

Traditional Student Perceptions of Military Veterans Pursuing a Degree in Engineering

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Classroom dynamics between students can impact downstream Engineering enrollments and retention for Student Veterans and Service Members (SVSMs), in particular. SVSM interactions with traditional undergraduate engineering students are an overlooked area of student veteran pedagogical research, with prior focus emphasizing faculty, staff, and advisors as key interaction pathways that support SVSM enrollment and retention in STEM and Engineering. Despite bringing valuable assets from their service, such as technical expertise, maturity, leadership, teamwork, and discipline, Student Veterans and Service Members (SVSMs) often confront socially ingrained narratives and stereotypes. SVSMs experience biases and perceptions from a variety of sources to include fellow students, staff and faculty, employers, and even pop culture. Some of these perceptions may generalize student veterans positively, while some may portray them negatively without the ill-intent. Other student perceptions and interactions can impact SVSM learning outcomes and their classroom experience. Although federal protections against discrimination provided through the Uniformed Services Employment and Reemployment Rights Act of 1994 (USERRA) and the Vietnam Era Veterans' Readjustment Assistance Act (VEVRAA) exist, SVSMs continue to face typecasts and bias in both campus and employment contexts. The national priority for workforce development and technical expertise will result in SVSM presence in the physical and virtual engineering education campuses. Going forward, it is crucial to further integrate SVSMs in engineering classrooms because enrollment data suggests that variability in SVSM classroom presence is cyclical and tied to average contract lengths rather than strictly dependent on peace-keeping efforts or conflict events.

This paper is part of a larger study of perceptions of and impact on SVSMs in engineering programs. Specifically, this investigation focuses on traditional student perceptions of engineering student veterans in higher education. Through the quantitative survey instrument described here and administered across many courses at a R1 land grant institution, we show existing stereotypes and perceptions retained by other students and perception differences from first year students who started high school before and those after the US withdrawal of the last major conflict in 2021. Questions from this survey sought the level of agreement or disagreement regarding several known veteran stereotypes. Preliminary results from the analyses indicate that these biases or perceptions are active in non-veteran student populations.

Keywords: Student veteran stereotypes; Engineering classroom climate; Peer perceptions in STEM education; Military-to-civilian educational transition.

Introduction

The average time in service for enlisted U.S. military service members is less than seven years [1]. Very few service members remain in the military for their entire working careers, so the majority must transition into the civilian workforce. Today, many enlisted service members purposefully choose limited-term service contracts with the intention of using military education

benefits (i.e., GI Bill) to improve their civilian job opportunities and social mobility. SVSM populations on campus have historically followed the rhythm of military conflict and drawdowns, and universities have seen some of the highest SVSM enrollments as a consequence of the Post 9/11 GI Bill and the student veterans' desire to obtain their educational goals.

Much of the previous literature on student veteran higher education experiences typically views student veterans as outsiders adapting to a new environment. McDonagh in a 1947 study adopted an impoverishment methodology to contextualize student veteran deficits and challenges in the classroom [2]. This research position was not ill intended, as it is empirically easier to focus on the absence of particular student actions or abilities than focus on student veteran educational and experiential talents. However, the result is continued research and studies that focus on identifying associated deficits and suggested interventions for student veterans [2-8]. In contrast, this study explores the classroom environment and cultural terrain student veterans experience when they enroll in engineering programs in higher education. There are numerous perceptions about veterans that stem from different sources. Some of the perceptions may lead to biases towards SVSMs, creating social barriers and obstacles for them.

Following on previous veteran perceptions-focused research that concentrated on student veterans and student peers in engineering [9], the current study represents an effort to better understand first year student perceptions of student veterans, and the degree to which they adhere to known stereotypes regarding veterans. There have been some recent advances to better understand some of the staff and faculty perceptions in general [10] and have led to further studies to gain insight into factors such as institution type [11], role and rank of faculty [12], proximity and personal knowledge of student veterans [13], and effectiveness of Green Zone training [14]. These recent studies acknowledge that misperceptions about student veterans can have negative consequences for student veterans and non-student veterans, alike. These studies did not investigate the extent that negative perceptions affect student veteran performance, persistence to degree, and self-efficacy. However, Louten did investigate how a sense of belonging is important to academic persistence in STEM and is a communal outcome that is acknowledged in many diversity, equity, and inclusion initiatives in higher education [15]. Currently, the team seeks to understand current perceptions of SVSMs through the traditional first year engineering student and the degree to which they adopt known veteran stereotypes.

