates with higher levels of resilience will be more likely to complete the course than their less resilient peers. Based on prior literature (e.g., Bajaj & Pande, 2016; Charbonneau, 2019; Lin et al., 2020; Pérez-Aranda et al., 2021), we expect that resilience may serve as a mediator between mindfulness and BUD/S completion. Thus, our study addressed the following research questions:

(1) To what extent does higher mindfulness predict successful completion of BUD/S?
(2) To what extent does higher resilience predict successful completion of BUD/S?
(3) To what extent does resilience mediate the relationship between mindfulness and successful completion of BUD/S?

Methods

The data for this study were collected on BUD/S trainees at the Naval Special Warfare Center in Coronado, California. BUD/S is a six-month assessment and selection course for Navy SEALs. All candidates attending BUD/S are active duty sailors. The process begins with Basic Orientation (BO), and progresses through three distinct phases (1, 2, and 3). We followed candidates from their entry into three distinct classes, denoted as A, B, and C, to the end of their training, outcomes of which include successful completion, dropping out at the candidate's request (DOR), being dropped by cadre due to poor performance, or being dropped for medical reasons.

Participants and procedure

The initial number of individuals available for study was 406. For these analyses, we limit our sample to individuals who attended BO with Class A, B, or C, excluding 26 candidates who joined these classes in later phases. Further, we eliminated those who opted-out of the study or otherwise did not participate in the initial survey data collection, leaving 348 respondents (86% of eligible participants).

Survey data were collected on four occasions for the first two classes: (1) at the end of BO/beginning of phase 1; (2) at the end of phase 1/beginning of phase 2; (3) at the end of phase 2/beginning of phase 3; and (4) at the end of phase 3. Survey data were not collected at the end of phase 3 for Class C due to COVID restrictions on travel. However, for the purposes of this research, the focus was on the first occasion of data collection for each of the respective classes following which the most attrition occurred.

The data collection was completed by a group of researchers from five U.S. universities; IRB approval was granted from the primary researcher's institution. To ensure confidentiality and mitigate undue influence, BUD/S candidates were separated from their instructor cadre during data collection and assured that participation in the study would not impact their progression through BUD/S. Candidates were provided verbal details regarding informed consent, emphasizing the voluntary nature of the study and the ability of candidates to withdraw at any time, ensuring confidentiality, and relaying the purpose of the study. Candidates were then provided a written informed consent reinforcing all of the information provided verbally and asked to sign the informed consent if they desired to participate in the research.

Our key questions are whether mindfulness and resilience – as measured by two validated scales – predict the completion of BUD/S training. Although some SEAL candidates are ultimately successful in completing BUD/S training, it often takes them more than one attempt to do so. A sizable minority of candidates opt to quit (i.e., drop on request; or "DOR") early in training and never return, but a common experience is for a candidate to be dropped (by cadre) from training for poor performance or for a medical issue. In such cases, candidates can be placed into a subsequent class. In such cases, depending on when the event happened, the candidate may (1) restart the entire program or (2) join a subsequent class in the phase of training in which they were dropped. Over approximately a year and a half, we tracked the status of the 348 candidates from their initial entry into Class A, B, or C, respectively, and up to a fixed number of classes later, in an effort to account for any possible return of candidates into subsequent classes.

Measures

Our variables used in this study consist of demographic and social characteristics of BUD/S participants, measures of mindfulness and resilience, and training outcomes as described in the subsequent section. We measured several demographic variables, including: BUD/S class, age, race, region of residence, relationship status, educational attainment, and rank. Sex was not used because, at the time of this research, only males were in the training. Class A is used as the reference; thus, we construct indicator variables for classes B and C. Age is measured in years, with a range from 18 to 35. Race is measured with an indicator for "nonwhite" vs. "white." Region of residence is measured with an indicator for south vs. elsewhere. Relationship status is measured with an indicator for whether the candidate is

partnered (vs. not). Education is measured as a continuous variable with three values: 0 = high school graduate (or GED), 1 = some college, 2 = college degree or more. Rank is measured with an indicator for whether the respondent is an officer (vs. enlisted).

Dependent variable

The outcome variable in our model was derived from an item representing the BUD/S candidate's status at the last time he was observed. The statuses were: (1) successfully completed BUD/S (completion); (2) dropped on request/quitting (DOR); (3) candidate was dropped by the BUD/S cadre due to subpar performance (performance drop); or (4) candidate was dropped by the BUD/S cadre as the result of a medical problem (medical drop).

