Military and Veteran Student Achievement in Postsecondary Education: A Structural Equation Model Using the Community College Survey of Men (CCSM)

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Military and veteran students have existed in significant numbers in higher education since the end of World War II. The introduction of the Serviceman's Readjustment Act of 1944, more commonly known as the GI Bill, increased veteran enrollment in U.S. colleges to 49% by 1947 (Lang & Powers, 2011). Just as college campuses faced an influx of student veterans after the war, community college campuses are today experiencing a new wave of increases in military and veteran enrollment from returning Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans. Similar to veterans from previous eras, the current generation of veterans is seeking to utilize the new and improved Post-9/11 GI Bill to attain postsecondary degrees (Randall, 2012). In some college campuses surveyed, enrollment of military and veteran students have increased by up to 500% since 2009 with an estimated $36 billion in Post-9/11 GI Bill entitlement benefits as of 2013 (Lang, Harriett, & Cadet, 2013). Military service members and veterans often begin their journey into higher education at community colleges. While 43% of postsecondary student veterans are enrolled in community colleges (Radford, 2011), 84% of this student population begins postsecondary education enrolled in two-year institutions (Kim & Cole, 2013). Thus, community colleges serve as a critical component of the postsecondary pipeline for student veterans.

Methods to ease transition and ensure academic success for military veterans will continue to engage community college faculty and administrators. A need for specialized services and programs targeting the military and student veteran population will continue based on current military operations (Ackerman, DiRamio, & Mitchell, 2009). Previous research indicates that student veterans often share the risk factors related to other adult learners such as full-time employment, part-time enrollment, delayed entry, and dependents (Wheeler, 2012), in addition to psychological feelings of isolation, disconnectedness, and discomfort in academic settings (Persky & Oliver, 2010). Regardless of the challenges presented to veterans transitioning from a military to civilian lifestyle (and into postsecondary education), student veterans exhibit several positive traits that are conducive to achievement in academic programs. Military and veteran students are generally described as emotionally mature, mission-oriented (focused), and experienced leaders who set the example in both college and workplace settings (Lighthall, 2012). Additionally, student veterans are typically older and often rate their own leadership abilities above those of nonmilitary student peers (Lang & Powers, 2011). Presently, few quantitative studies exist on veteran success in postsecondary education, and existing qualitative research has also not accurately identified factors related to veteran achievement or pathways to success in postsecondary education (Olsen, Badger, & McCuddy, 2014).

The Community College Survey of Men (CCSM) evaluates predictors of student success for underrepresented and underserved men in community colleges and was originally designed to assist in improving programming and service-delivery for male students (Wood and Harris, 2013). Recent validation efforts also confirmed the CCSM as an assessment tool for addressing the needs of veteran men in community colleges through developing and improving programs that facilitate transition and success in civilian college settings (De La Garza, Wood, & Harris, 2015). To further advance understanding of student veterans in postsecondary education, a structural equation model is introduced to test and explain achievement trajectories for this diverse group of students.

Methods

Structural equation modeling is a technique used to depict statistical procedures which include factor analysis, path analysis, and multiple regressions, to visually portray, test, and quantify relationships between variables, factors, and ultimate endogenous variables (Hox & Bechger, 1998; Kline, 2005; Lei & Wu, 2007). Building on previous validations of

the CCSM (Wood & Harris, 2013), including a factor and item reliability analysis of veteran respondent answers to the survey (De La Garza et al., 2015), a conceptual model was constructed and is presented in Figure 1. The model depicts military and veteran student success in postsecondary education using four key variables from the CCSM and five latent variables formed from the previous factor analysis.