This study was guided by three distinct research questions:

1. How do traditional first year students view SVSMs in general?
2. To what degree do traditional students have different perceptions of SVSMs?
3. Are there common themes or perceptions relevant to SVSMs?

Methods

Quantitative Methods

Targeting common myths and stereotypes of veterans, the survey instrument queried participants' degree of agreement or disagreement with the following statements with respect to veterans. For a systematic review and dispelling of these false stereotypes, the authors

summarized a meta-analysis [9]. As a point of emphasis, this paper focuses on the general first year engineering students' perceptions towards veterans and not veterans' perceptions or veterans' perceptions of other veterans.

Below is a table of questions (using a 5-point Likert Scale: 1-Strongly Disagree → 5-Strongly Agree) for participants summarizing some of the more common perceptions. For clarity, these myths or stereotypes are sourced from known veteran stereotypes of veterans [9] and do not reflect the authors' perspectives.

Table 1: Survey of General Perceptions of Veterans and Service Members

Question	Likert (1-5) Rating
1. Veterans are more likely than civilians to have Post Traumatic Stress Disorder (PTSD).	
2. Military personnel are likely to have had high level security clearance / access.	
3. Veterans are more likely than civilians to use profanity.	
4. Veterans are more likely than civilians to have right-wing political views.	
5. Veterans are more likely than civilians to not value higher education.	
6. Military culture waters down ('dumbs down') information and training for their personnel.	
7. Military culture uses more acronyms than corporate / industry organizations.	
8. What are some other things you associate with veterans and /or military culture?	Free Text (non Likert)

The survey was administered during First Year Seminars in Spring 2025 (Sp25) and in Fall 2025 (Fa25) at The Pennsylvania State University's University Park campus. One control group of upper-class students (second year through fourth year) was used to determine any difference in perceptions from first year students. The upper-class control group's sample size was 19, and the first-year sample size was 63 for Sp25 and 119 for Fa25.

Natural Language Processing Methods

Qualitative responses were analyzed using a dictionary-based Natural Language Processing (NLP) approach to identify recurring thematic patterns across respondents. An *a priori* theme dictionary was developed through an iterative process combining inductive review of the response corpus and theory-informed constructs drawn from the literature on military identity, stereotyping, and student veteran experiences in higher education. Each theme was operationalized as a set of keywords and phrases, and responses were coded with the maximum number of applicable labels, allowing a single response to reference multiple themes. Theme prevalence was calculated as the proportion of respondents whose qualitative responses contained at least one term associated with a given theme. In addition, pairwise co-occurrence analysis was conducted to examine patterns in how themes were jointly expressed within

individual responses. This approach captures surface-level semantic cues indicative of dominant framing patterns while preserving transparency and reproducibility.

From a cognitive linguistic perspective, language serves as a mechanism of cognitive offloading and conceptual organization. Recurrent lexical patterns in open-ended responses therefore reflect underlying mental models rather than incidental word choice. The dictionary-based NLP approach employed here leverages this property to identify dominant framings and archetypes through which respondents conceptualize SVSMs.

Results and Analysis

Quantitative Results

Figure 1 depicts several differences and some similarities between the group averages. Sp25 FY represents the first-year engineering students in the spring 2025 term; Fa25 FY represents the first-year engineering students in the fall 2025 term; and Fa25 UC represents the Fa25 upper level (second year through fourth year) engineering students in one section of a course. The questions were summarized for brevity in the chart but correspond to the questions in Table 1.

