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Military medical students' intentions to pursue operational medicine:

Survey design and initial validation

By

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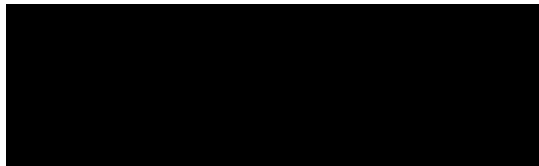
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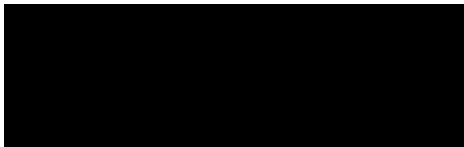
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ABSTRACT

Military medical students' intentions to pursue operational medicine:

Survey design and initial validation

James F. Schwartz, Master of Health Professions Education, 2020

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Abstract

Purpose: Despite the longstanding practice of conducting a Summer Operational Experience (SOE) at the Uniformed Services University (USU), a formal evaluation of the program to assess its impact on motivating students to pursue an operational medicine assignment has not been conducted. Our primary objective was to develop and collect initial validity evidence for a survey instrument designed to assess various aspects of students' attitudes and behavioral intentions to pursue an operational medicine assignment as a result of their participation in the SOE.

Materials and Methods: Using the Theory of Planned Behavior (TPB) as a framework, we developed a survey that focused on four constructs: attitude, subjective norms, perceived behavioral control, and intention to pursue an operational medicine assignment. We followed a systematic, seven-step design process to develop the survey and collect initial validity evidence. Students in the Class of 2020 completed the 21-item survey prior to their operational experience.

Exploratory factor analysis (EFA) and reliability analysis were performed to examine the structure of the instrument and the internal consistency reliability of the subscale scores, respectively. In addition, bivariate correlation and multiple linear regression analyses were used to explore the relationships between the identified factors and students' self-reported intentions to pursue operational medicine.

Results: Among the 149 eligible students, 122 (response rate = 82%) completed the entire survey. Results from expert reviews and cognitive interviews suggested the survey items were clear and interpretable. Findings from the EFA and reliability analysis suggested four underlying factors with reasonable internal consistency reliability (Cronbach's alpha $>.70$), and the regression analysis showed that three factors statistically significantly predicted students' intentions to pursue operational medicine: Attitude: Personal Growth ($b=.67, \beta=.42, p<.001$), Behavioral Control ($b=.20, \beta=.15, p<.05$), and Attitude: Career Progression ($b=.36, \beta=.30, p<.001$). The fourth factor, student's perception of the importance that others placed on an operational medicine assignment, was not a statistically significant predictor of intention.

Conclusions: Findings from this study suggest the developed survey yields scores that can reliably assess students' attitudes, subjective norms, and perceived behavioral control. Using this survey, course leaders have a tool for evaluating the success of the SOE and identifying potential areas for curricular improvement. More broadly, other educators can use the theoretical framework and instrument design process described here to examine students' attitudes, subjective norms, and perceived behavioral control in their own contexts.

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Chapter 1 - Introduction

The Uniformed Services University of the Health Sciences (USU) coordinates a two-week operational experience during the first year of medical school. This operational experience, commonly known as the Summer Operational Experience (SOE), aims to provide students with operational context and enhance familiarity with service-specific operational environments, the services' medical department capabilities, and/or general warfighter skills. The SOE has been part of the USU curriculum for over 40 years. Originally under the direction of COL Robert J.T. Joy, MC, USA, the former chair of the Department of Military and Emergency Medicine (MEM), the SOE was designed to give students with no prior military experience exposure to an operational experience, with an emphasis on medical units.¹ In 1986, COL Craig H. Llewellyn, MC, USA, and the MEM staff shifted the focus of the SOE to a more non-medical operational experience¹ designed to provide the medical student an opportunity to experience life in a tactical unit, or aboard a ship.

The current SOE is a combination of operational medicine or field unit experiences. The University provides a menu of various operational experiences ranging from shipboard operations and Special Forces to mountain or aviation medicine and humanitarian support opportunities. All Services are represented in the SOE program. The cost to execute the program is approximately \$150,000 per year. Students submit a preference sheet and are selected through a lottery. This educational experience is aligned with the University's mission "to support the readiness of America's Warfighter and the health and well-being of the military community"² and directly supports the MEM's mission "to educate, train, and inspire USU SOM students to support and lead in operational and emergency medicine environments in the Uniformed Services..."³ One overarching goal of the SOE is to provide an experience that may motivate

students to pursue an operational medicine assignment at some point in their military career. For the purposes of this work, we used the following definition of operational medicine:

“Operational Medicine is defined as providing medical care while assigned or attached to military operational units (conventional and/or unconventional land, sea and air forces) with the unit’s mission to operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care.”⁴

Despite the longstanding tradition of the SOE at USU, a formal evaluation of the program has never been conducted, and only anecdotal feedback has been collected through informal discussions and/or free-text comments from students about their individual experiences. Furthermore, little evaluation data has been collected regarding the effectiveness of the SOE in encouraging medical students to pursue operational medicine assignments. Therefore, the purpose of this project was to develop and collect initial validity evidence for a self-report survey instrument (or questionnaire) designed to assess various aspects of students’ attitudes and behavioral intentions to pursue an operational medicine assignment at some point in their military career.