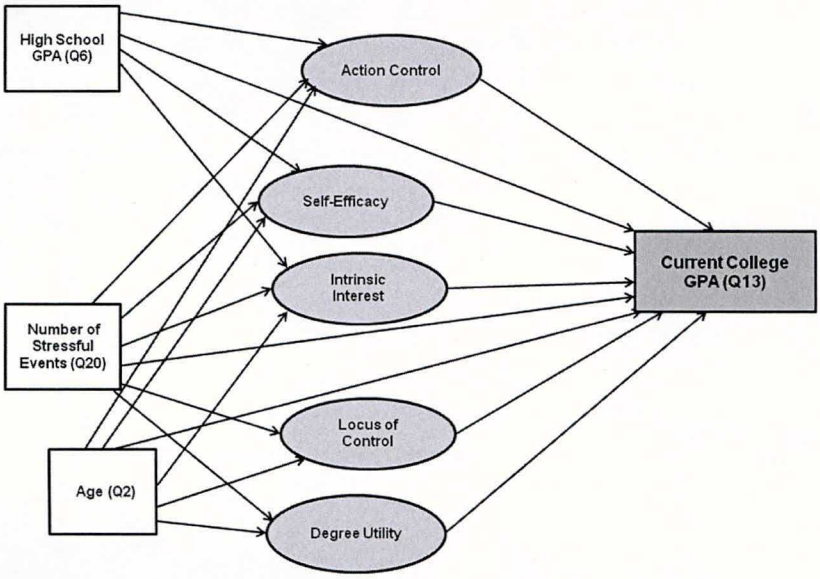

Figure 1. Initial Structural Equation Model for CCSM Veteran Respondents

The sample for this analysis was limited to CCSM respondents identifying themselves as active duty military or veterans of one of the four uniformed military services (Army, Navy, Air Force, or Marines). The final sample consisted of 391 military and veteran men from 17 community colleges. The instrument was randomly distributed to men attending these institutions. This analysis focuses solely on the noncognitive intrapersonal items in the instrument that are presented to participants on a six-point Likert scale of agreement. Overall model fit will be determined by calculating and analyzing noncausal scores using the following ranges: below .06 = Excellent Fit; .06 - .10 = Moderate Fit; and above .10 = Weak Fit.

The four key variables used in the model were: age (Q2), high school GPA (Q6), total credits or units earned (Q12), and number of stressful events (Q20) experienced by the respondent in the past year. Existing literature related to the variables of age and high school GPA indicates that military and veteran students are generally older and have lower high school GPAs than nonmilitary community college students (Lang and

Powers, 2011; Pryor, Hurtado, DeAngelo, Blake, & Tran, 2010). Both age and high school GPA were, therefore, included as variables in the model. Number of stressful events was employed as a variable in the model since military veterans reportedly consider and react differently to stressful events than their nonmilitary peers (Aldwin, Levenson, & Spiro III, 1994). Examples of stressful life events for military and veteran students can include the death of a colleague in combat, experiencing and surviving single or multiple combat engagements, witnessing and having colleagues wounded in combat, and actually being wounded themselves. While there are significant psychological effects from combat exposure, some combat veterans have reported that the stressful events involved with combat duty actually made them stronger and better able to endure hardship and challenging life transitions, including becoming a college student (Ackerman et al., 2009). The total credits earned variable was also entered into the model to differentiate military and veteran student success at various stages in their academic programs.

The five factors presented in the model are labeled action control, self-efficacy, intrinsic interest, locus of control, and degree utility. See Table 1. Each factor was derived from the aforementioned factor analysis of CCSM veterans with the factors previously defined as: 1) Action control (α = .92) – The directed attention students place on academic matters; 2) Self-efficacy (α = .90) – Students' confidence and the perceived ability to complete academic coursework successfully; 3) Intrinsic interest (α = .87) – Students' authentic personal interests and enjoyment in learning academic subject matter; 4) Locus of control (α = .89) – Students' feeling of control over their academic future; and 5) Degree utility (α = .86) – Students' perceptions of the usefulness or worthiness of their collegiate endeavors (De La Garza et al., 2015). Previous literature related to men of color identified these five constructs as reliable determinants of student success in postsecondary education (Harris and Wood, 2014; Mason, 1998). With the De La Garza, et al. (2015) validation of the instrument for community college military and veteran students, each of the five factors was incorporated into the structural equation model along with the four key variables from the CCSM survey to test their fit as predictors of college GPA.

