March 2024

Impact of Reasonable Accommodations on Disabled Student–Veteran Higher Educational Achievement

Michael A. Buoniconti
University of Massachusetts Amherst

Impact of Reasonable Accommodations on Disabled Student–Veteran Higher Educational Achievement

A Dissertation Presented

by

MICHAEL A. BUONICONTI

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

February 2024

College of Education

Impact of Reasonable Accommodations on Disabled Student–Veteran Higher Educational Achievement

A Dissertation Presented

by

MICHAEL A. BUONICONTI

Approved as to style and content by:

_____

Stephen G. Sireci, Chair

_____

Shane P. Hammond, Member

_____

Tassos C. Kyriakides, Member

_____

Shane P. Hammond, Associate Dean for Student Success

College of Education

DEDICATION

To my wife. I am so grateful for your love and support.

To my son. You have been my guiding light since you were born.

To my mother. I hope that this achievement makes you smile proudly.

To my fellow Veterans– past, present, and future. Thank you for your service to our great nation, particularly those of you who left or will leave the battlefield scarred for the remainder of your lives. With this dissertation, I hope to launch a career in research that will serve you as fervently as I did our nation while in uniform. I salute you.

ACKNOWLEDGMENTS

I thank my wife, my son, and my mother for their unconditional love and support. You inspired me to complete my PhD and seek new mountains to climb. I love you.

I thank my advisor, Dr. Stephen Sireci, for helping me complete my PhD program. His guidance and support were exactly what I needed when I needed it.

I thank Dr. Tassos Kyriakides for opening the field of research to me and enabling my access to the VA research world.

I thank Dr. Shane Hammond for his support, both administratively and as a member of my dissertation committee.

I thank Dr. Elani Streja for her facilitating my access VA data. Dr. Streja was extraordinarily responsive and generous with her time and programming expertise.

I thank Ms. Lori Parente for her patient and competent support throughout the VA Institutional Review Board/ Research & Development Committee process.

I thank Dr. Michael Wininger for sharing his statistical analysis expertise. Dr. Wininger's tutorials were very helpful as I worked through data analysis.

I thank my longtime friend, Mr. Joseph Eagleeye, for sharing his statistical analysis expertise. Mr. Eagleeye's observations of the data were very helpful.

I thank my longtime friend, Mr. Michael Kim, for his generous support during my transition from education operations to education research.

ABSTRACT

IMPACT OF REASONABLE ACCOMMODATIONS ON DISABLED STUDENT–VETERAN HIGHER EDUCATIONAL ACHIEVEMENT

FEBRUARY 2024

MICHAEL A. BUONICONTI

Ph.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by Professor Stephen G. Sireci

Objectives: The purpose of this study was (a) to investigate the degree to which reasonable accommodations affected the educational achievement (graduation and GPA) of U.S. Student–Veterans with military service–connected disabilities and (b) to categorize the accommodations according to impact (positive, mixed, none, and negative).

Research Design: Archival and survey data were used to investigate whether there was a relationship between U.S. Student-Veteran level of military service–connected disability, Student-Veteran utilization of reasonable accommodations support, and Student-Veteran higher educational achievement. Two variables (a) U.S. Student-Veteran military service–connected disability severity rating (both continuous and categorical) and (b) U.S. Student-Veteran utilization of reasonable accommodations were used to evaluate their relationship with U.S. Student-Veteran higher educational achievement.

Methodology: Study participant recruitment was carried out via email and included 425,083 U.S. Student–Veterans with (n = 1,020 Student–Veterans with military service–connected disabilities who received reasonable accommodations; n = 5,339 Student–

Veterans with military service–connected disabilities who did not receive reasonable accommodations).

Impact/Significance: This study could significantly impact the level of educational achievement of U.S. Student–Veterans with military service–connected disabilities attending college and graduate school. The study findings provide baseline data regarding U.S. Student–Veterans with military service–connected disabilities and their higher educational achievement. Specifically, the results could provide information regarding: (a) the percentage of U.S. Student–Veterans who inform their college or university about their military service–connected disability(ies), (b) the types of reasonable accommodations that have been provided to U.S. Student–Veterans with military service–connected disabilities, and (c) the impact these reasonable accommodations have had on the educational achievement of U.S. Student-Veterans with military service–connected disabilities. These baseline findings may become a foundation for best instructional practices for informing college and university educators about how to support U.S. Student–Veterans with military service–connected disabilities. This study might also serve as the basis for additional research into the higher educational achievement of U.S. Student–Veterans with military service–connected disabilities as well as other students with learning disabilities similar to those of U.S. Veterans.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 - INTRODUCTION