Independent Variables

Our key predictors of interest are mindfulness and resilience. We used the measures of mindfulness and resilience obtained at the end of BO/beginning of phase 1 for each participant.

Mindfulness. Mindfulness was measured using the 15-item Five-Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2012). This instrument has demonstrated good reliability in measuring mindfulness as a trait (Truong et al., 2020). According to Baer et al. (2012), the measure (FFMQ-15) utilizes 15 items, each on a five-point Likert scale, to assess five facets of mindfulness: observing (obs), describing (desc), acting with awareness (act), non-judging (nonj), and non-reactivity (nonr). We followed the recommended approach and constructed five distinct indexes reflecting (1) observing (alpha = 0.62), (2) describing (alpha = 0.86), (3) acting with awareness (alpha = 0.59), (4) non-judging (alpha = 0.74), and (5) non-reactivity (alpha 0.63). There is ongoing debate as to the minimal acceptable value of alpha (Bonett & Wright, 2015; Heo et al., 2015; Taber, 2018). Taber (2018) argued that alphas of 0.58 and higher, range in levels of acceptability from satisfactory to good, concluding that lower values of alpha should not be considered indicative of an unsatisfactory instrument. Notable to the present research, Tavakol and Dennick (2011) indicated that measures with fewer items create inherently lower Cronbach alphas, but do not suggest a lack of reliability. They argued that higher Cronbach alphas do not necessarily indicate a high degree of internal consistency, rather it may be a reflection of the number of construct questions. The five distinct indexes of mindfulness use three questions per dimension, thus, we consider the Cronbach alphas to be acceptable.

Resilience. The 25-item Connor-Davidson Resilience Scale (CD-RISC) was used to measure resilience (Connor & Davidson, 2003). Davidson (2019) recommended the 25-item CD-RISC instrument should be considered a single-factor construct for resilience. Each item is measured on a five-point Likert scale. In a previous paper, we evaluated the measurement properties of the resilience items for this population and found that a single-factor solution fit the data best, but with some items excluded from the original battery (A. Ledford et al., 2021). For this paper, we use a summed index of the remaining items (1, 4, 5, 7, 8, 10, 11, 12, 14, 16, 17, 19, 21, 22, 23, 24; Cronbach's alpha = 0.88).

Analytic approach

Given the unordered categorical nature of the data, we estimated a series of dichotomous and multinomial logistic regression (logit) models using several distinct outcome measures. Our first outcome is an indicator simply for whether the candidate completed the last observed phase successfully (versus DOR'd, was dropped due to poor performance, or was dropped due to a medical problem). Our second outcome is an indicator for whether the candidate DOR'd (versus all other possible outcomes). Our third outcome is an indicator for whether the candidate DOR'd or was dropped for poor performance (versus completed the phase or was dropped for a medical problem). For each of these outcomes, we estimate dichotomous logit models. Our final outcome was categorical and contrasts each distinct outcome against successful completion of the last phase observed. For this outcome, we estimate multinomial logit models.

For each outcome variable, we estimate three models with controls/covariates. In our first model, we include only the five subscales for mindfulness. In our second model, we include only the resilience index. In our third model, we include both the five subscales for mindfulness and the resilience index. Thus, we report results for each of the four outcomes for the three models.

Results

The means and standard deviations for each of the control variables (BUD/S class, age, race, region of residence, educational attainment, relationship status, and rank), independent variables (mindfulness and resilience), and the dependent variable are presented in Table 1. The correlations between each of the variables are provided in Table 2.

Table 3 shows results from the logit models. The table reports the coefficients for mindfulness and resilience measures for each model. Covariates were included in

Table 1. Descriptive statistics for variables used in analyses (n = 348).