Findings

Each of the model's six endogenous variables required regressions, outlined in Table 2, with the initial results depicted in the intermediate model displayed in Figure 2. The stepwise regression method was employed

Table 1. Community College Survey of Men Varimax Rotation Factor Loading Matrix for Community College Student Veterans

Rotated Factor Matrix[a]

	Factor				
	Action Control	Self-Efficacy	Intrinsic Interest	Locus of Control	Degree Utility
I put forth my best effort in school.	.913	-	-	-	-
I work as hard as I can to earn good grades in all my classes.	.885	-	-	-	-
I am driven to be successful in school.	.789	-	-	-	-
I am completely focused on school.	.634	-	-	-	-
I am confident in my academic abilities.	-	.796	-	-	-
I can master the material in my courses.	-	.784	-	-	-
I can understand difficult concepts.	-	.776	-	-	-
I have the ability to excel in my coursework.	-	.669	-	.401	-
What I learn in class is interesting.	-	-	.843	-	-
I enjoy learning from my classes.	-	-	.810	-	-
I want to learn as much as I can in school.	-	-	.650	-	-
I get totally absorbed in my coursework.	-	-	.594	-	-
The time I spend in school will help me achieve my personal goals.	-	-	.428	-	.420
I have full control over my own academic success.	-	-	-	.885	-
My academic success is in my own hands.	-	-	-	.848	-
I have the power to get good grades when I want to.	-	-	-	.677	-
If I study hard enough, I'll get good grades.	-	-	-	.459	-
Attending college will create a better life for me and my family.	-	-	-	-	.882
Attending college will increase my job opportunities.	-	-	-	-	.809
Attending college will provide me with financial security.	-	-	-	-	.701

using nine variables (four key variables and five factor constructs) related to veteran postsecondary success with a probability to enter of .05 and an exit of .10. The first regression used the ultimate endogenous variable, college GPA, as the dependent variable and the following five regressions used each of the previously identified factor constructs for dependent variables. Note that in the first regression, four of the five factor constructs and two of the four key variables entered the equation ($R = .429$, $R^2 = .184$, Sig F = .04) accounting for 18.4% of the variance in college GPA. Inspection of the Sig t results confirmed that each of these six variables were significant predictors of college GPA while inspection of the Betas revealed that high school GPA ($\beta = .267$, Sig $t < .01$) was the overall strongest predictor and self-efficacy ($\beta = .163$, Sig $t < .01$) was the second strongest. Locus of control ($\beta = -.017$, Sig t = .76) possessed no direct or indirect linkages with college GPA and was, therefore, removed from the final model and not retained in subsequent analyses.

Figure 3 presents the final model to include error vectors for each regression and the top three factor loadings presented for each of the remaining four factors. Examination of the error vectors in the model indicated a moderate prediction for college GPA (e = .90). The top three factor loadings for each of the four remaining factors in the model corresponds to the CCSM question related to the loading (e.g., .913, Q19-3). Factor loadings presented in this model are derived from the previously mentioned factor analysis from De La Garza, et al. (2015). The factor with the strongest link (second overall) to college GPA is self-efficacy which represents student confidence and the perceived ability to complete academic coursework successfully. The top three factor loadings for

Table 2. Regressions for CCSM Veteran Structural Equation Model

Dependent Variables	Independent Variables
College GPA (Q13)	Factors 1-5, Age (Q2), H.S. GPA (Q6), Total Credits (Q12), Number of Stressful Events (Q20)
Action Control Factor (F1)	Age, H.S. GPA, Total Credits Earned, Number of Stressful Events
Self-Efficacy Factor (F2)	Age, H.S. GPA, Total Credits Earned, Number of Stressful Events
Intrinsic Interest Factor (F3)	Age, H.S. GPA, Total Credits Earned, Number of Stressful Events
Locus of Control Factor (F4)	Age, H.S. GPA, Total Credits Earned, Number of Stressful Events
Degree Utility Factor (F5)	Age, H.S. GPA, Total Credits Earned, Number of Stressful Events