Theoretical Framework

As a foundation for survey development, the Theory of Planned Behavior (TBP) was used as the theoretical framework. Developed by Icek Ajzen, the TBP postulates three distinct constructs that influence behavioral intention and help explain behavior; these variables center on one’s personal attitude, societal attitude, and perceived ability to perform the behavior.⁵

At the root of these variables are three beliefs: behavioral, normative, and control beliefs - what Ajzen refers to as salient beliefs about any given behavior. Behavioral beliefs affect one’s

attitude toward the behavior and whether or not the individual views the behavior positively or negatively. Behavioral beliefs or attitudes can be defined as either affective or instrumental attitudes. Affective attitudes deal with whether the individual views the behavior as enjoyable or not; while instrumental attitudes address whether the behavior is beneficial or not. Both of these attitudinal perspectives affect the outcome of the individual's behavioral belief.⁷

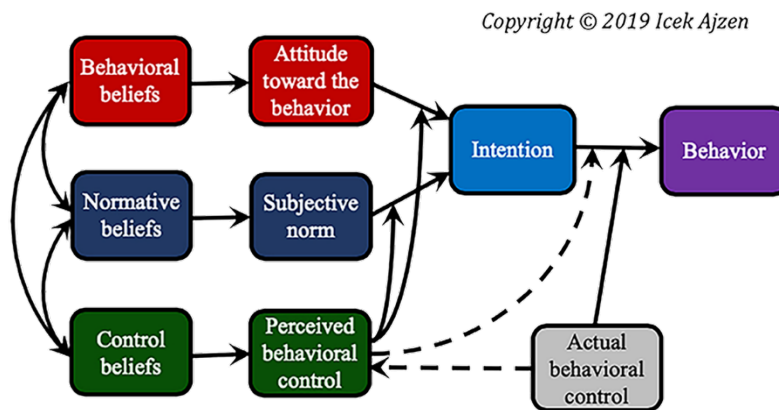


Figure 1. Theory of Planned Behavior⁶

Normative beliefs influence subjective norms, or the opinion a person holds toward the behavior. Normative beliefs are influenced by important person(s), a group of individuals, or society as a whole. Subjective norms can be further explained as either injunctive or descriptive norms. Injunctive norms are formed from the perception that others view the behavior as appropriate and would encourage the behavior; while descriptive norms are formed from the perception that others actually do the behavior. Subjective norms are measured by one's normative beliefs weighted by the motivation to comply.⁷

Lastly, control beliefs affect one's perception of their ability to influence or have power over the behavior; in other words, how much "control" does an individual have over accomplishing the behavior? Is the behavior something that the individual sees themselves capable of doing and is confident they can do? Does the individual believe they can overcome

any barrier or challenge that might interfere with doing the behavior?⁷ In many ways, control beliefs are analogous to Bandura's concept of self-efficacy.⁸

Ajzen proposed that the three constructs of attitudes, subjective norms, and perceived behavioral control directly influence an individual's intention to pursue a behavior. A positive endorsement of these three constructs generally results in greater intention to pursue and act on the particular behavior, while a negative stance results in a less likely intention to pursue and act on the behavior.

It is important to note that these three variables not only directly influence intention but can also have an effect on each other. For example, an individual's perceived behavioral control can affect his attitude toward the behavior: positive perceived behavioral control can create positive attitudes toward the behavior, and vice versa. Similarly, a negative attitude toward the behavior by an influential person or group can influence the individual's attitude toward the behavior and diminish their perceived behavioral control and ability to accomplish the behavior. Although these three variables can influence each other, Ajzen theorized that an individual's perceived behavioral control can have a direct effect on the behavior itself, and depending on how accurate an individual's perception of their behavioral control is, it can act as a substitute for actual behavioral control and be a very strong predictor of the actual behavior;^{5,9} whereas the effects from the other two variables tend to act indirectly through behavioral intentions.⁵

As an example, in 2012 the Department of Family Medicine at McMaster University in Hamilton, Ontario, developed a survey instrument using the TPB as the framework to assess whether a new curriculum was having an impact on residents' intentions to adopt a more comprehensive scope of practice. Their research found that using the TPB as a framework provided insight into residents' intentions regarding comprehensive family medicine and the

specific constructs that influenced their intentions. Furthermore, researchers were able to use that information to identify potential areas for improvement in the curriculum.¹⁰

Relevance

If the University is truly committed to providing an educational environment that not only prepares but also encourages students to pursue an operational assignment, then it is critical to evaluate the programs that provide those experiences. In doing so, we can better ensure the University is meeting its commitment. As noted in a 2001 Rand Report, “although some medical professionals do ultimately follow operational career paths... this type of career path is often the exception.”⁴ And although it is the exception, if there is an expectation that USU graduates possess the knowledge, skills and attitudes to successfully perform in the operational environment, then the University is obligated to provide students with the means for success. Opportunities for operational experiences, even for those medical specialties not typically considered “operational,” is one means of doing this. Lastly, an important aspect of the SOE that should not be minimized is the potential impact on students’ identity formation as military medical officers. Identity formation is “an important cultural component” that develops as a result of medical and operational personnel working together.⁴

Study Purpose

The purpose of this research project was to design and collect preliminary validity evidence for a theoretically grounded survey instrument that focuses on four constructs: attitude, subjective norms, perceived behavioral control, and intention to pursue an operational medicine assignment at some point in their military career.

