A STEM Mentorship Program to Improve Veteran Student Efficacy at Georgia Southern University - Year 1

Dr. Keith A. Landry, Georgia Southern University

Keith Landry, PhD, PE, F.ASCE Colonel (Retired), US Army Assistant Dean for Research Assistant Professor of Civil Engineering

College of Engineering & IT Civil Engineering & Construction Management Department Georgia Southern University Statesboro, GA

Dr. N. Mike Jackson, Georgia Southern University

Dr. Jackson is an experienced Engineering Administrator, Educator, and Researcher. He has completed over $5M in externally funded research and has published more than 75 scholarly works related to Civil Engineering and Construction. His academic career includes several appointments in higher education instruction, research, and administration. He is currently Chair of the Department of Civil Engineering and Construction Management at Georgia Southern University, where he recently received the 2015 Chancellor's Service Excellence in Leadership Award. He is also a licensed Professional Engineer and actively participates with numerous professional organizations, maintaining an excellent reputation for quality, integrity and ethics.

Mr. Kevin Gavin Finley, Georgia Southern University - College of Engineering and Information Technology

I am a graduate student pursuing my masters degree in applied engineering with a concentration of civil engineering and construction management.

A STEM-Mentorship Program to Improve Veteran Student Efficacy @ Georgia Southern University → Year 1

ABSTRACT

National studies indicate roughly half of the military veterans that start higher education pursuits using their earned GI Bill benefits will leave school without earning a degree. Veteran student graduation and retention rates in the College of Engineering & IT at Georgia Southern University are compared with national and statewide rates to support the need for a more effective approach to improving the number of veterans who will see a positive return on their earned benefits. The pedagogical concepts supporting the structure and implementation of a mentorship program designed to improve the retention and graduation rates of military veterans pursuing STEM are presented. Social support theory principles defining the structure of the mentorship effort which utilizes military veteran volunteers already serving on the college or university faculty and staff are presented and discussed. The Stress and Coping, Social Constructionist and Relationship perspectives of social support theory are evaluated for their ability to identify the principle issues producing the stress felt by the students and mitigate their impact. Cohen's Perceived Stress Scale (PSS) is used to measure perceived stress in the mentorship program and identify students in a state of high stress who may require intervention. Data collected from intake and exit surveys, Cohen's PSS and personal interviews is presented and discussed.

INTRODUCTION

In 2007, approximately 75,000 service members were serving at nine military installations across the state of Georgia. Given its long history as a regional comprehensive university, Georgia Southern has received a small but consistent stream of military service members, veterans and dependents using GI Bill benefits to pursue higher education goals. Since 2001, military veterans have constituted, on average, less than 1% of each entering class or roughly 15-20 students.

The College of Engineering and Information Technology (CEIT) was founded in 2012 by merging engineering technology programs from the College of Science and Technology (COST) with computer science and information technology programs in the College of IT (CIT). CEIT eventually received ABET accreditation in 2014 retroactive to its founding. The first freshman class with veterans that could graduate with an ABET accredited degree entered the college in 2008. Since then, on average, approximately 4-9 veterans have entered with each freshmen class.

Analysis of student data obtained from the university reveals that 46% of the veterans who started their academic studies in pursuit of a STEM degree in 2008 graduated four years later. This

graduation rate aligns with the overall national average for veterans of 40-50% identified in the Veteran Economic Opportunity Report (2015). Of concern though is the fact that, of the veterans who entered as freshmen from 2008 through 2011, only 78% of that cohort were still in school in 2011. This rate compares poorly with the retention rate of 90% for the non-veteran students in that same cohort. There is significant room to improve the retention and graduation rates of veteran students. In an earlier paper, Landry and Jackson (2016), the authors presented educational models of student learning in a STEM environment and offered a vehicle for developing a program to mitigate these issues and improve graduation and retention rates by increasing the efficacy of veteran students.

BACKGROUND

In their 2016 paper, the authors presented findings from a recent Institute for Veterans & Military Families (IVMF) survey and report by the Department of Veterans Affairs (VA) which indicated "veteran students begin their transition from military service into academic pursuits well-motivated to succeed but with varying degrees of resilience to the most common challenges faced by students." Respondents to the IVMF survey revealed "Military service tends to motivate service members to believe furthering their education after transitioning to civilian life is key to their future success." Table 1 is a list of the top motivating factors service members provided along with the corresponding percentage of survey responses.