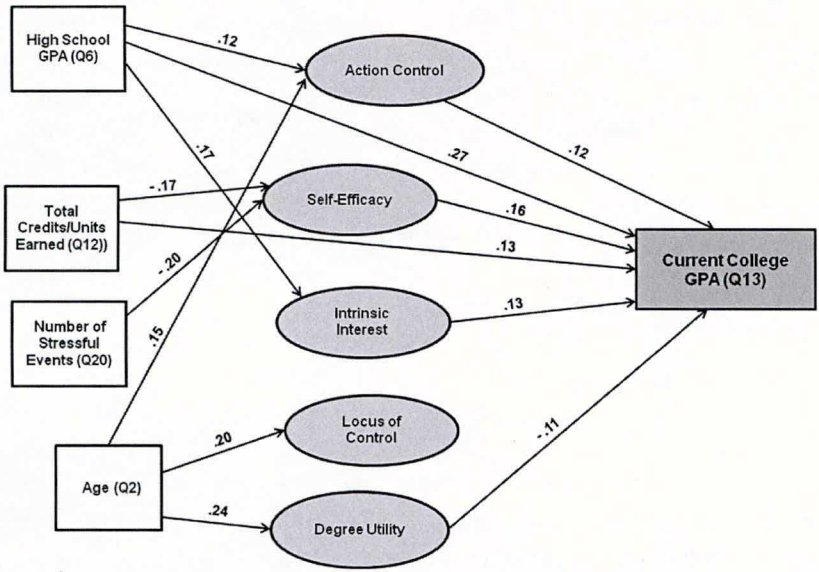

Figure 2. Intermediate Structural Equation Model for CCSM Veteran Respondents

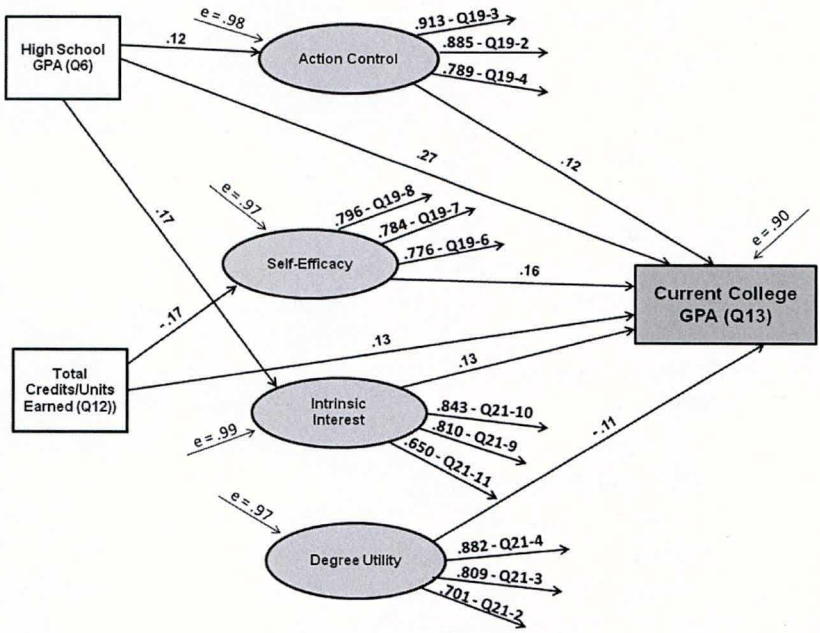

Figure 3. Final Structural Equation Model for CCSM Veteran Respondents

self-efficacy were: 1) **.796**, Q19-8 – I am confident in my academic ability; 2) **.784**, Q19-7 – I can master the materials in my courses; and 3) **.776**, Q19-6 – I can understand difficult concepts. The second strongest factor in the model was intrinsic interest (β = .125, Sig t = .03) which portrays students' authentic personal interests and enjoyment in learning academic subject matters. The top three factor loadings for intrinsic interest were: 1) **.843**, Q21-10 – What I learn in class is interesting; 2) **.810**, Q21-9 – I enjoy learning from my classes; and 3) **.650**, Q21-11 – I want to learn as much as I can in school. Action control (β = .115, Sig t = .04) ranks as the third strongest factor (fifth overall) and depicts students' directed attention (focus/effort) placed on academic matters. The top three factor loadings for action control are: 1) **.913**, Q19-3 – I put forth my best effort in school; 2) **.885**, Q19-2 – I work as hard as I can to earn good grades in all my classes; 3) **.789**, Q19-4 – I am driven to be successful in school. The final remaining factor was degree utility (β = -.112, Sig t = .04) which encompasses students' perceptions regarding the usefulness or worthiness of their collegiate endeavors. The top three factor loadings for degree utility were: 1) **.882**, Q21-4 – Attending college will create a better life for me and my family; 2) **.809**, Q21-3 – Attending college will increase my job opportunities; and 3) **.701**, Q21-2 – Attending college will provide me with financial security.