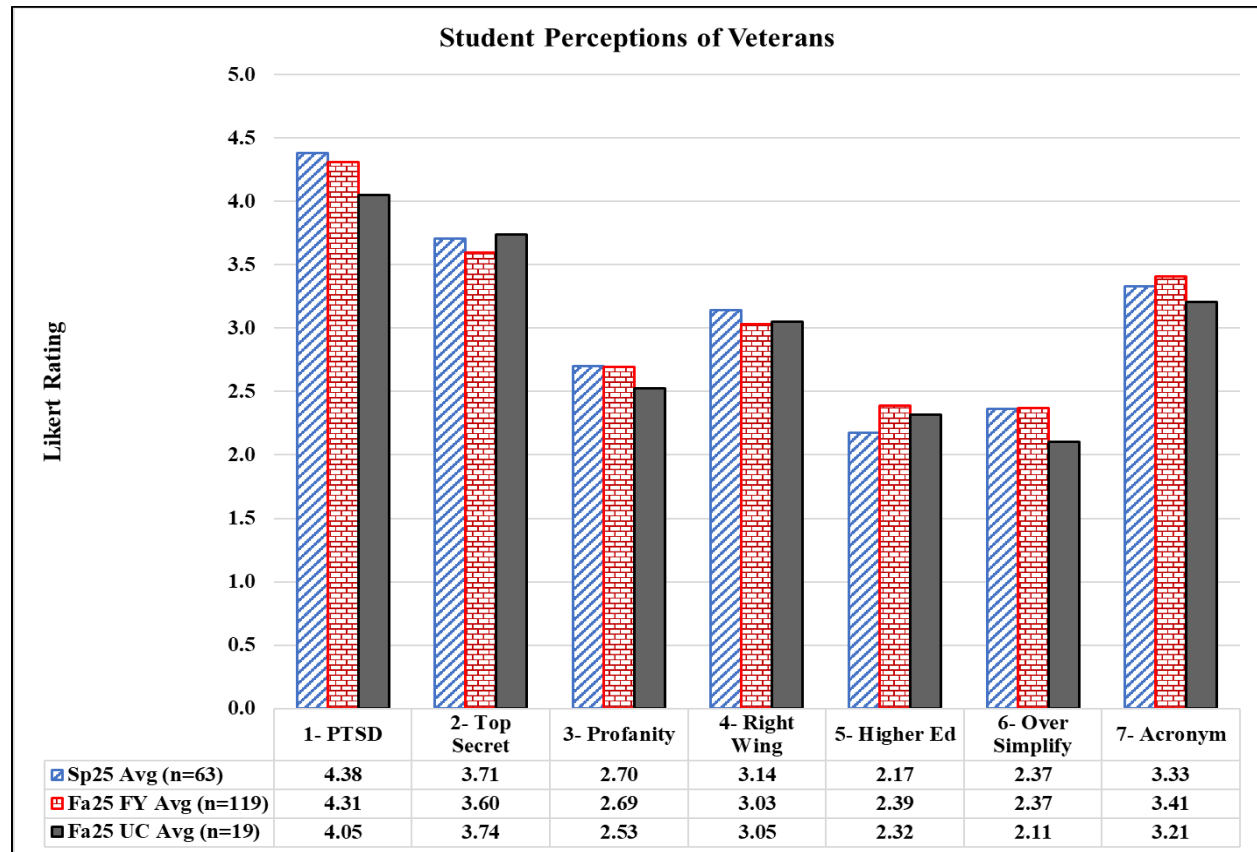


Figure 1: Survey results (Questions 1-7)

Table 2 shows the averages displayed in Figure 1 with the corresponding standard deviations for each question and group.

Table 2: Group averages and standard deviations

	1- PTSD	2- Top Secret	3- Profanity	4- Right Wing	5- Higher Ed	6- Over Simplify	7- Acronym
Sp25 Avg (n=63)	4.38	3.71	2.70	3.14	2.17	2.37	3.33
Sp25 SD	0.65	0.90	0.86	0.79	0.77	0.88	0.84
Fa25 FY Avg (n=119)	4.31	3.60	2.69	3.03	2.39	2.37	3.41
Fa25 FY SD	0.65	0.83	0.89	0.74	0.84	0.97	0.96
Fa25 UC Avg (n=19)	4.05	3.74	2.53	3.05	2.32	2.11	3.21
Fa25 UC SD	0.394	0.784	0.881	0.887	0.921	0.788	0.832

Discussion of similarities and differences follows in the succeeding subsections.

PTSD. The newest cohort of students (Fa25 FY) had the strongest agreement that veterans were more likely than civilians to have PTSD. The SP25 first year students had a slightly lower agreement score but were very close to this group. The lowest agreement group was the upper-class group with the SP25 first year students. Overall, there was consensus and concurrence of this perception. No statistical correlation tests were conducted for statistical significance, but the differences between first year and upper-class students were noticeable.

Top Secret Clearances. Survey participants tended to slightly agree overall that veterans had high level security clearances. The upper-class students and the newest students (Fa25 FY) tended to agree about the same while the Sp25 FY students had a slightly lower level of agreement about this perception.

Profanity. Overall, the students tended to slightly disagree that veterans tended to use profanity more than their civilian counterparts. The variation in the ratings was minor.

Right Wing Political Views. All three groups were neutral on this perception with very slight differences in averages.