1.1 Background

My PhD journey began from a very personal perspective. I served in the U.S. Air Force, both active duty and reserve, for 30 years, essentially my entire adult life. I was heavily steeped in a culture that emphasized and esteemed both physical and mental toughness combined with discipline and a commitment to service before self. I wholeheartedly believed in these principles, which I viewed to be noble, and I endeavored to live them for decades. When I retired from the military, it seemed appropriate that I connect with the U.S. Department of Veterans Affairs (VA). After all, the mission of VA is "To fulfill President Lincoln's promise to care for those who have served in our nation's military and for their families, caregivers, and survivors" (U.S. Department of Veterans Affairs, 2023). Following a medical examination by the Veterans Benefits Administration (VBA), I was assessed a more severe disability rating based on my musculoskeletal conditions. Because my military training had ingrained in me never to show weakness, it never even occurred to me to report my military service-connected disabilities to my university. As I had been shaped by the military, I would tough it out; "press on" was the expression I had learned as a second lieutenant back in 1989 during officer training school. Fast forward 34 years, as I near the end of my PhD journey, my perspective has changed dramatically.

Based on a review of the current literature, there does not appear to be any research focused on (a) the degree to which U.S. Student–Veterans with military service–connected disabilities have reported their conditions to their college or university, (b) the types of reasonable accommodations provided to U.S. Student–Veterans with military

service–connected disabilities, or (c) the impact of these reasonable accommodations on U.S. Student–Veteran educational achievement. This dissertation begins to gather these data through a comprehensive survey.

Within this study, educational achievement was defined as the attainment of higher educational goals, including degree and grade point average (GPA). This study will not conflate military service–connected disabilities with learning disabilities. "A learning disability is a disorder in one or more basic psychological processes that may manifest itself as an imperfect ability in certain areas of learning, such as reading, written expression, or mathematics" (Learning Disabilities Association of America, 2012, para. 1). While a military service–connected disability may cause a learning disability, it is specifically defined as a "service–connected illness or injury that was caused by, or got worse because of, active military service" (U.S. Department of Veterans Affairs, 2023, para. 1).

1.2 Purpose

The purpose of this study was (a) to investigate the degree to which U.S. Student–Veterans with military service–connected disabilities are self–reporting to their college or university; (b) to investigate the degree to which U.S. Student–Veterans who do self–report are receiving reasonable accommodations; (c) to investigate the degree to which such reasonable accommodations affect the educational achievement of these U.S. Student–Veterans; and (d) to categorize the accommodations according to impact (positive, mixed, none, and negative).

1.3 Hypotheses

1.3.1 Primary Hypotheses

The higher educational achievement (graduation status and GPA) of Student–Veterans with military service–connected disabilities is improved when colleges/universities provide reasonable learning accommodations.

1.3.2 Sub–Hypotheses

1. Student–Veterans with military service–connected disabilities who receive reasonable learning accommodations have better educational outcomes than Student–Veterans with military service–connected disabilities who do not receive such accommodations.
2. Student–Veterans supported by reasonable accommodations varies by military service–connected disability severity rating.
3. Student–Veteran disclosure of disability to their college or university correlates positively with academic success.
4. Student–Veteran disclosure of disability to their college or university varies by military service–connected disability severity rating.

1.4 Veteran Population with Military Service–Connected Disabilities

In 2021, 18.5 million men and women were Veterans of the U.S. armed forces (U.S. Department of Labor, Bureau of Labor Statistics, 2021), which constituted 5.6% of the total U.S. population (U.S. Census Bureau, 2021). Of all Veterans, about one in 10 were women (U.S. Department of Labor, Bureau of Labor Statistics, 2021). Approximately 27% of the total Veteran population (4.9 million) had a military service–

connected disability (U.S. Department of Labor, Bureau of Labor Statistics, 2021). Of note, among Veterans who served during the Post 9/11 era, 44% (2.0 million) reported a military service–connected disability (U.S. Department of Labor, Bureau of Labor Statistics, 2021).