Chapter 2 – Research Publication

Military medical students’ intentions to pursue operational medicine: Survey design and initial validation

This chapter’s content was submitted for publication to *Military Medicine* on 24 April 2020.

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Introduction

Military physicians serve a unique population that requires a unique perspective. Gaining this perspective can come through many different experiences - from the classroom, to working on the wards in military medical treatment facilities, to conducting field training exercises or simulations. One unique opportunity is to observe, team, and work with warfighters in their operational environment. Such experiences provide physicians-in-training with a chance to gain an understanding of the service members' work environments, occupations, and "the military context in which they will provide care."¹ The Uniformed Services University of the Health Sciences (USU) is a leadership academy for military medicine. The mission of the University is to support warfighter readiness "by educating and developing uniformed health professionals, scientists and leaders; by conducting cutting-edge, military-relevant research, and by providing operational support to units around the world."² In support of the University's mission, the Department of Military and Emergency Medicine (MEM) annually coordinates what has commonly become known as the Summer Operational Experience (SOE). The SOE is a two-week, hands-on experience conducted as part of the pre-clerkship military medical curriculum. Students have participated in some form of the SOE as part of the USU curriculum for over 40 years. Within that timeframe the general aims of the program have remained relatively constant - to give students an opportunity to get out of the classroom and into the "field" with the goal of learning and experiencing the services' missions and capabilities, as well as the medical community's role within these mission sets. Similar to other pre-commissioning programs, the SOE aims to provide students with additional operational context and enhance familiarity with the services' medical department capabilities, the service-specific operational environment, and/or general warfighter skills. Students can choose from a range of field and operational

experiences and are selected through a lottery process. A primary overarching goal of the experience is to provide students with a learning experience that may excite and motivate them to pursue an operational medicine assignment at some point in their military career.

Despite the longstanding practice of the SOE at USU, a formal evaluation of the program to assess its impact on motivating students to pursue an operational medicine assignment has not been conducted. Instead, only anecdotal student feedback has been collected through informal discussions and/or free-text student comments about their individual experiences. Therefore, the purpose of the study was to use a theoretical framework to design and collect preliminary validity evidence for a survey instrument focused on measuring four distinct constructs: attitude, subjective norms, perceived behavioral control, and intention. Using this carefully developed survey, USU educators will have an assessment tool that can be used in future work to evaluate the success of the SOE and potential areas for improvement.

Theoretical Constructs

As a foundation for the survey's design and overall structure, the Theory of Planned Behavior (TPB) was used as the theoretical lens. Developed by Icek Ajzen, the TPB proposes that behavioral intention and behavior can be explained by three distinct variables: an individual's personal attitude toward the behavior, the subjective norms or the societal attitudes toward the behavior, and an individual's perceived ability to perform the behavior. A positive endorsement of these three variables generally results in greater intention to pursue a particular behavior, while a negative stance results in less intention to pursue the behavior.^{3,4} Finally, according to the theory, these three variables not only have direct effects on intention, but each variable can also have effects on the other variables in the model. For example, an individual's perceived behavioral control can affect his attitude toward the behavior: positive perceived behavioral control can create positive attitudes toward the behavior, and vice versa. Although

these three variables can influence each other, Ajzen theorized that an individual's perceived behavioral control can have a direct effect on the behavior itself; whereas the effects from the other two variables tend to act indirectly through behavioral intentions.^{3,4}

Methods

Survey Design

We followed the systematic, 7-step, survey design process described by Artino et al.⁵ Beginning with a literature search, we determined that to accurately evaluate students' behavioral intention, they must have a clear understanding of the term "operational medicine." The literature review revealed that although there are definitions for military medicine, there was no conclusive definition for operational medicine. Thus, using language and concepts from *Reorganizing the Military Health System*, and collaborating with three MEM faculty members, we developed the following "operational medicine" definition for use in this survey:

"Operational Medicine is defined as providing medical care while assigned or attached to military operational units (conventional and/or unconventional land, sea and air forces) with the unit's mission to operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care."¹

The initial survey was then developed in consultation with the SOE course director and through literature reviews, which included reviews on the TBP and its use as a framework in previous survey design efforts.⁴ The initial survey included 31 items that addressed personal attitude, perceived subjective norm, perceived behavioral control, intention, and demographics.

Continuing with the survey-design process, we then conducted expert panel reviews, as well as cognitive interviews with respondents from the population of interest. Next, we collected

data for the purposes of the present study, described by Artino et al. as a “pilot study.”⁵ The sample consisted of pre-clerkship military medical students. Students completed a revised 21-item version of the survey that emerged from the expert reviews and cognitive interviews. The survey was completed prior to their SOE experience to evaluate their intentions to pursue operational medicine at some point in their military career. Validity evidence was gathered using Messick’s five-source validity framework, as articulated in *The Standards for Educational and Psychological Testing, 2014*.⁶

Initial Survey Review

An expert panel reviewed the initial survey draft. Four experts were used: two panel members were selected based on their survey design expertise, one member was selected based on her health professional education expertise, and the last member was selected based on his expertise with the SOE program and his background as a military physician. Panel members were sent a cover letter with instructions for completing the evaluation and requesting feedback returned within 7 days. Adapted from a review form by Rubio, et.al,⁷ experts were asked to rate each item based on four categories; *representativeness* - how well the item illustrates the construct of interest; *clarity* - how understandable each item is; *relevance* - how well the item relates to the construct; and *comprehensiveness* - the completeness of the entire measure. Panel members had the opportunity to indicate whether any items should be deleted or added to the survey, and they were also asked for recommendations on how to improve the items if needed. At the completion of the expert review, modifications were made to the survey and cognitive interviews were conducted with two students from the sample population who volunteered to take the survey and participate in the interview. We used retrospective verbal probes that were asked immediately after the respondent completed the survey.⁸ Each individual cognitive interview took approximately 1 hour to complete.