Valuing Higher Education. This perception garnered one of the lowest disagreements of all the questions. The newest cohort (Fa25 FY) disagreed the most with the idea that veterans are more likely than civilians to not value higher education.' The Sp25 FY and the upper-level student groups tended to disagree as well but to a lesser extent.

Oversimplifying / Dumbing Down. Similarly, the perception that 'military culture waters or dumbs down information and training for their personnel' received nearly the same disagreement. However, it was the upper-level student group that disagreed the most, while the two first year groups (Sp25 and Fa25) disagreed about the same.

Acronym Usage. The idea that the military ‘has its own language and is full of acronyms’ received a very slight agreement overall. The upper-level students were the closest to neutral on this perception. The two first year groups agreed with this more.

Other Associations with Veterans. The free text question to ask ‘what other associations do people have about the military’ revealed a variety of answers. Some interesting short anecdotes are included here:

- “strict schedules, strong traditions / courtesies”
- “strong, short tempered, unemotional”
- “homelessness”
- “extremely strict, not fun, limited time with family”

Qualitative Responses

Using a Natural Language Processing approach to analyze patterns in the qualitative responses, an initial inductive category framing surfaced from the 201-record dataset, of which 135 contained qualitative commentary on SVSMs. The following list of themes provides the structured tagging of entries.

Positive trait

- (1) **Discipline / structure.** (discipline, organized, strict, obedient, neatness)
- (2) **Bravery / honor / sacrifice.** (bravery, honor, valor, sacrifice, duty, service)
- (3) **Patriotism / nationalism.** (patriotism, national pride, protectors of country, flag/freedom)
- (4) **Toughness / grit / stoicism.** (tough, grit, fearless, strong, unemotional/stoic)
- (5) **Teamwork / brotherhood / community.** (teamwork, brotherhood, unit, others-first, community)
- (6) **Respect / admiration.** (respect, well-deserved, good people)
- (7) **Loyalty / commitment / dedication.** (loyal, commitment, dedication)
- (8) **Experience / maturity / professionalism** (experience, mature, professional)

Neutral trait

- (9) **Training / bootcamp / war-combat.** (boot camp, training, war, combat, military culture)
- (10) **Hierarchy / authority.** (rank, chain of command, higher authority/command)
- (11) **Political identity & symbols.** (“don’t tread on me,” Trump/MAGA, black American flag, hunting/fishing)
- (12) **Benefits / resources / GI Bill / discounts.** (GI Bill, benefits, resources, discounts, “free college”)
- (13) **Law enforcement / security pathway.** (police, law enforcement, security)

Negative trait

- (14) **Trauma / PTSD / mental health.** (PTSD, trauma, mental problems)
- (15) **Adjustment / civilian reintegration.** (difficulty adjusting to civilian life, transition/reintegration, job difficulty)

- (16) **Socioeconomic hardship / neglect.** (mistreated, left behind, poverty, homelessness)
- (17) **Temper / aggression.** (short-tempered, anger, aggression)
- (18) **Gendered perception.** (mostly men, male)

Table 3 shows the prevalence of top 15 themes across complete qualitative response records (n=135), demonstrating that despite selected persistent negative biases toward SVSMs, most respondents provided ‘positive’ counterbalancing qualitative commentary. Additionally, when multiple themes were mentioned, undergraduate students tended to signal a valorized veteran archetype, rather than an engineering peer. For example, for ~12% of respondents, the following idealized themes emerged together: (1) discipline / structure; (2) bravery; (3) toughness; (4) teamwork. These themes are not independent traits but rather form a recognizable archetype. Of note, negative or neutral traits do not co-occur! This indicates that respondents tend to compartmentalize positive archetypes and deficit / risk narratives as separate ideas rather than integrating them, even in the presence of stereotype agreement for the Likert items. Analytically, this suggests a preference for simplified mental models of what it means to be an SVSM, and an apparent avoidance of nuance.