Variable	Mean or % (s.d.) [Range]
BUD/S Class[a]	
Class A	114 (32.8%)
Class B	106 (30.5%)
Class C	128 (36.8%)
Age	23.4 (3.1) [18,35]
Race	
Nonwhite	n = 47 (13.5%)
Region of Residence	
South	n = 122 (35.1%)
Relationship Status	
Partnered	n = 42 (12.1%)
Educational Attainment	1.26 (.83) [0,2]
HS/GED	n = 85 (24.4%)
Some College	n = 88 (25.3%)
BA or greater	n = 175 (50.3%)
Rank	
Officer	n = 40 (11.5%)
Mindfulness	
Observe	11.4 (2.3) [3,15]
Describe	10.9 (2.6) [3,15]
Acting with Awareness	10.9 (1.9) [6,15]
Non-judging	11.8 (2.2) [4,15]
Non-reactivity	12.0 (1.9) [4,15]
Total	57.0 (6.5) [39,75]
Resilience	57.4 (5.7) [39,64]
Ultimate Outcome (n = 348)	
Completion	n = 136 (39.1%)
DOR	n = 144 (41.4%)
Performance Drop	n = 36 (10.3%)
Medical Drop	n = 32 (9.2%)

[a]BUD/S classes are coded at A, B, C to ensure confidentiality.

each model; however, for parsimony, only coefficients for the relevant independent variables are reported (full results available on request).

The first column of Table 3 shows the results for our first research question, *to what extent does higher mindfulness predict successful completion of BUD/S*. Model 1 in the table shows the results for the five subscales of mindfulness as the key predictor of each outcome. The upper three rows provide the logit model coefficients predicting each of the three dichotomous outcomes described above; the lower three rows provide the multinomial logit model coefficients contrasting each outcome against successful completion of BUD/S. The effect of mindfulness is non-significant in the models that include it. None of the subscales predicts any of the outcomes in the dichotomous logit models nor the multinomial logit model at the usual $p < .05$ level.

Model 2 in Table 3 shows the results for our second research question, *to what extent does higher resilience predict successful completion of BUD/S*. In contrast to the results for the models with mindfulness, resilience predicts several of the outcomes. First, resilience has a positive and significant effect on completion of BUD/S ($b = 0.06$, $p < .01$). Second, resilience reduces the risk of DOR ($b = -0.04$, $p < .05$) and dropping from BUD/S due to DOR or performance ($b = -0.06$, $p < .05$). In the multinomial logit model, resilience has a negative effect on DOR (vs. completion; $b = -0.07$, $p < .01$), and no effect on performance or medical drops.

Given these results, our third question – *to what extent does resilience mediate the relationship between mindfulness and successful completion of BUD/S* – may be moot. A non-effect cannot be mediated under a traditional conceptualization of mediation (Barron & Kenny, 1986). However, it is possible that resilience acts as a suppressor of the relationship between mindfulness and completion of BUD/S (see, MacKinnon, 2008). Model 3 shows results from models that include both the five subscales of mindfulness and resilience. These results are consistent with models 1 and 2. Mindfulness does not predict any outcome at a statistically significant level, while the effects of resilience are slightly larger than those shown in model 2. Specifically, the effect of resilience remains significant for predicting successful completion ($b = 0.07$, $p < .01$), DOR ($b = -0.06$, $p < .05$), and dropping due to DOR or performance ($b = -0.08$, $p < .01$) in the dichotomous logit models, and the effect

Table 2. Correlation matrix of demographic, mindfulness, resilience, and completion of BUD/S.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Class B	1.00														
2.	Class C	−0.50**	1.00													
3.	Age	0.05	−0.05	1.00												
4.	Race (nonwhite)	−0.04	0.03	−0.06	1.00											
5.	Region (south)	−0.03	0.13*	−0.17**	0.03	1.00										
6.	Marital Status (partnered)	0.06	−0.03	0.29**	0.14*	−0.01	1.00									
7.	Education	0.03	0.01	0.48**	−0.16**	−0.06	0.02	1.00								
8.	Rank (officer)	0.06	−0.03	0.02	−0.09	0.02	0.03	0.32**	1.00							
9.	Mind – obs	−0.01	0.04	−0.03	0.03	0.00	−0.12*	−0.04	−0.03	1.00						
10.	Mind – desc	0.10	0.10*	0.15**	0.10	−0.01	0.06	0.10	−0.03	0.23**	1.00					
11.	Mind – act	0.00	0.06	0.11*	0.06	−0.05	0.11*	0.01	0.01	0.13*	0.19**	1.00				
12.	Mind – nonj	−0.02	0.12*	0.15**	−0.02	−0.06	0.03	0.02	−0.07	0.05	0.23**	0.40**	1.00			
13.	Mind – nonr	−0.09	0.15**	0.03	0.05	0.04	0.07	0.04	−0.02	0.23**	0.21**	0.15**	0.16**	1.00		
14.	Resilience	−0.03	0.16**	0.01	0.08	0.09	0.02	0.01	0.09	0.17**	0.26**	0.32**	0.42**	0.39**	1.00	
15.	BUD/S Comp	−0.15**	−0.09	0.10	−0.04	−0.11*	−0.01	0.25**	0.25**	−0.01	0.03	0.03	0.01	0.01	0.11*	1.00

*N = 348, *p < 0.05, **p < 0.01*

Table 3. Results of dichotomous and multinomial logit models (n = 348).