Motivating Factors	%
Career Improvements	86%
Self-Improvement	71%
Potential for Increased Salary	69%
Professional Advancement	56%
To Use Earned Benefits	51%

Table 1: Top 5 Motivators for Military Veterans Pursuing Higher Education

The IVMF survey also listed the top challenges military service members expected to encounter while pursuing their academic studies. Table 2 is a list of the top barriers reported along with the corresponding percentage of survey responses.

Barriers to Pursuit of Higher Education	%
Financial Resources	56%
Personal/Family Obligations	28%
GI Bill Benefits Expired	25%
Health/Disability Issues	23%
School/Job Conflict	22%

Table 2: Top 5 Barriers for Military Veteran's Pursuit of Higher Education

Veteran students currently in school also responded and described the major challenges impeding their academic progress. Table 3 is a list of the top problems they encountered along with the corresponding percentage of survey responses.

Problems Faced in Pursuit of Higher Education	%
Age Difference	37%
Financial Resources	32%
Working Full Time	32%
Family Responsibilities	29%
Few Veteran Resources On Campus	26%

Table 3: Top 5 Problems Military Veterans Face Pursuing Higher Education

Military service members are leaving their respective services with great intentions and a solid mix of extrinsic and intrinsic motivations for pursuing some form of higher education using their earned GI Bill benefits, yet far too many are leaving school without a degree. While in uniform, every veteran is exposed to various methods designed to improve their resilience and improve their ability to operate in stressful environments and situations. The problems and barriers veterans report facing as students all create stress which likely inhibits academic performance. Finding an effective way to improve student resilience and reduce stress would appear to offer a viable means of increasing the retention and thus graduation rate of veteran students. Doing so in a manner that builds upon each service member's military experiences provides an excellent opportunity for leveraging existing strengths in pursuit of academic goals.

THEORY: MENTORSHIP

Packard (2016) argued strongly for the use of well-defined STEM student support structures to improve the performance of under-represented minorities in undergraduate STEM education programs. She noted that underrepresented student groups, including students from low income backgrounds, particularly benefit from mentoring initiatives. Her mentoring theory suggests veteran students, as an underrepresented group, would also benefit from the implementation of a mentorship program structured to address stress-related issues affecting their academic performance.

Specifically, mentoring programs are defined as, "developmental experiences or a type of support intended to advance students toward important goals." (Packard, 2016) In this case, the goal is to keep veteran students in school year-to-year. Packard's research demonstrated the positive effect mentoring programs can have on specific groups of underrepresented students and how these experiences help improve individual persistence. Mentoring interactions have their greatest impact when they are inclusive and equip students to take on challenges inherent in STEM programs by increasing their individual capabilities and motivation. In short, mentoring offers a means of improving student efficacy. Doing so using military veterans as mentors in the program offers a means of building upon positive experiences each veteran brings to their academic studies from their military service.

THEORY: PERCEIVED STRESS

The common factor linking each of the motivating factors, barriers and problems experienced by veteran students is one of perceived stress. Each veteran student will respond to the positive or negative aspects of these life events with their own individual levels of stress based on their personal perceptions. The Cohen Perceived Stress Scale (PSS) (1983) provides a validated means of quickly and objectively measuring the degree of stress resulting from subjective individual experiences. The PSS currently exists in 14-, 10- and 4-question formats. The 10-question version used in this study is widely accepted as a measure of chronic stress due to ongoing life circumstances and expectations about future events. In this format, responses to 10 questions, rated on a scale of 0 (Never) – 1 (Almost Never) – 2 (Sometimes) – 3 (Fairly Often) – 4 (Very Often), are scored to yield a number which serves as a measure of the respondent's stress level. Individual scores are then grouped to determine the average and standard deviation. High stress levels are considered to be indicated by scores more than one standard deviation above the mean in this study.

It is generally recognized that high stress levels, experienced over an extended period of time, will not prove beneficial to successful academic performance. An effective mentorship program mentorship program will help reduce levels of perceived stress while it seeks to increase abilities and resilience as described by Packard. Periodic applications of the PSS will allow the authors to assess the impact of mentoring activities upon perceived stress felt by veteran students.