Table 3: Prevalence of themes across 135 qualitative responses

Theme	# of Respondents	% of Respondents
Discipline/structure	31	23.0
Bravery/service/honor	25	18.5
Patriotism/Nationalism	19	14.1
Toughness/grit/stoicism	18	13.3
Training/bootcamp/war	12	8.9
Respect/admiration	11	8.1
Teamwork/brotherhood/community	7	5.2
Benefits/discounts/GI Bill/resources	7	5.2
Socioeconomic hardship/neglect	6	4.4
Loyalty/commitment	6	4.4
Trauma/PTSD/mental health	5	3.7
Political identity/symbols	5	3.7
Gendered perception	3	2.2
Adjustment/civilian reintegration	3	2.2

There were several main themes that emerged from the free text responses: (1) Discipline / structure; (2) Bravery / service / honor; and (3) Patriotism. The frequency with which these themes occur in the qualitative data accounts for 39% of all responses (n=135). No relationship was found to connect the presence of negative themes and the likelihood with affirming agreement with a particular bias about SVSMs, as shown in models (B) and (C) of Table 4. Contrary to expectations, qualitative positive-affect statements were not associated with either higher agreement or greater response extremity from mean scores on the SVSM stereotype-Likert items. This suggests that respondents’ narrative framing in the qualitative response is not compensatory but reflects an independent schema concept operating alongside attitude measures (C).

Table 4 shows a point-biserial correlation measure where each Likert item was computed to a sample mean, and each respondent's answer was calculated as the mean absolute deviation from the item mean, capturing how far that person is, on average, from the normal center of distribution. All qualitative responses were coded as a binary positive or negative effect. Table 4 shows that $r \approx 0.007$, effectively zero, indicating no linear relationship in either direction, with a $p \approx 0.92$

Table 4: Mixed methods binary correlations model comparisons

Correlation Relationship	r	p-value
(A) Positive affect $\times$ Distance from mean	0.007	0.92
(B) Positive affect $\times$ Any high agreement	~ 0.068	~ 0.34
(C) Positive affect $\times$ High-agreement count	~ 0.072	~ 0.31

Discussion

The authors conducted the survey over two semesters and noticed some small patterns. There were responses that indicated the students had relatives who served in the military (from the free text responses), and the same students sometimes used positive words in the free text responses such as patriotism, care, pride, etc. However, some of the other students' responses were less positive on the Likert scaled ratings of the perceptions. The last 40 students who responded to the survey were also asked where they learned the most about the military and were given four choices:

1. Media (news, tv shows, movies, etc.)
2. Family (maybe someone was or is in the military)
3. Friends
4. Other (identify the source)

There are several factors that may inform the differences in results. The first-year students who started in the fall 2025 term were younger and possibly less exposed to military culture than upper-level students. Second, the first-year students started high school in the fall of 2021 when U.S. military operations worldwide were noticeably reduced. There was less public exposure to the military with declining news coverage and current events.

Of the 40 students who were asked the source of their military knowledge 20 (50%) cited media which may be news or fictionalized on TV or a movie. Only 15 (37%) cited a family member, and only 3 (8%) answered a friend or peer. Just 2 (5%) answered with 'Other' and identified a teacher or the internet as the source.

The first-year engineering students appear to have a positive impression of veterans and service members overall. There were several neutral impressions or slight disagreements with some of the negative perceptions such as 'veterans not valuing higher education' or 'use of profanity'.

However, there were some perceptions that the student population agreed with and perpetuated the negative perceptions and stereotypes such as ‘likeliness of PTSD’. Because no relationship in either direction was found to correlate between positive qualitative responses and relatively high bias-agreement responses, the authors conclude that perceptions of SVSMs align with ‘Deficit-with-Respect’ framing, a schema that has been described in education theory as a kind of praise for resilience because a particular group is assumed to be lacking in a key area [16]. In other words, the respondents know it's "right" to respect/honor/admire SVSMs but still hold their underlying perceptions of SVSMs.

Implications and Suggestions

First, organizations should assess what training is available for staff, faculty, and students on the differences between traditional students and military-connected students. Organizations should assess if the training is current and adequate. One military ally training is ‘Green Zone Training’ typically for staff and faculty. Retooling Green Zone Training toward an asset-based model of Veteran skills and preparation is a next step. This modified Green Zone Training for traditional students should emphasize the positive aspects of military service members. Additionally, faculty, staff, advisers, and administrators should have a basic understanding of the military-connected population (veterans, National Guard, reserves, and active duty) to reinforce any student training programs.

Future Work

The authors acknowledge that there are opportunities to provide more resolution in each of the broad perceptions and themes to provide more insight. These preliminary findings suggest that traditional first year students have an overall positive perception of SVSMs. The extent this perception has on SVSM persistence and sense of belonging is still unknown. There is an opportunity to discover how institutional and social dynamics can enhance or inhibit SVSM academic success. Future work in this area will examine, revise, and validate the survey tool, expanding the overall response rate. These exploratory findings suggest there may be more correlations that can help the team develop interventions for students, faculty, staff, and administration as this project moves forward.

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