Survey Implementation

The survey was administered online using Google® Forms through the University's learning management system. The confidential survey collected no personal identifiable information; instead, students were asked to create their own personal identification code, which allowed us to link their pre- and post-survey responses for later use. The confidential nature of the survey was an important part of the administration, since USU students who are receiving a federally funded medical education may not be motivated to reveal their true intentions, especially if those intentions do not include long-term service to the nation. This work was reviewed and approved by USU's Institutional Review Board (IRB).

Participants

We invited the entire class of 2020 who participated in the SOE (149 students) to take the survey; in total, 122 students (response rate = 82%) completed the entire survey. The participants included 50 females (41%), and 72 males; 30 students (25%) had prior military experience (officer or enlisted). Student service affiliation was 45 (37%) Army, 38 (31%) Navy, 37 (30%) Air Force and 2 (2%) Public Health Service. Student commission source was 81 (66%) direct commission, 19 (16%) service academy, 12 (10%) officer candidate or warrant officer candidate school, and 10 (8%) Reserve Officer Training Corps (ROTC). At the time of administration, the student participants had completed approximately 11 months of their first year of medical school.

Analyses

A qualitative review of the expert panel and cognitive interview recommendations was conducted, and statistical analyses were done on the pre-course survey data from the cohort of USU medical students. First, we conducted an exploratory factor analysis (EFA) to examine the underlying structure of the survey items' scores (evidence regarding internal structure). We used principal axis factoring and direct oblimin rotation ($\delta = 0$). Following the EFA, we performed

a reliability analysis to examine the internal consistency of the items. Next we conducted a Pearson correlation analysis to examine the strength of bivariate correlations between the identified factors. Finally, we conducted a multiple linear regression analysis to investigate the extent to which attitudes, subjective norms, and perceived behavioral control could predict students' intentions to pursue operational medicine. All the statistical analyses were performed using IBM SPSS 25.0

Results

From the initial draft to the cognitive interview the four-member expert review provided the greatest number of modifications to the survey. An analysis of the expert reviews revealed recommendations to modify question stems, change some response options from unipolar to bipolar options, delete six questions, add five questions, and reorganize item sequence. One expert strongly suggested rephrasing from a question format to a statement format; while one expert strongly recommended adding the modifier "to what extent do you..." at the beginning of each question that asks for a student's belief or opinion. Neither recommendation was adopted. Two questions were found to be more about the student's satisfaction with the experience than behavioral intention and were moved to the demographics section of the survey. Two questions were deleted from the scale based on a discussion with one panel expert who highlighted the questions' ambiguity.

Although the cognitive interviews did not provide many linguistic or technical modifications, the interviews did provide valuable feedback. In particular, the following changes were made: the addition of clarifying examples and a question focused on pre-experience instructional training; the elimination of one operational experience from the survey that did not

meet the intent of the survey; and revision of the definition for Operational Medicine. All recommendations were adopted.

The final version of survey that was administered to the first year medical students was comprised of the following sections: four items to measure attitude, five items to measure perceived subjective norms, three items to measure perceived behavioral control, and one item to measure intention. A demographic section consisting of seven items was also included at the end of the survey.

Exploratory factor and reliability analysis

The Kaiser-Meyer-Olkin measure of sampling adequacy (.70) revealed a “middling” sample size for the factor analysis (Hutcheson & Sofroniou). Bartlett’s test of Sphericity ($\chi^2(66)=488.32, p<.001$) indicated the correlation matrix is not an identity matrix. The scree plot and the factor matrix both suggested four underlying factors. The first to the fourth factors accounted for 28.63%, 18.86%, 11.83%, and 8.79% of the variance, respectively, with the cumulative percentage being 68.10%. The loadings of the individual items on factors and the communalities are shown in Table 1. Communalities of all the items were .40 or above, except the Subjective Norm-3 (SUBNORM-3) item. The SUBNORM-2 item loaded on more than one factor and was removed from further analysis. Thus, the Attitude: Personal Growth factor was composed of the Attitude -1 and 2 items (Cronbach’s $\alpha = .76$); the Behavioral Control factor had the Behavior Control 1, 2, and 3 items (Cronbach’s $\alpha = .80$); the Subjective Norms factor had the SUBNORM 1, 3, 4, and 5 items (Cronbach’s $\alpha = .70$); the Attitude: Career Progression factor had the Attitude 3 and 4 items (Cronbach’s $\alpha = .77$). As indicated, all internal consistency reliability scores were considered acceptable (i.e., $>.70$). Individual sub-scale scores were then

calculated using the average of the items associated with each of the factors that emerged from the EFA (i.e., they were an unweighted mean score).