1.5 Educational Benefits for Veterans

Prior to World War II, Veterans of the U.S. armed forces returned to civilian life with little to no support from the U.S. government. (U.S. Department of Defense, 2019). With the Great Depression of the 1930s still fresh in their minds, U.S. political leaders were concerned by the looming prospect of another severe economic downturn if the 16 million U.S. Veterans were to return home after the war only to face unemployment. (U.S. Department of Defense, 2019). To avert this economic instability, the U.S. Congress passed the Servicemen's Readjustment Act of 1944, known as the GI Bill of Rights, providing education benefits to Veterans of World War II (U.S. Department of Defense, 2019). The original GI Bill provided tuition, subsistence, books and supplies, equipment, and counseling services for Veterans to continue their education in school or college (U.S. Department of Defense, 2019). Within its first seven years of implementation, approximately eight million Veterans accessed these federal educational benefits (U.S. Department of Defense, 2019). Following its initial passage in 1944, the GI Bill was extended after the Korean Conflict (1956) and during the Vienam Conflict (1966. (U.S. Department of Defense, 2019). In 2008, Congress passed a version known as the Post 9/11 GI Bill, which has benefitted approximately 800,000 Veterans and their families totaling more than $12 billion (U.S. Department of Defense, 2019). Based on the

44% of Post–9/11 Veterans reporting a military service–connected disability, the number of disabled Veterans benefiting from the Post–9/11 GI Bill is approximately 350,000.

Many of these disabled Student–Veterans were protected by the Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act of 1973. These laws mandate equal access to postsecondary institutions for students with learning disabilities, including Veterans with military service–connected disabilities. Despite the significant population of Student–Veterans with military service–connected disabilities pursuing higher educational since the passage of the Post 9/11 GI Bill, a recent literature review reveals that there is a glaring absence of research examining the impact of such accommodations on Student–Veteran educational achievement.

1.6 Key Legislation

In 1973, the U.S. Congress passed the Rehabilitation Act, which prohibits discrimination on the basis of disability in programs receiving federal financial assistance (U.S. Department of Education Office for Civil Rights, 2020). Within the Rehabilitation Act, Section 504 prohibits discrimination against persons with disabilities by any recipients of federal financial assistance, such as grants or student loans (U.S. Department of Education Office for Civil Rights, 2020). In 1990, the Americans with Disabilities Act (ADA) expanded beyond federally–funded programs prohibiting discrimination "on the basis of disability in employment, state and local government, public accommodations, commercial facilities, transportation, and telecommunications" (U.S. Department of Justice Civil Rights Division, 2020, para. 2). Title II of ADA protects people with disabilities from discrimination by educational institutions that receive state funding, such as state universities, community colleges, and vocational

schools (U.S. Department of Education Office for Civil Rights, 2020). All public colleges and universities must comply with Section 504 and Title II (U.S. Department of Education Office for Civil Rights, 2020). Title III of ADA protects people with disabilities from discrimination by private colleges and universities, which are classified as "places of public accommodation" (U.S. Department of Justice Civil Rights Division, 2020). "Virtually all private colleges and universities are also covered by Section 504 because they receive federal financial assistance by participating in federal student aid programs" (U.S. Department of Education Office for Civil Rights, 2020, para. 5).

1.7 Reasonable Accommodations in Higher Education

At the post–secondary level, colleges and universities are required to provide reasonable accommodations as necessary to ensure that the institution does not discriminate on the basis of disability (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011). The appropriate reasonable accommodation must be determined based on disability and individual needs (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011). Reasonable accommodations generally include supplemental aids and services as well as modifications to academic requirements. (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011, para. 12). "Examples of reasonable accommodations include arranging for priority registration; reducing a course load; substituting one course for another; providing note takers, recording devices, sign language interpreters, extended time for testing; equipping school computers with screen–reading, voice recognition, or other adaptive software or hardware opportunity" (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011, para. 12).

While physical disabilities are more visibly apparent requiring obvious reasonable accommodations, mental disabilities are not visible and require more nuanced support. For example, additional time for testing may be an appropriate adjustment for a Student–Veteran struggling with abstract thinking, concentration, and recall (Mitchell, 2016). A quiet room may be an appropriate adjustment for a Student–Veteran having difficulty concentrating (Mitchell, 2016). Additional time for completion of assignments may be an appropriate adjustment for a Student–Veteran struggling with focus, concentration, and organization (Mitchell, 2016). A note–taker or scribe may be an appropriate accommodation for a Student–Veteran struggling with focus, attention, and short–term memory impairment (Mitchell, 2016). Short breaks during a lecture may be an appropriate accommodation for a Student–Veteran coping with attention, restlessness, anxiety, and physical pain (Mitchell, 2016).