THEORY: SOCIAL SUPPORT GROUPS

A mentorship program, focused on veteran students, is simply an "in university" social support group structured to reduce perceived stress. Cohen & Lakey (2000) state "the most influential theoretical perspective on social support hypothesizes that support reduces the effects of stressful life events on health (i.e. acts a stress buffer) through either the supportive actions of others (e.g., advice, reassurance) or the belief that support is available." Three perspectives of social support, "stress and coping", the "social constructionist" and "relationship perspective" are used to define and explain the array of emotions contributing to the stress veteran students experience in their STEM-focused academic studies.

The stress and coping perspective aims to protect people from the adverse impacts of stress. The social constructionist perspective seeks to mitigate stress by protecting an individual's self-esteem. The relationship perspective states that the health effects of social support are not separate from an individual's supportive relationships. Table 4 seeks to identify the perspective offering the best means of mitigating perceived stress resulting from the barriers and problems identified by the IVMF survey. The "stress and coping" and "relationship" perspectives seem to offer a reinforcing pair of approaches to reducing stress that mimic approaches veteran students will have experienced during their military service.

Barriers	Stress and Coping	Social Constructionist	Relationship
Financial Resources	x		
Personal/family obligations	x		x
GI benefits expired	x	x	
Health/disability issues		x	
School/job conflict	x		

Problems	Stress and Coping	Social Constructionist	Relationship
Age difference with peers			x
Financial resources	x		
Working full time	x		
Family responsibilities	x		x
Few veteran resources		x	x

Table 4: Social Support Theory Perspectives and Veteran Student Barriers/Problems

STUDY CHARACTERISTICS: MENTORS & STUDENTS

The authors employed a targeted marketing plan in the Fall 2016 semester to recruit veteran mentors and students for the mentorship program. The Registrar identified 78 veterans serving on the faculty and staff. The authors approached 10 individuals who were most closely associated with CEIT or STEM programs. All 10 volunteered to participate in the mentorship program.

In a similar fashion, contact information for all students using GI Bill benefits was made available to the authors. Email flyers describing the program were sent to each student since they were not categorized by the type of GI Bill benefit (e.g. Active Duty, Veteran, Dependent, etc.). Additionally, descriptive ads placed on electronic signage and bulletin boards across campus and radio interviews on the campus radio station were used to inform a wider population. In short order, 10 veteran students responded and asked to join the program.

The mentors and students who agreed to participate in the program were given an intake questionnaire to gather pertinent personal characteristics which included branch of service, age, gender and years of service as demographics the authors felt would be of the greatest initial interest to both groups in terms of shared characteristics. Figures #1 and #2 depict the branch of service breakdown for the 20 mentors and students.

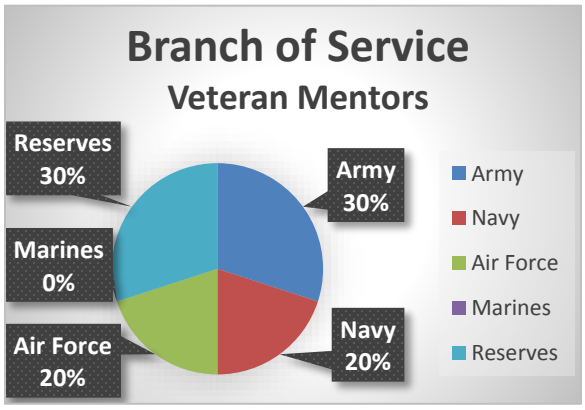

Figure #1: Veteran Mentors' Branch of Service

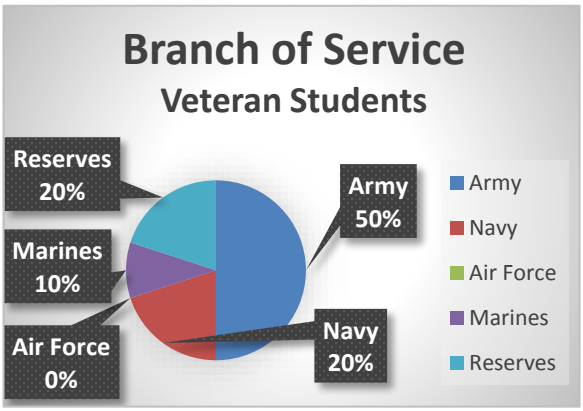

Figure #2: Veteran Students' Branch of Service

The veteran student population of this initial cohort consists of sophomore to graduate students. Figures #3 and #4 depict the age ranges of the mentors and veteran students.