Table 3 presents the decomposition of bivariate covariation for the structural equation model and depicts the direct, indirect, total causal, and noncausal effects of each variable and factor on the ultimate endogenous variable, college GPA. Examination of the noncausal scores indicated an overall excellent model fit with five of the six remaining variables with noncausal ratings below .06, and intrinsic interest slightly above at .068. Note that high school GPA had the strongest direct effect and total causal effect on college GPA. This finding corresponds with existing literature which identifies high school GPA as one of the most significant determinants of postsecondary success (Hagedorn, Maxwell, & Hampton, 2001). Total credits earned (β = .134, Sig t = .02) was the only other single variable in the model with a direct link to college GPA. This variable, however, negatively impacted self-efficacy in the third regression (β = .165, Sig t < .01) and, therefore, ranked as the fifth strongest influence within the model. Age indirectly affected college GPA through both the action control and degree utility factors, but its overall effect was minimal compared with those variables and factors with direct effects. Number of stressful events also indirectly affected college GPA, but only through self-efficacy, which runs contrary to assertions that stressful events also affect action control and locus of control for community college males

(Harris III & Wood, 2013). Both age and number of stressful events were removed from the final structural equation model since there were no direct effects on the ultimate endogenous variable and the indirect effects did not significantly influence the outcome of the regressions they were involved in (See Figure 3).

Table 3. Decomposition of Bivariate Covariation for CCSM Veteran Respondents

	CC GPA/ AC	CC GPA/SE	CC GPA/II	CC GPA/ DU	CC GPA/ Age	CC GPA/HS GPA	CC GPA/ Credits	CC GPA/ Stress
Original Causal	.157	.152	.198	–.111	.002	.313	.157	–.089
Direct	.12	.16	.13	–.11	0	.27	.13	0
Indirect	0	0	0	0	.044	.014	–.027	–.032
Total Causal	.12	.16	.13	–.11	.044	.284	.103	–.032
Noncausal	.037	.008	.068	.001	.042	.029	.054	.057

Discussion and Implications

This study created a structural equation model analyzing the relationships between five previously identified factor constructs for CCSM military and veteran respondents (De La Garza et al., 2015) along with four additional CCSM variables for assessment as predictors of success in postsecondary education. The model confirmed that four of the five noncognitive factors and two of the four key variables employed in the model had direct and significant effects on college GPA which provides several key implications for community college administrators and faculty.

While each of the four constructs—action control, self-efficacy, intrinsic interest, and degree utility—plays a role in determining academic success for veterans in postsecondary education, self-efficacy in particular has a strong effect on college GPA. Wheeler (2012) affirms that developing self-efficacy skills is vital to successful transition from military to civilian and college settings. As such, efforts by college administrators should focus on building confidence in academic ability in military and veteran students, especially since many of these students may have been away from academic settings for several years compared with nonmilitary peers.

Veteran Affairs offices on campus should consider designing and using counseling-based interventions to communicate to student veterans that they possess the ability to complete studies based on the strength of character required, gained, and instilled through military service. These interventions should have formal and informal components with the

formal occurring during periodic scheduled meetings between student veterans and their academic counselors in a one-on-one setting. Here, the counselor can outline and articulate the student's strengths and formulate a plan that maximizes those strengths. The informal component can occur at student veteran social events and receptions where recent veteran graduates and alumni can interact with military and veteran students in both group and individual settings. At these events veteran graduates and alumni can best convey how they were able to complete their studies, suggest strategies for those seeking to finish, and help build confidence for any students in doubt.

Additionally, while student age and number of stressful events are discussed throughout academic literature concerning veterans and postsecondary education, neither played a significant role relating to academic success in this model. This does not suggest that age and stressful events should be overlooked by community college administrators. However, the findings do suggest that high school GPA, self-efficacy, intrinsic interest, and the other remaining elements in the model are more reliable indicators of postsecondary success. The significance of the intrinsic interest construct in the model is important considering the sometimes challenging transition from military service to college. The construct also highlights the importance of having academic counselors engage military and veteran students with diagnostic activities that identify their areas of interest and place them in academic programs aligned with those interests. Addressing issues related to intrinsic interest might also have positive effects on the other constructs in the model, in particular degree utility and action control. Degree utility had a negative effect on college GPA in the model, but improvements in student veteran intrinsic interest might actually reverse this trend into a positive effect. Future scholarly research should explore the interrelationships between each of the five noncognitive outcomes to determine how each construct interacts with one another and positively or negatively impacts military and veteran student achievement.

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