Correlation and regression analysis

The Pearson correlation coefficients between the sub-scale scores are shown in Table 2. The strength of the bivariate correlations between the sub-scale scores were weak to moderate. The Attitude: Personal Growth factor was significantly correlated with the Subjective Norm factor ($r=.28, p<.01$) and with the Attitude: Career Progression factor ($r=.39, p<.01$). The results of the multiple linear regression analysis are displayed in Table 3. Taken together, the four factors explained 39% of the variance of the intention item. Three factors had significant predictive power on the intention item -- Attitude: Personal Growth ($b=.67, \beta=.42, p<.001$), Behavioral Control ($b=.20, \beta=.15, p<.05$), and Attitude: Career Progression ($b=.36, \beta=.30, p<.001$).

Discussion

An overarching mission of USU is to inspire medical students to support and lead in operational environments in the uniformed services. In today's military environment it is not only imperative that military providers be excellent clinicians, but they must also be operational assets for the commander. In other words military physicians must extend beyond their clinical duties and contribute operationally to the team. In a study conducted with line battalion and brigade commanders at Fort Hood Texas, commanders rated their unit Army medical corps officers high in medical competence but lower in categories of military competency such as "presence at unit functions, fitness, medical readiness of troops, medic training, Physician Assistant (PA) training, physician training, and equipment readiness."⁹ USU has a responsibility for creating an environment and generating opportunities that allow students to expand beyond "field medical competencies," and into areas of "military" and operational competencies. The SOE is designed to provide such an opportunity, and in the present study we systematically

developed a survey instrument to measure three important constructs related to behavioral intention: attitude, subjective norms, and perceived behavioral control. Results from this study suggest the instrument can reliably measure these constructs, thereby providing course leaders with a useful tool for assessing the value of the SOE as an educational experience that can influence students' intentions to pursue an operational medicine assignment.

Numerous studies have used the TPB as a framework for studying intention and behavior, from online grocery buying,¹⁰ to using electronic media to conduct continuing medical education,¹¹ to the effect of messaging on adult oral health.¹² In this study we designed a survey instrument using the TPB as a framework and collected initial validity evidence to assess various aspects of students' attitudes and behavioral intentions to pursue an operational medicine assignment. The EFA suggested four underlying factors resulting from the three TPB constructs used for survey development: attitude: personal growth, behavioral control, subjective norms, and attitude: career progression. These four sub-scales were shown to have acceptable internal consistency reliability and were related to one another, and to intention, in ways that aligned with the theory.

Finding from the regression analysis indicated that three factors had significant predictive power on the intention item - Attitude: Personal Growth, Attitude: Career Progression and Behavioral Control. Although correlational, these results suggest that the University might bolster behavior intentions by explicitly demonstrating and communicating how important an operational medicine assignment can be to a physician's personal, professional and career growth, regardless of specialty or Service. This purposeful demonstration could be one avenue for not only strengthening behavioral intention, but also for establishing and/or reinforcing the student's professional identity as a military medical officer. One way to do this could be to help

students identify the relevance that address the “why is this important for me” aspect of operational medicine. As Archer et al., suggest, “... the TPB has even greater utility as an organisational framework for the integration of professionalism training into medical education curricula.”¹³

Furthermore, to ensure we are strengthening students’ perceived behavioral control, the University should continue to ensure that the knowledge, skills and attitudes (KSAs), particularly the KSAs commensurate to supporting operational combat units on today’s trans-regional, multi-domain, and multi-functional (TMM) threat environment, are aligned and current to what the Services expect of their physicians. A recent example at the University includes the addition of KSAs that address prolonged field care as a result of “enemy threats and constraints of the environment [that] will challenge the application of a “golden hour” standard in a medical treatment/evacuation paradigm”.¹⁴ Ensuring the curriculum addresses these important KSAs, and providing students with opportunities to master these KSAs, should strengthen their perceived behavioral control to succeed in the operational environment.¹⁵ Likewise, the addition of KSAs that specifically address leadership and followership and that promote “strong joint leaders of character [that] will need to think critically and strategically, and confidently address the toughest problems to assure future success,”¹⁴ could also strengthen students’ perceived ability and confidence to successfully perform in the operational assignment. Finally, it might be worthwhile to reconsider the specific goals of the SOE beyond familiarization of the Services’ mission, capabilities and warfighting, to also include the professional identity element. This broader goal may lead to the student internalizing the SOE as a “personal” and potentially significant experience. Doing this would likely require a redesign of the SOE to include new

experiences and/or to modify (and possibly delete) some of the current experiences that are offered in the program.

Our findings suggest that subjective norms are not strongly related to behavioral intention. Of the four subjective norms that we measured - personal relationships, peers, civilian faculty, and military faculty - there may be potential to modify the influence that faculty have on a student's intention, beginning with simply educating the faculty as to this goal. That is, by having faculty encourage students to consider operational medicine, and the benefits it provides one as a person, physician, and officer. Furthermore, the University could also partner with the Services to actively recruit and assign faculty with operational experience as part of their repertoire. Moreover, explicitly enhancing exposure to operational medicine curriculum within the basic sciences modules could help the student "connect the dots" between the basic sciences and operational medicine. For example, as part of a musculoskeletal basic science module a military faculty member could present an operational medicine case study on a deployed Soldier's physical activity and the impact of carrying a combat load.¹⁶ Lastly, it could be valuable to study the University's "hidden curriculum" as it relates to subjective norms and attitudes surrounding the importance of operational medicine and the potential impact on professional identity.^{13,17} All of these ideas, of course, would need to be tested in future work, and the survey developed here could be used as part of that evaluation effort.