In providing reasonable accommodations, colleges and universities are not required to lower or modify educational requirements (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011). For example, while a college or university may be required to provide extended testing time, it is not required to change the essential content of the test (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011). Additionally, colleges and universities do not have to offer accommodations that would fundamentally change an educational program or cause an unreasonable financial hardship or administrative burden (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011). Finally, colleges and universities are not required to provide personal accommodations, such as tutoring and typing (U.S. Department of Education, 2011).

Importantly, colleges and universities are not required to identify students as having disabilities or to assess their needs (U.S. Department of Justice Civil Rights Division Disability Rights Section, 2011). Therefore, *to access reasonable accommodations, students with learning disabilities must (1) inform their college or university that they have a disability and need a reasonable accommodation and (2) follow the institutions procedures for accessing these supports.*.

1.8 Self–Disclosure of Disabilities

According to the U.S. Department of Education – National Center for Education Statistics, 19% of undergraduate students disclosed a disability to their college or university during academic year 2015–16. These students reported they had one or more of the following disabilities: (a) blindness or visual impairment that cannot be corrected by wearing glasses; (b) hearing impairment (e.g., deaf or hard of hearing); (c) orthopedic or mobility impairment; (d) speech or language impairment; (e) learning, mental., emotional., or psychiatric condition (e.g., depression, attention–deficit/hyperactivity disorder); or (f) other health impairment or problem (U.S. Department of Education – National Center for Education Statistics, 2021). As depicted in Table 1, the U.S. Department of Education reported that 25.8% of postsecondary Student–Veterans reported disabilities at the undergraduate level, while 17.1% of postsecondary Student–Veterans reported disabilities at the postbaccalaureate level. These percentages are far below the 44% reported by the U.S. Department of Labor, Bureau of Labor Statistics, which might reflect the percentage of Veterans who transfer their Post–9/11 GI Bill benefit to immediate family members. Importantly, it is unclear as to whether the reported disabilities by Student–Veterans are specifically military service–connected . It

may be that the reported Student–Veteran disabilities are a combination of military service–connected and non–military service–connected disabilities. One of the key objectives of this study is to establish a baseline of data including military service–connected disabilities exclusively.

Table 1: Postsecondary Students with Disabilities 2015–2016.

POSTSECONDARY STUDENTS WITH DISABILITIES 2015–16		
	Undergraduate	**Graduate**
Total	**19.4%**	**11.9%**
Veteran status		
Veteran	**25.8%**	**17.1%**
Not veteran	**19.1%**	**11.6%**
SOURCE: U.S. Department of Education, National Center for Education Statistics. (2021). Digest of Education Statistics, 2019 (2021-009), Chapter 3.		

1.9 U.S. Military Service–Connected Disabilities and Ratings

The U.S. Department of Veterans Affairs defines a military service-connected condition as an illness or injury that was caused by, or became worse because of, active military service (U.S. Department of Veterans Affairs, 2023). Table 2 outlines the process by which the Veterans Benefits Administration determines whether a Veteran's illness or injury is military service-connected.

Table 2: Eligibility for VA Disability Benefits or Compensation.

ELIGIBILITY FOR VA DISABILITY BENEFITS OR COMPENSATION
Both of these must be true:
Veteran has a current illness or injury (known as a condition) that affects their mind or body, and
Veteran served on active duty, active duty for training, or inactive duty training
And at least one of these must be true:
Veteran got sick or injured while serving in the military—and can link this condition to their illness or injury (called an in-service disability claim), or
Veteran had an illness or injury before joining the military—and serving made it worse (called a pre-service disability claim), or
Veteran has a disability related to their active-duty service that didn't appear until after they ended their service (called a post-service disability claim)
Source: U.S. Department of Veterans Affairs, 2023

Military service–connect disabilities are grouped into 15 categories within the U.S. Code of Federal Regulations, Title 38 – Pensions, Bonuses, and Veterans Relief, Chapter 1 – Department of Veterans Affairs, Part 4 – Schedule for Rating Disabilities, Subpart B – Disability Ratings (National Archives and Records Administration's Office of the Federal Register (OFR) and the Government Publishing Office, 2021) (Table 3).

Table 3: VA Military Service–Connected Disability Ratings Categories.