	Model 1: *Mindfulness*						Model 2: *Resilience*		Model 3: *Mindfulness and Resilience*						
	Obs	Desc	Act	Nonj	Nonr	R-sq.	Res	R-sq	Obs	Desc	Act	Nonj	Nonr	Res	R-sq.
	b (SE)	*b (SE)*	*b (SE)*	*b (SE)*	*b (SE)*		*b (SE)*		*b (SE)*	*b (SE)*	*b (SE)*	*b (SE)*	*b (SE)*	*b (SE)*	
Logit Models															
Completion	−0.01 (0.06)	0.06 (0.05)	0.03 (0.07)	0.01 (0.06)	0.001 (0.07)	0.13	0.06** (0.02)	0.14	−0.02 (0.06)	0.06 (0.05)	0.01 (0.07)	−0.05 (0.07)	−0.06 (0.07)	0.07** (0.03)	0.15
DOR	−0.03 (0.06)	−0.01 (0.05)	−0.03 (0.07)	−0.02 (0.06)	0.04 (0.07)	0.13	−0.04* (0.02)	0.14	−0.02 (0.06)	−0.01 (0.05)	−0.01 (0.07)	0.03 (0.06)	0.09 (0.07)	−0.06* (0.03)	0.14
DOR+Perf. Drop	−0.04 (0.05)	−0.01 (0.05)	0.002 (0.07)	−0.03 (0.06)	0.04 (0.07)	0.12	−0.06* (0.02)	0.13	−0.02 (0.06)	0.004 (0.05)	0.03 (0.07)	0.03 (0.06)	0.10 (0.07)	−0.08** (0.03)	0.14
Multinomial Logit															
DOR	−0.01 (0.06)	−0.05 (0.06)	−0.04 (0.08)	−0.02 (0.07)	0.02 (0.08)	0.11	−0.07** (0.03)	0.11	0.00 (0.06)	−0.04 (0.06)	−0.01 (0.08)	0.05 (0.07)	0.09 (0.08)	−0.08** (0.03)	0.12
Performance Drop	−0.01 (0.09)	−0.03 (0.09)	0.03 (0.11)	−0.02 (0.10)	−0.01 (0.11)		−0.06 (0.03)		0.00 (0.09)	−0.01 (0.09)	0.06 (0.12)	0.05 (0.11)	0.07 (0.12)	−0.09 (0.04)	
Medical Drop	0.10 (0.10)	−0.16 (0.09)	−0.10 (0.12)	0.03 (0.10)	−0.08 (0.11)		−0.04 (0.04)		0.11 (0.10)	−0.16 (0.09)	−0.09 (0.13)	0.05 (0.11)	−0.05 (0.12)	−0.03 (0.05)	

Notes*: pseudo-r-squared values presented.*
Observing (obs), Describing (Desc), Acting with awareness (Act), Non-judging (nonj), and Non-reactivity (nonr) are subscales of mindfulness, Res(ilience) is a single index of resilience.
Logit Model outcomes are contrasted against all other outcomes; multinomial logit model outcomes are contrasted against successful completion.
*$p < .05$, **$p < .01$

of resilience remains significant for reducing the risk of DOR vs. completion ($b = -0.08$, $p < .01$) in the multinomial logit model. As in the second model, resilience is not significant in predicting performance or medical drops.

In sum, our results show that mindfulness is unrelated to successful completion of BUD/S, but resilience consistently predicts success. Those with greater resilience are more likely to complete BUD/S, they are less likely to DOR, and they are generally less likely to be dropped for performance. To evaluate the robustness of our results, we conducted extensive additional investigation of the relationship between mindfulness and BUD/S outcomes, discussion of which can be found in the Appendix.