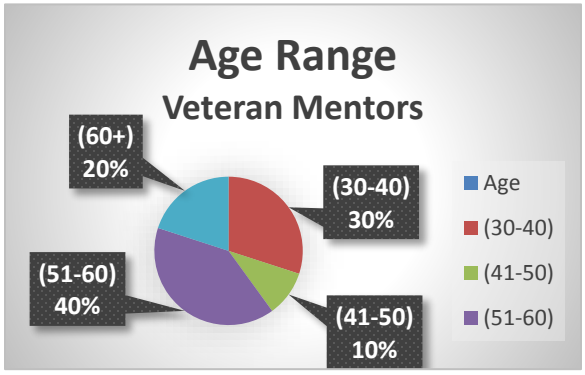

Figure #3: Veteran Mentors' Ages

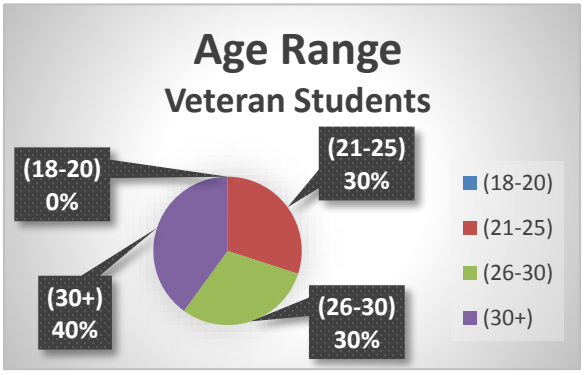

Figure #4: Veteran Students' Ages

Figures #5 through #8 depict the years of military service and gender breakdown of the mentors and veteran students.