Of note, students perceived the ease or difficulty of an operational medicine assignment as fairly neutral, but were somewhat confident they could learn the skills and be successful in an assignment. This perception may be a result of the students "not knowing what they don't know" at this early stage in their military medical education, but at the same time feeling confident that the University and the Service will teach and train them in the KSAs necessary to be successful

in the operational setting. Additionally, we recognize that the operational experience may assist students with specialty career decisions and discovering areas for self-improvement. Future research should evaluate the effects the SOE has on behavioral intentions by assessing students both before and after the experience. Finally, it might be beneficial to survey students after completing the entire four-year curriculum to evaluate the curriculum's effects on behavioral intentions to pursue operational medicine.

Limitations

This study has several important limitations. First, the sample is relatively small and potentially biased toward pursuing an operational medicine assignment. Although students enroll at USU for a number of reasons, we must at least consider that some enroll because they have a desire or interest to practice operational medicine. Also given their experience and the stage of education, students may not be able to accurately assess “what it takes” to be successful in an operational medicine assignment, thereby having a limited context to accurately predict their future behavior.² We also acknowledge that the sample is in the early stages of identity formation as a military physician, and many of these students likely have no idea of what specialty or type of medicine they might pursue in three years. Lastly, the survey does not assess whether the student will *actually* pursue an operational medicine assignment; nor does it assess how well the student will perform in an operational medicine assignment. Future work should consider what students choose to do once they begin practicing military medicine to determine the extent to which the survey constructs developed here explain actual behavior.

Conclusion

USU is committed to offering the best educational experiences and opportunities to our students in an effort to develop military medical officers that are technically and tactically competent, confident, and capable of leading within their Service. By providing a military

experience early in the student's medical education, the University strives to educate the student to the uniqueness of military medicine and the military population that they will be entrusted to care for in the future. Although the SOE may not directly lead the student to pursue an operational assignment, it is the University's intent that the experience should at least better inform students about the Services' mission and capabilities, arm them with an understanding of their role as a force provider within the operational forces, and contribute to the formation of their professional identity.

Findings from this study suggest the developed survey yields scores that can reliably assess students' attitudes, subjective norms, and perceived behavioral control. Using this survey, course leaders have a tool for evaluating the success of the SOE and potential areas for improvement within the curriculum. More broadly, other educators can use the theoretical framework and instrument design process described here to evaluate students' behavioral intentions in their own contexts.

Table 1. Descriptive statistics, factor loading after rotation, and communality of the items ($N=122$)

Item	Mean	SD	Factor				Communality
			ATT: Personal Growth	Behavioral Control	Subjective Norms	ATT: Career Progression	
ATT-1 Importance of OMA for a military physician?	4.28	.72	.86				.72
ATT-2 OMA improves growth as a clinician?	3.98	.84	.66				.47
ATT-3 OMA enhances competitiveness for promotion?	4.05	1.05				-.77	.64
ATT-4 OMA enhances career opportunities?	3.98	.96				-.78	.66
SUBNORM-1 Importance of an OMA for those who professionally influence you?	4.04	.74			.48		.43
SUBNORM-2 Importance of an OMA for those who personally influence you?	3.77	.82	.35		.33		.40
SUBNORM-3 Importance of an OMA for your fire team (classmates)?	3.69	.87			.43		.26
SUBNORM-4 Importance of an OMA for a USU military faculty member?	4.18	.75			.69		.48
SUBNORM-5 Importance of an OMA for a USU civilian faculty member?	3.50	.84			.76		.54
BC-1 Ease or difficulty of an OMA for you?	2.95	1.09		.56			.41
BC-2 Confidence you can learn the necessary skills required to perform in an OMA?	3.89	.93		.80			.64
BC-3 Confidence you can successfully perform in an OMA?	3.86	1.02		.96			.93

Note: ATT, Attitude; SUBNORM, Subjective Norm, BC, Behavioral Control; OMA, Operational Medicine Assignment. Factor loadings lower than .30 were suppressed.

Table 2. Pearson correlations between factors

	Attitude: Personal Growth	Behavioral Control	Subjective Norms	Attitude: Career Progression
Attitude: Personal Growth		.07	.28**	.39**
Behavioral Control			-.10	.09
Subjective Norms				.32

Note: ** $p < .01$

Table 3. Multiple linear regression of predicting intention from factor scores

	Unstandardized Regression Coefficient	Standardized Regression Coefficient	<i>p</i> value
Attitude: Personal Growth	.67	.42	<.001
Behavioral Control	.20	.15	<.05
Subjective Norms	-.10	-.05	.51
Attitude: Career Progression	.36	.30	<.001

Note: Model total $R^2 = .39$

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Chapter 3 - Discussion

The University has a responsibility to teach the knowledge, skills, and attitudes (KSAs) that prepare students to successfully perform in the operational environment. The SOE is one aspect of the curriculum that is designed to provide those KSAs that prepare students to perform in this demanding environment and, unlike many of their civilian counterparts, to incorporate a distinctive approach to medicine. In the present study we used a stepwise, empirically tested approach to develop a 21-item survey instrument to measure three important constructs related to behavioral intention: attitude, subjective norms, and perceived behavioral control. Results from our study suggest the instrument can reliably measure these constructs. As such, the survey can provide course leaders with a useful tool for assessing the value of the SOE as an educational experience that can influence students' intentions to pursue an operational medicine assignment.