Discussion

BUD/S training incorporates high-intensity physical activity, sleep deprivation, and exposure to the cold to create a high-stress environment that in part simulates the adversity SEALs will face in combat (Couch, 2003). Throughout BUD/S, mindful habits are implicitly encouraged by the SEAL cadre as a method to persist through the rigors and demands of the selection and assessment process. Interestingly, however, we found that mindfulness, as measured by the FFMQ-15 (Baer et al., 2006) mindfulness scale, did not predict completion of BUD/S. Our results show a discrepancy between how mindfulness *should* theoretically positively influence SEAL candidates and the measurement of mindfulness in SEAL training.

One possible explanation for the lack of effect of mindfulness is that candidates selected for BUD/S tend to have scores for mindfulness that are near the upper limit of the measured indicators. Thus, variance in the indicators is reduced, as is covariance between items. This ceiling effect may explain both why mindfulness has no effect on performance and why the Cronbach's alphas for the subscales are relatively low in our sample (Munz et al., 2004). A more substantive explanation could be that the environment of BUD/S is not conducive to leveraging mindfulness because of the chaotic nature of the training. There is limited time for sleep, few calm and restful moments, and limited autonomy. However, many (Fraher et al., 2017; Jha et al., 2015; Meland et al., 2015; Thomas & Taylor, 2015) argue that mindfulness can be beneficial in exactly these chaotic environments to withstand the stressors of those surroundings.

Another possible explanation is that mindfulness does not have predictive validity in this population in relation to the completion of BUD/S. Brown et al. (2007) argued that results reported by Baer et al.'s (2006) unusual findings with the FFMQ may be a function of the measurement instrument rather than mindfulness itself. It is quite possible that our findings could be indicative of the same issues, namely that the FFMQ is a poor measure of the aspects of mindfulness required for completion of BUD/S. There are aspects of BUD/S in which mindfulness, specifically being present and fully in the moment such as with shooting and demolition exercises, can be essential to getting through BUD/S. There are also times when being fully present is not conducive to completing BUD/S, such as the long durations spent by the candidates in the cold Pacific waters where it is often highly beneficial to allow the mind to drift away from the physical discomfort rather than being fully present. The results could show that the mindfulness necessary in BUD/s is not adequately captured by the FFMQ instrument. Bergomi et al.'s, 2013) contention that mindfulness scales do not adequately capture all aspects of mindfulness supports this possibility.

Further, this aligns with emerging theoretical considerations: that mindfulness as measured by commonly used scales may be distinct from the foundational elements of mindfulness from its original source, Buddhist tradition (Anālayo, 2019; Feng et al., 2018; Rosch, 2007). Rosch (2007) reasoned that commonly used scales of mindfulness do not capture the theoretical components of mindfulness that are present in Buddhist tradition or awareness in a broader sense. Feng et al. (2018) concluded that mindfulness in psychological instruments is conceptualized as non-judgmental and present-centered awareness, whereas the Buddhist elements contain aspects of attentional flexibility, skillfulness, purposefulness, wisdom, and ethics. In many ways, the Buddhist aspects of mindfulness may better capture aspects of mindfulness that are important for being able to endure and ultimately complete the rigors of BUD/S selection and assessment process. The attentional flexibility and skillfulness seen in Buddhist Shaolin monks performing remarkable physical feats with calm and meditative tranquility closely resembles the repose required of SEAL candidates in the face of continuous physical and mental adversity. Indeed, knowing how to shift one's attention to the present as well as how to shift it away from the present appears to be an essential component of mindfulness at BUD/S. This involves attention not only in the calm, quiet moments, but also in the chaotic and intense pressure evolutions of BUD/S.

Ultimately, the indication of this study is that the FFMQ-15 measure of mindfulness may not adequately capture the components of mindfulness applicable for persisting through BUD/S. While there are few studies that have explicitly examined mindfulness in the SEAL

community, Fraher et al.'s (2017) study of SEALs hinted at the idea that mindfulness may be unique in this population. Fraher et al. concluded that mindfulness in SEALs was a combination of attention to detail, engagement in the present, a flexible state of mind, and openness to multiple emerging realities. In the interviews that were performed in Fraher et al's study, the idea of being able to switch mind-set or compartmentalize emerged. The authors' findings appear to align with some of the components of mindfulness in Buddhism (flexibility, skillfulness, and purposefulness, in particular). However, when considering the measure of mindfulness used in this study, the ideas of being flexible, open to multiple realities, and compartmentalizing are not captured. Rather, Baer et al.'s (2006) FFMQ measure captures: (1) observing – noticing internal and external experiences; (2) describing – able to verbally express one's experiences; (3) acting with awareness – focused on the present moment activity; (4) non-judging – accepting thoughts and emotions; (5) nonreactivity – not being carried aways by thoughts and emotions.