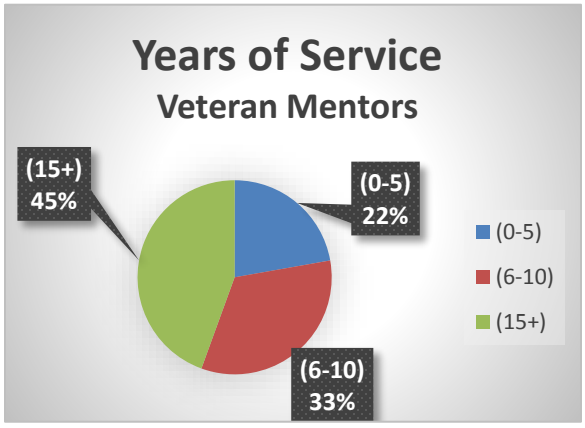

Figure #5: Veteran Mentors' Years of Service

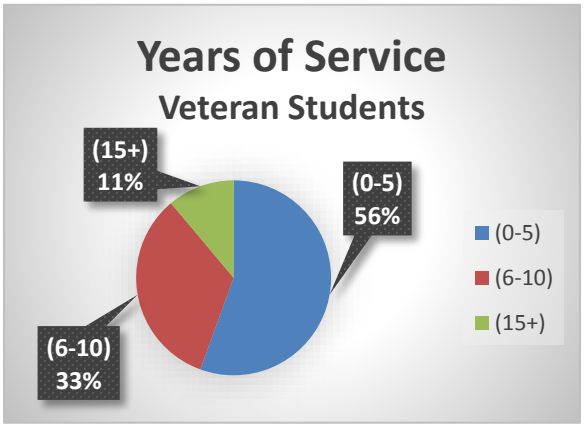

Figure #6: Veteran Students' Years of Service

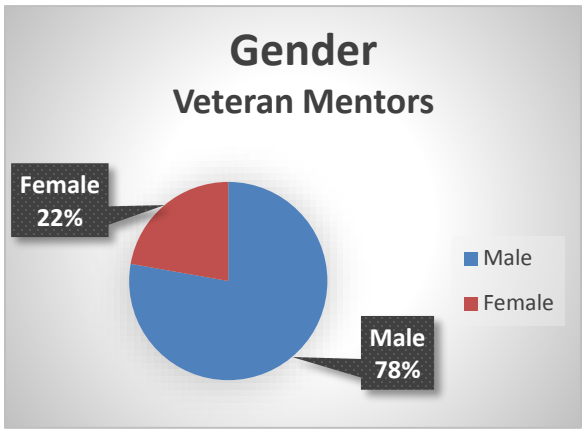

Figure #7: Veteran Mentors' Gender

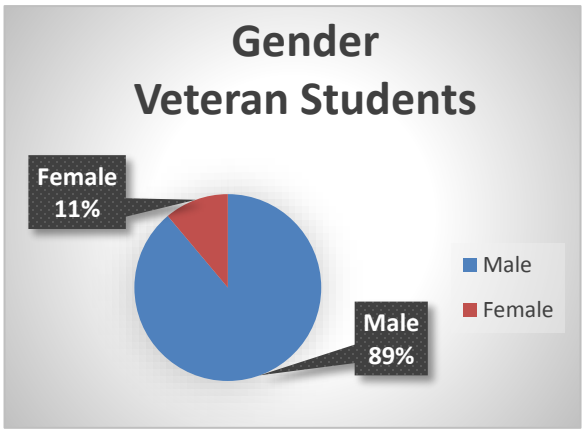

Figure #8: Veteran Students' Gender

The students were asked additional questions on their intake survey in order to assess their motivations, barriers and problems for comparison with those identified the IVMF and RAND surveys. Table #5 contains the results of that assessment.

Study Data vs. National Data in Rank Order			
	Issues	**National Average**	**Study Averages**
	Career/Job Improvements	1	4
	Self-improvement	2	3
Concerns	Potential for increased salary	3	2
	Professional advancement	4	5
	To use earned VA benefits	5	1
	Financial resources	1	3
	Personal/family obligations	2	4
Barriers	GI bill benefits expired	3	2
	Health/disability issues	4	1
	School/job conflict	5	5
	Age difference with student peers	1	4
	Financial resources	2	3
Problems	Working full time	3	2
	Family responsibilities	4	1
	Few veteran resources on campus	5	5

Table 5: Study Data vs. National Data in rank order

DISCUSSION

From the outset of the mentor and student recruiting effort, the intention of the authors was never to set up a system where the number of mentors matched the number of students. The goal was simply to provide a pool of faculty mentors with varied engineering and IT degrees along with staff mentors located in academic departments where veteran students were studying. The authors provided each student with a summary listing of the mentors and their characteristic data thinking that the students would want to seek out and establish their own personal relationships with mentors based on points of commonality. Our initial assumption was that the students had developed and internalized a sense of self-sufficiency during their military service that their academic peers did not possess.

Recruitment of mentors and students was relatively effortless. As mentioned earlier, every veteran who was contacted volunteered after hearing of the project and its goal of improving the graduation rate for veterans in CEIT. Similarly every student who asked for more information about the project volunteered to participate. The authors are not able though to accurately assess yet what percentage of the veteran student population in CEIT has joined the STEM-Mentorship program.

The initial student cohort contained sophomores, juniors, seniors and graduate students. Data from the classes entering in 2008-2011 indicates that 22% of veterans are leaving school sometime between their 1st and 3rd year of studies. The veteran students participating in the study are not primarily 1st thru 3rd year students. To remedy this shortcoming, one of the authors, a retired Army combat engineer with 26 years of service, will start teaching a section of the university's required First Year Experience (FYE) course in the Fall 2017 semester. Each FYE section has a theme to attract students with an interest in that subject. The theme of the FYE section designed to attract veterans pursuing engineering and IT degrees in CEIT will be "An Introduction to Engineering and IT Through a Combat Veteran's Eyes." Capturing 1st year students in the program appears crucial to their retention into their junior year and ultimate graduation.

A review of Figures #1 - #8 reveals the mentors and students matchup well in terms of gender and branch of military service distribution. In terms of years of military service and age though, the distributions are quite skewed. Over half of the students are under the age of 30 while just 30% of the mentors are under the age of 40. In terms of the length of military service, virtually all of the students (90%) served less than 10 years while about half of the mentors fell into that category. Despite the age or length of service differences, none of the students raised them as concerns in any of their interviews or surveys.

Throughout the semester, the authors maintained contact with the student cohort through various methods. A closed Facebook group was established and 15 of the 20 mentors and students became members. Social media proved to be a far more effective means of communicating information

than email. Through Facebook, the authors were able to quickly introduce new members to the group, encourage cross-talk among students and assess interaction.