VA MILITARY SERVICE-CONNECTED DISABILITY RATINGS CATEGORIES	
1	The Musculoskeletal System
2	The Organs of Special Sense
3	Impairment of Auditory Acuity
4	Infectious Diseases, Immune Disorders and Nutritional Deficiencies
5	The Respiratory System
6	The Cardiovascular System
7	The Digestive System
8	The Genitourinary System
9	Gynecological Conditions and Disorders of the Breast
10	The Hematologic and Lymphatic Systems
11	The Skin
12	The Endocrine System
13	Neurological Conditions and Convulsive Disorders
14	Mental Disorders
15	Dental and Oral Conditions
Source: National Archives and Records Administration's Office of the Federal Register (OFR) and the Government Publishing Office, 2021	

The total Veteran population reported in the FY2021 Veterans Benefits Administration Annual Benefits Report was 19.2 million (Table 4). Of this total population, 5.2 million or 27% of Veterans were identified with military service–connected disabilities (Table 4). This percentage reflects the total number of living Veterans with military service–connected disabilities going back to WWII. Assuming that the vast majority of Student–Veterans in higher education served during the Gulf War era (1990–present), the percentage of Veterans with military service–connected disabilities is significantly higher than the percentages of Student–Veterans with disabilities reported by the U.S. Department of Education (Table 1). In Table 4, the Department of Veterans Affairs reported that 35.5% of Gulf War era (1990–present) Veterans have a military service–connected disability. The discrepancy between Table 1

and Table 4 may reflect under–reporting of disabilities by Student–Veterans to their colleges and universities.

Additionally, it is important to note that the previously cited figure of 44% reported by the U.S. Department of Labor Bureau of Labor Statistics reflects the population of Veterans with military service–connected disabilities who served during the Post–9/11 era (2001–present). These reported figures suggest that the Post–9/11 era includes the largest percentage of Veterans with military service–connected disabilities. The reasons for this strikingly high percentage are undetermined but may be driven, at least in part, by improved medical diagnostic technology available during the Post–9/11 era that was not previously available.

Table 4: Average Number of Military Service–Connected Disabilities Per Veteran.

AVERAGE NUMBER OF MILITARY SERVICE-CONNECTED DISABILITIES PER VETERAN						
	World War II	**Korean Conflict**	**Vietnam Era**	**Gulf War Era**	**Peacetime Periods**	**Total**
Total Veteran population	**219,684**	**863,076**	**5,665,282**	**8,211,348**	**4,203,099**	**19,162,489**
Number of veterans with military service-connected disabilities	**22,965**	**78,648**	**1,397,362**	**2,912,176**	**814,269**	**5,225,420**
Percentage of Veterans with military service-connected disabilities	**10.5%**	**9.1%**	**24.7%**	**35.5%**	**19.4%**	**27.3%**
Total number of military service-connected disabilities	**55,565**	**195,455**	**5,645,702**	**22,311,223**	**2,894,325**	**31,102,270**
Average number of military service-connected disabilities per veteran	**2.42**	**2.49**	**4.04**	**7.66**	**3.55**	**5.95**
Source: FY2021 Veterans Benefits Administration Annual Benefits Report						

The percentages of Veterans with military service–connected disabilities reported by the U.S. Department of Veterans Affairs includes only living Veterans, which may shed some light on the differences in percentages between eras of conflict. Both the

WWII and Korean Conflict era Veteran populations have dwindled to less than one million Veterans. Of this aging population, approximately 10% (Table 4) of the Veterans have been diagnosed with military service–connected disabilities. Assuming the health of Veterans with military service–connected disabilities is generally more compromised than that of non–disabled Veterans, one can reasonably postulate a shorter life span for Veterans with military service–connected disabilities. If this hypothesis is true, then this factor may explain some of the reason for the lower percentage of WWII Veterans with military service–connected disabilities. This reasoning may also shed some light on the higher percentage of Veterans with military service–connected disabilities in the Vietnam era and Gulf War era. As mentioned previously, the improvement of medical diagnostics over time might also be a contributing factor to the higher percentages of Veterans with military service–connected disabilities in the Vietnam and Gulf War eras. Table 5 details military service–connected disabilities by major body system and also includes all living Veterans from World War II to present.

Table 5: Military Service–Connected Disabilities FY2020.