A conclusion from this finding regarding mindfulness and a consideration for future research is that mindfulness may be distinct in differing contexts. This interpretation is supported by other researchers (e.g., Brown et al., 2007; Christopher et al., 2009; Dorjee, 2010), who conclude that mindfulness may be distinct in varying contexts and those distinctions should be considered in theory and research. Dorjee (2010) maintained that context "needs to be taken into account in the development of research hypotheses and interpretations of research results if we want to get a more accurate picture of how mindfulness works" (p. 158).

Thus, future research, especially in studies focused on those operating or training for in extremis environments, should take into account which aspects of mindfulness may best capture mindfulness in the particular context. This may require qualitative research to first explore mindfulness in the particular context of interest, then taking specific items from a variety of instruments that best align with what emerged from the qualitative study or even creating a new measure of mindfulness that might be applicable to specific focal areas.

Our finding that higher levels of resilience indicate a greater likelihood of completion of BUD/S supports other research that links greater levels of resilience to lower attrition (e.g., Udell et al., 2018) and greater retention (e.g., Doney, 2013; A. K. Ledford et al., 2020; Underdahl et al., 2018). It does provide unique insight into the value of resilience for those persisting through arduous training environments, specifically those in the Special Operations Community. However, the unanswered question in this study is if resilience mediates the relationship (if one exists) between mindfulness and retention in an intense training environment. Once there is a better understanding of how to measure mindfulness in a specialized population, such as those in the Special Operations Community or even SEAL candidates, and a relationship is established between mindfulness in the specific context and retention, then, exploring resilience as a mediator in that relationship may be a reasonable consideration.

Limitations

Our research has three limitations. First, both the mindfulness and resilience scales used in this research relied on self-report data as do many other studies on these topics. There is a danger in self-reporting in that these candidates were working each day to enter a very select community and there is the potential that their answers were given based on what they believe portrayed them in the best light. Even though the participants were told that their answers would be confidential and would have no impact on the program, there was a concern that candidates would answer with perceived desirable responses. Due to these potential issues with self-reported data, we recommend that future research considers using both self-report and reports from an individual's peers and/or supervisors. SEAL candidates were also asked to respond *during* BUD/S, which was most likely the most stressful period of their lives. BUD/S was a period in which each and every day, each and every hour, candidates incurred adversities and challenges that often seemed insurmountable. Then, during our data collections, we requested that they think about their time at BUD/S in a general context, which may have proved difficult. Although it was stressed that the SEAL candidate responses should be for their experience up to that point, this limitation is possible given how intense the training could be.

The second limitation is in regard to the assessments used in this study, in which single measures for mindfulness and resilience were used. Based on the findings, the FFMQ-15 may not be the most appropriate measure of mindfulness in BUD/S candidates. Thus, it may be beneficial to use different measures for mindfulness for individuals that operate in high-stress environments. Another consideration is to examine these variables, in particular mindfulness, from a state perspective rather than a trait perspective to understand how resilience and mindfulness develop and change throughout an intense training situation, such as BUD/S. Since there are indications that the mindfulness trait can be developed through mindfulness training (e.g., Goldberg et al.,

2016; Menezes de Sousa et al., 2021; Quaglia et al., 2016) there is value in continuing to consider mindfulness as a trait in addition to examining how mindfulness changes during an arduous training situation (Carter & Tobias, 2019; Friedl & Gifford, 2020). Ultimately, it will be important to consider the context in which mindfulness is studied prior to choosing an instrument to measure mindfulness. As this study indicates, mindfulness in the SEAL candidates may better align with mindfulness as conceptualized by the more traditional Buddhist form of mindfulness; thus, the common psychological measures of mindfulness may not capture mindfulness in this population. Thus, qualitative research may provide an avenue to better understand mindfulness in this context.