Given the results of this initial survey validation, potential next steps include analyzing the data to find areas for improvement, modification, or other research considerations. First, with the data obtained from the pre-survey results, we could investigate how the University might strengthen or improve the student's personal attitude and their perceived behavioral control beginning with their first day on campus. A perplexing result from the study is that the societal norm construct was not found to predict behavioral intention to pursue an operational medicine opportunity. With this in mind, we could explore how to strengthen the societal norm construct, by studying the University's "hidden *military* curriculum." Hafferty et al. broadly defines the hidden curriculum as "the attitudes and values conveyed, most often in an implicit and tact fashion, sometimes unintentionally, via the educational structures, practices, and culture of an educational institution."¹¹ We could examine the unique components of the University's hidden

curriculum – those attitudes and values commensurate with aspects of medicine, and officership– and the presence of and interaction between each of these components.

Second, from a SOE programmatic standpoint, we must determine if the specific operational experiences, actually affect, in a causal way, students’ attitude, societal norms, perceived behavioral control or intention to pursue an operational medicine opportunity. This evaluation requires administering a post survey that measures the four constructs immediately following an individual’s SOE. A comparison between pre and post survey data would then provide evidence of the degree to which the SOE affected the student’s behavioral intention, in either a positive or negative way. Knowing the impact of each operational experience could provide a basis to modify, delete, or add experiences. Experiences that appear to instill positive intention could then be studied using qualitative methods to determine why these experiences were successful, with the results forming a basis for the criteria of an “acceptable experience.”

Additionally, further quantitative analysis of the survey results could provide insight into how demographics, e.g. marriage, children, age, commissioning source, etc., may affect a student’s intentions to pursue an operational medicine assignment. Moreover, the results of the SOE survey could be compared at a later date to USU graduates’ actual career choices to determine if students who showed a strong intention to pursue an operational opportunity early in their medical school experience followed through and actually acted on the behavioral intention.

Finally, as stated in the introduction, we should not overlook the value that the SOE potentially contributes to the students’ identity formation as military medical officers and how the survey data could potentially inform the development of curriculum focused on professional identity formation. For the overwhelming majority of USU students, this is their first opportunity to experience the Service outside of a formal schoolhouse environment. It is their first chance to

observe the various Services' "culture" in action, and potentially begin to internalize their roles within the Service. Thus, SOE is one experience that addresses the medical education community's shift from focusing solely on professionalism to now focusing on professional identity, and developing curriculum that specifically supports builds professional identity formation.¹²

Cruess et al. define professional identity for a physician as "a representation of self, achieved in stages over time during which the characteristics, values, and norms of the medical profession are internalized, resulting in an individual thinking, acting, and feeling like a physician."¹² By participating in the SOE, students may begin to view themselves as a military physician, *not* just a physician in the military. Research has shown that an individual's professional identity is built upon their preexisting personal identity, and influenced by external and internal factors, such as family, friends, culture and gender, as well as "the culture and learning environment which learners choose to enter."¹² Again this points to the importance of not only personal attitudes, but the influence of societal attitudes as it pertains to professional identity formation – an important data point from the SOE survey that should be further explored if the University views itself as partnering with students to bridge the identity gap between layperson to physician to military physician.

Military Relevance

Since USU's medical degree program is federally funded, the University has a responsibility to the U.S. taxpayers to develop and provide the most relevant curriculum possible for the military medical student to ensure the student is prepared to support the warfighter. To that end, the careful development of this survey should assist educators with assessing the quality of the SOE and diagnose potential problems that can be addressed to improve behavioral

intentions. Furthermore, the survey may provide some insights into how this generation of military medical students view their role in military medicine and their relationship to the warfighter. Moreover, the survey provides an opportunity for the University to reflect on its role as it relates to encouraging students to pursue operational medicine. Finally, and more broadly, educators outside of USU might be able to use the theoretical framework and instrument design process described here to examine students' behavioral intentions in their own contexts.

In conclusion, this project resulted in development and initial validation of a survey instrument to assess various aspects of students' attitudes and behavioral intentions to pursue an operational medicine assignment. The SOE is an important and unique opportunity that is offered only to USU students. The capability to assess the effects of the SOE on our students is essential to providing a worthwhile educational and enriching experience. For the military medical student, such operational experiences are the types of opportunities that elevate USU above every other medical school in the United States. Using this rigorously designed survey, USU educators can further evaluate the SOE and potentially explore other areas for assessment, improvement, and research. Taken together, these efforts are all focused on enhancing and offering the best educational experiences and opportunities to our students, with the ultimate goal of delivering to the Services the best military physicians possible.

Summer Operational Experience Pre Survey

Thank you for taking the time to complete this survey. Your responses will be kept confidential. No personally identifiable information will be associated with your responses in any reports of the data, and all data will be reported in aggregate.

PURPOSE: The Summer Operational Experience aims to provide the student with additional operational context and enhance familiarity with the medical departments' capabilities, service-specific operational environment, or general war-fighter skills. One overarching goal of the experience is to provide an opportunity that may motivate the student to pursue an operational medicine assignment at some point in their career. The department wants to determine whether these experiences are related to the student's likelihood of pursuing an operational medicine assignment.

It is an important part of your Summer Operational Experience to complete this pre and the post Summer Operational Experience Survey. The pre and post surveys are confidential, but in order to determine whether these experiences are related to the student's likelihood of pursuing an operational medicine assignment the pre and post surveys need to be linked. In order to link the surveys the student will create a personal identifier that will be used on the pre and post survey.