During the semester, individual meetings were conducted with each veteran student to check on their academic progress and assess their level of perceived stress using Cohen's PSS. Table 6 contains the results of the single PSS conducted at the mid-point of the study's first semester. Table 7 defines the levels of perceived stress based on the average $\sigma \pm \sigma_{\bar{x}}$ with a scoring range of 0-40. Seven of the student scores were below the sample average score of 19.

LEVEL	RANGE
AVG	19
RANGE	16-25
STD DEV	2.83

Table 6: PSS Results

LEVEL	RANGE	#
LOW	<16	0
MEDIUM	16-22	9
HIGH	>22	1

Table 7: Levels of Perceived Stress

At the end of the first semester, each student completed an exit survey to informally gage satisfaction with the direction of the study and its execution. Data from the exit surveys was uniformly positive. All students and mentors asked to stay engaged in the program and contribute to its growth. Of great interest too was the uniform request for more directed interaction between the students and mentors. As a result, in the second semester (Spring 2017), two monthly meetings were added to the study. The first is a general meeting, conducted mid-day in a "bag lunch" format, during which everyone has an opportunity to connect and offer up subjects for discussion. The second is a scheduled meeting between individual mentors and students. Using the characteristic data collected in the intake surveys, two meetings will be coordinated amongst the mentors and students in future semesters until the students have met with every mentor.

To better assess changes in levels of perceived stress among the students, the PSS will be conducted at the start, mid-point and end of each semester starting in the Spring 2017 term. Data from the PSS is generally considered valid for 6-8 weeks after collection so this evaluation frequency should adequately cover the university's 15 week-long academic terms.

Of the initial cohort of 10 mentors and 10 students, two mentors relocated for professional reasons and two students graduated with their degrees at the end of the first semester. Prior to the start of the second semester, two new mentors (both Air Force veterans) and one new student (Marine, sophomore) had already joined the study. Recruitment of additional students and mentors is continuous.

AREAS FOR FUTURE RESEARCH

Proper assessment of veteran student motivation for participating in the study remains to be completed. Use of validated Intrinsic Motivation Inventory (IMI) surveys or Self-Regulation Questionnaires (SRQ) appear to have potential for incorporation into this study.

CONCLUSION

Veteran students feel having access to a veteran mentor network will be beneficial. Social support theory and academic pedagogy offer a means of structuring a mentorship program to improve student resilience. Measurement of perceived stress provides a measure of effectiveness in mitigating stress affecting students and their academic performance. A combination of positive, strong relationships among veteran student peers within the context of a well-defined mentorship program appears to have the potential for improving year-to-year retention rates and ultimately graduation rates for veteran students.

REFERENCES

(1) Cohen, Sheldon, Lynn Underwood, and Benjamin Gottlieb*, "Social Support Measurement and Intervention: A guide for health and social scientists*." New York: Oxford University Press, 2000.

(2) Cohen, Sheldon, Tom Kamarck and Robin Mermelstein. *"A Global Measure of Perceived Stress"*, Journal of Health and Social Behavior, 24, pp 385-396. 1983.

(3) Department of Veterans Affairs, *"2015 Veteran Economic Opportunity Report*," Washington D.C., www.benefits.va.gov/benefits/docs/VeteranEconomicOpportunityReport2015.PDF

(4) Landry, Keith and Mike Jackson, "A STEM-Mentorship Program to Improve Veteran Student Efficacy @ Georgia Southern University → Year 0", ASEE National Conference, New Orleans, LA, June 2016.

(5) Packard, Becky Wai-Ling. "*Successful STEM Mentoring Initiatives for Underrepresented Students: A Research-Based Guide for Faculty and Administrators*," Sterling, Virginia, Stylus Publishing LLC, 2016.

(6) Poe, Mary, *"Military Data of First-time Freshman for the Department of Civil Engineering and Construction Management 2000-2015."* Georgia Southern University, Office of Strategic Research and Analysis, 2016.

(7) Zoli, Corri, Rosalinda Maury and Daniel Fay, *"Missing Perspectives: Servicemembers' Transition from Service to Civilian Life – Data Driven Research to Enact the Promise of the Post 9/11 GI Bill (Institute for Veterans & Military Families),"* Syracuse University: Institute for Veterans and Military Families, 2015