Our third limitation is the sample population. SEAL candidates are not representative of the general population, or even the general military population, but are a somewhat homogeneous sample carefully screened for this training. This could present an issue in making generalizable statements beyond the special operations community. The selection process for this group began at U.S. Navy Boot Camp or officer accession sources such as the Naval Academy, Navy Reserve Officer Training Course, or Officer Candidate School. Only a small group of many that applied met the physical, mental, and emotional criteria and successfully completed several screening events to get a spot at BUD/S. Therefore, the sample population used in this study already demonstrated a substantial level of these psychological markers just to enter BUD/S training. Despite this, there is still a 65–80% attrition rate with this select group, which highlights how resilience remains incredibly important each day of training. Nevertheless, it is an acknowledged limitation with this research.

Conclusions

Despite these limitations, our key conclusion is that it is possible that aspects of mindfulness can vary significantly within select populations, enough to obscure findings with validated instruments. Our analysis also supports that higher resilience does have a positive relationship with completing BUD/S. Ultimately, more research needs to be performed to uncover how mindfulness should be operationalized for those high stress environments, such as BUD/S. Our hope is that this study will further energize the continued analysis of mindfulness and resilience in demanding situations.

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Data availability

The de-identified data can be made available to verified researchers by request with the corresponding author. There were five data collections taken over the course of 18 months for this study. Data was collected at each point for resilience and mindfulness. Code used for the analysis of the resilience and mindfulness data is openly accessible at:
https://osf.io/wjk6m/
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Appendix

To evaluate the robustness of our results, we conducted extensive additional investigation of the relationship between mindfulness and BUD/S outcomes. First, we estimated logit models for each dichotomous outcome using every combination of subsets of the 15 mindfulness items. There are 2^{15}-1=32,767 possible combinations of the 15 items. Only a handful of the possible indexes reached significance in predicting any BUD/S outcome, and none did after making Bonferroni corrections for multiple testing.

Second, we constructed an alternate data set to make full use of the panel structure of the data. Specifically, we constructed a person-phase data set in which each candidate contributed as many records as phases in which he participated. We then estimated the dichotomous logit models described in the methods section of the manuscript. These models, when applied to person-phase data are discrete time hazard models (Allison, 1984), and the coefficients reflect the probability a candidate experienced a given event in a specified period of time (60 days; the length of one phase). The sample size in these models is considerably larger than in the models discussed in the main text (n=792), because most candidates experience more than one phase and therefore contribute more than one record to the person-phase data set. The results of these models were consistent with those we reported in Table 3 in the main text. Results for the models using the person-phase data set are provided in Table A1.

Similar to our results for the logit models, the person-phase data set results show that mindfulness is unrelated to successful completion of BUD/S, but resilience consistently predicts success.

Table A1. Results of dichotomous and multinomial for person-phase data (n = 792)[a]

	Model 1: *Mindfulness*					Model 2: *Resilience*	Model 3: *Mindfulness and Resilience*					
Logit Models	Obs	Desc	Act	Nonj	Nonr	Res	Obs	Desc	Act	Nonj	Nonr	Res
Completion	−0.03	0.04	−0.02	−0.02	−0.02	0.003	−0.03	0.04	−0.02	−0.03	−0.03	0.01
DOR	−0.08	−0.004	−0.01	−0.07	0.07	−0.06**	−0.06	0.00	0.03	−0.02	0.12	−0.07**
DOR + Perf. Drop	−0.03	−0.01	0.02	−0.05	0.03	−0.03	−0.03	−0.01	0.03	−0.03	0.06	−0.03
Multinomial Logit												
DOR	−0.05	−0.02	0.01	−0.04	0.07	−0.05**	−0.04	−0.02	0.04	−0.00	0.11	−0.07**
Performance Drop	0.03	−0.03	0.04	0.00	−0.00	0.01	0.03	−0.03	0.03	−0.01	−0.01	0.01
Medical Drop	0.12*	−0.08	0.01	0.13*	−0.00	0.04	0.12*	−0.08	0.00	0.11	−0.02	0.02

[a]See discussion of panel data.

Notes:

Mind 15 is a 15-item index of all mindfulness items.

Observing (Obs), Describing (Desc), Acting with awareness (Act), Non-judging (Nonj), and Non-reactivity (Nonr) are subscales of mindfulness

Res(ilience) is a single index of resilience.

Logit Model outcomes are contrasted against all other outcomes; multinomial logit model outcomes are contrasted against successful completion.

*$p < .05$, **$p < .01$*