MILITARY SERVICE-CONNECTED DISABILITIES FY 2020			
	Body system	**Number of military service-connected disabilities**	**Percentage of military service-connected disabilities**
1	**Musculoskeletal**	**11,724,365**	**37.7%**
2	**Auditory**	**4,064,400**	**13.1%**
3	**Neurological**	**3,770,120**	**12.1%**
4	**Skin**	**3,364,340**	**10.8%**
5	**Mental**	**2,163,197**	**7.0%**
6	**Respiratory**	**1,427,166**	**4.6%**
7	**Digestive**	**1,228,124**	**4.0%**
8	**Cardiovascular**	**1,052,549**	**3.4%**
9	**Genitourinary**	**989,955**	**3.2%**
10	**Endocrine**	**513,783**	**1.7%**
11	**The Eyes**	**329,298**	**1.1%**
12	**Gynecological**	**167,913**	**0.5%**
13	**Dental/Oral**	**154,112**	**0.5%**
14	**Hemic/Lymphatic**	**78,984**	**0.3%**
15	**Infection/Immune/ Nutrition**	**58,182**	**0.2%**
TOTALS		**31,086,488**	**100.0%**
UNIQUE VETERANS		**5,225,420**	
Source: FY2021 Veterans Benefits Administration Annual Benefits Report			

Tables 6-7 and Appendix A detail the 10 most prevalent military service–connected disabilities by period of service as reported by the U.S. Department of Veterans Affairs. Tinnitus (ringing in the ears) and Post–Traumatic Stress Disorder (PTSD) have been prevalent disabilities in every period of service, including peace time. Emerging military service–connected disabilities in the Gulf War era include migraines and degenerative arthritis of the spine. Advancements in diagnostic imaging technology such as computed tomography (CT) and magnetic resonance imaging (MRI) may have contributed to the emergence of degenerative arthritis of the spine.

Table 6: Most Prevalent Military Service–Connected Disability by Period of Service – Gulf War Era.

MOST PREVALENT MILITARY SERVICE-CONNECTED DISABILITY BY PERIOD OF SERVICE			
Period of service (POS)	**Disability**	**Total number**	**% of all POS disabilities**
Gulf War Era	**Tinnitus**	**1,482,514**	**6.6%**
	Limitation of flexion, knee	**1,313,624**	**5.9%**
	Lumbosacral or Cervical Strain	**1,056,543**	**4.7%**
	Post-traumatic stress disorder	**797,001**	**3.6%**
	Scars, general	**736,666**	**3.3%**
	Limitation of motion of the ankle	**702,900**	**3.2%**
	Migraine	**689,917**	**3.1%**
	Limitation of motion of the arm	**672,463**	**3.0%**
	Paralysis of the sciatic nerve	**659,827**	**3.0%**
	Degenerative Arthritis of the Spine	**494,276**	**2.2%**
	Total most prevalent Gulf War Era disabilities	**8,605,731**	**38.6%**
	All Gulf War Era disabilities	**22,311,223**	
UNIQUE VETERANS		**2,912,176**	
Source: FY2021 Veterans Benefits Administration Annual Benefits Report			

Table 7: Most Prevalent Military Service–Connected Disability by Period of Service – Peacetime.

MOST PREVALENT MILITARY SERVICE-CONNECTED DISABILITY BY PERIOD OF SERVICE			
Period of service (POS)	**Disability**	**Total number**	**% of all POS disabilities**
Peacetime	**Tinnitus**	**326,824**	**11.3%**
	Hearing loss	**251,891**	**8.7%**
	Scars, general	**111,825**	**3.9%**
	Paralysis of the sciatic nerve	**109,592**	**3.8%**
	Limitation of flexion, knee	**101,665**	**3.5%**
	Lumbosacral or Cervical Strain	**89,561**	**3.1%**
	Impairment of the knee, general	**67,146**	**2.3%**
	Limitation of motion of the ankle	**64,423**	**2.2%**
	Degenerative Arthritis of the Spine	**58,369**	**2.0%**
	Post-traumatic stress disorder	**57,221**	**2.0%**
	Total most prevalent Peacetime disabilities	**1,238,517**	**42.8%**
	All Peacetime disabilities	**2,894,325**	
UNIQUE VETERANS		**814,269**	
Source: FY2021 Veterans Benefits Administration Annual Benefits Report			

1.10 Disability Severity Rating

The Veterans Benefits Administration (VBA) assigns a disability severity rating based on the severity of the military service–connected condition ranging from 0% to 100%. This percentage represents how much VBA believes the Veteran's disability decreases their overall health and ability to function (U.S. Department of Veterans Affairs, 2020). Table 8 summarizes the disability severity ratings of Veterans between 2017 and 2021. The most frequent severity ratings during this five–year time frame were 10% (18.1 percent) and 100% (15.9 percent).