* Required

Operational Medicine

For this survey Operational Medicine is defined as providing medical care while assigned or attached to deployable or expeditionary military operational units, which include conventional and/or unconventional land, sea and air forces. These units typically operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care.

Personal Identifier

In order to maintain confidentiality and link the pre and post surveys please enter in the space below the date of your birth (day) and the initials of your mother's maiden name (first and last name); for example if a student was born on 25 March 1995 and their mother's maiden name was Beth Timmons then the student would enter "25BT" as their personal identifier. If the student was born on 3 March, the student would enter 03.

- 1. Please enter the date of your birth and the initials of your mother's maiden name (first and last name). ***

Personal Attitude.

These first four questions are about your personal attitude toward an operational medical assignment.

Operational Medicine is defined as providing medical care while assigned or attached to

deployable or expeditionary military operational units, which include conventional and/or unconventional land, sea and air forces. These units typically operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care.

2. How important or unimportant do you believe an operational medicine assignment is for a military physician?

Mark only one oval.

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

3. How much do you believe an operational medicine assignment improves a military physician's professional growth as a clinician?

Mark only one oval.

- A tremendous amount
- Quite a bit
- Moderately
- Very little
- Not at all

4. All things being equal, to what extent do you believe a physician who has completed an operational medicine assignment is more competitive for promotion than a physician who has not completed an operational medicine assignment?

Mark only one oval.

- A great deal more competitive
- Quite a bit more competitive
- Moderately more competitive
- Slightly more competitive
- No difference in competitiveness

5. All things being equal, to what extent do you believe a physician who as completed an operational medicine assignment has more career opportunities (i.e. such as command, staff, teaching, fellowships, operational, etc.) than a physician that has not completed an operational medicine assignment?

Mark only one oval.

- A great deal more opportunities
- Quite a bit more opportunities
- Moderately more opportunities
- Slightly more opportunities

- No difference in opportunities

Perceived Subjective Norms.

The next five questions are about your perception of how others view an operational medicine assignment.

Operational Medicine is defined as providing medical care while assigned or attached to deployable or expeditionary military operational units, which include conventional and/or unconventional land, sea and air forces. These units typically operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care.

6. How important or unimportant of an experience do you think most people who PROFESSIONALLY influence you believe an operational medicine assignment is for a military physician?

Mark only one oval.

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

7. How important or unimportant of an experience do you think most people who PERSONALLY influence you believe an operational medicine assignment is for a military physician?

Mark only one oval.

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

8. How important or unimportant of an experience do you think most of your fire team believe an operational medicine assignment is for a military physician?

Mark only one oval.

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

9. How important or unimportant of an experience do you think most USU military faculty believe an operational medicine assignment is for a military physician?

Mark only one oval.

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

10. How important or unimportant of an experience do you think most USU civilian faculty believe an operational medicine assignment is for a military physician?

Mark only one oval.

- Very important
- Important
- Neutral
- Unimportant
- Very unimportant

Perceived Behavioral Control.

The next three questions are about your perceived ability to perform in an operational medicine assignment.

Operational Medicine is defined as providing medical care while assigned or attached to deployable or expeditionary military operational units, which include conventional and/or unconventional land, sea and air forces. These units typically operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care.

11. How easy or difficult do you believe an operational medicine assignment would be for you?

Mark only one oval.

- Very easy
- Somewhat easy
- Neither easy or difficult
- Somewhat difficult
- Very difficult

12. How confident are you that you can learn the necessary skills required to perform as a physician in an operational medicine assignment?

Mark only one oval.

- Extremely confident
- Quite confident
- Moderately confident
- Slightly confident
- Not at all confident

13. How confident are you that you could successfully perform in an operational medicine assignment?

Mark only one oval.

- Extremely confident
- Quite confident
- Moderately confident
- Slightly confident
- Not at all confident

Intention.

The next question is about your intention to pursue an operational medicine assignment.

Operational Medicine is defined as providing medical care while assigned or attached to deployable or expeditionary military operational units, which include conventional and/or unconventional land, sea and air forces. These units typically operate in an environment which may be described as either stable or unstable, isolated, austere, resource limited or where operational conditions may impact the delivery of medical care.

14. How likely or unlikely are you to pursue an operational medicine assignment during your career?

Mark only one oval.

- Very likely
- Somewhat likely
- Neither likely or unlikely
- Somewhat unlikely
- Very unlikely

Demographics.

15. What is your sex?

Mark only one oval.

- Female
- Male

16. What is your age range?

Mark only one oval.

- < 21 years old
- 22 – 25 years old
- 26 – 28 years old
- 29 – 30 years old
- > 30 years old

17. Are you married or in a serious relationship?

Mark only one oval.

- Yes
- No

18. Do you have children?

Mark only one oval.

- Yes
- No

19. Were you a prior U.S. Military Officer or Enlisted Service member before attending USU?

Mark only one oval.

- Yes
- No

20. What is your commissioning source?

Mark only one oval.

- Service Academy (USMA, USNA, USAFA, CGA)
- Reserve Officers' Training Corps (ROTC)
- Officer Candidate School or Warrant Officer Candidate School
- Direct Commission Officer

21. What is your Service?

Mark only one oval.

- Army
- Navy
- Air Force
- U.S. Public Health

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