Table 8: All Compensation Recipients by Severity Rating and Frequency FY2017–FY2021.

SEVERITY RATING	All compensation recipients FY 2017 to FY 2021					FREQUENCY	
	2017	2018	2019	2020	2021		
0%	9,567	9,019	8,446	8,055	7,481	42,568	0.2%
10%	870,547	883,629	900,686	897,386	894,954	4,447,202	18.1%
20%	447,341	441,456	435,374	425,264	411,876	2,161,311	8.8%
30%	402,871	398,301	392,592	383,648	370,451	1,947,863	7.9%
40%	384,240	384,798	383,752	378,730	370,749	1,902,269	7.8%
50%	292,608	297,779	300,811	301,172	297,301	1,489,671	6.1%
60%	407,506	421,137	431,720	436,617	437,719	2,134,699	8.7%
70%	423,956	447,330	469,606	486,296	498,884	2,326,072	9.5%
80%	394,925	426,483	455,239	478,731	501,701	2,257,079	9.2%
90%	309,933	348,325	387,876	422,989	461,406	1,930,529	7.9%
100%	609,325	684,851	778,173	862,804	972,898	3,908,051	15.9%
TOTALS	4,543,252	4,734,089	4,935,829	5,073,637	5,217,939	24,504,746	100%
Source: FY2021 Veterans Benefits Administration Annual Benefits Report							

Appendix B details the disability severity ratings of Veterans across the 15 body systems tracked by the U.S. Department of Veterans Affairs. Within each body system, the Veterans Benefits Administration determines a disability severity rating in increments of 10% on a scale from 0% to 100%. A 100% disability severity rating reflects the most severely disabled, while a 0% rating reflects the least seriously disabled. A 0% rating indicates that the Veterans Benefits Administration acknowledges a military service–

connected disability but deems the disability non–compensable. Zero percent ratings may be eligible for certain VA benefits such as health care, travel pay reimbursement, dental care, vision care, and Service–Disabled Veterans Life Insurance (U.S. Department of Veterans Affairs, 2022).

Table 9 outlines the 15 most prevalent military service–connected disabilities across all body systems, which comprise 14.6 million or 46.8% of the 31.1 million total disabilities.

Table 9: Most Prevalent Military Service–Connected Disabilities.

MOST PREVALENT MILITARY SERVICE-CONNECTED DISABILITIES			
	Disability	**Number of military service-connected disabilities**	**Percentage of military service-connected disabilities**
1	**Tinnitus**	**2,500,581**	**8.0%**
2	**Limitation of Flexion, Knee**	**1,474,667**	**4.7%**
3	**Hearing Loss**	**1,377,713**	**4.4%**
4	**Post-Traumatic Stress Disorder**	**1,257,940**	**4.0%**
5	**Lumbosacral or Cervical Strain**	**1,217,631**	**3.9%**
6	**Paralysis of the Sciatic Nerve**	**1,149,565**	**3.7%**
7	**Scars, General**	**992,770**	**3.2%**
8	**Limitation of Motion of the Ankle**	**840,514**	**2.7%**
9	**Migraine**	**743,156**	**2.4%**
10	**Degenerative Arthritis of the Spine**	**601,102**	**1.9%**
11	**Scars, Burns (2nd degree)**	**595,492**	**1.9%**
12	**Eczema**	**481,521**	**1.5%**
13	**Sleep Apnea Syndromes**	**452,343**	**1.5%**
14	**Hypertensive Vascular Disease**	**448,398**	**1.4%**
15	**Diabetes Mellitus**	**433,301**	**1.4%**
TOTAL NUMBER OF MOST PREVALENT DISABILITIES		**14,566,694**	**46.8%**
TOTAL NUMBER OF DISABILITIES		**31,102,270**	
UNIQUE VETERANS		**5,225,420**	
Source: FY2021 Veterans Benefits Administration Annual Benefits Report			

1.11 Body Systems – Military Service–Connected Disabilities – Reasonable Accommodations

A total of 15 body systems are used by the Veterans Benefits Administration to categorize military service–connected disabilities. These body systems were addressed according to the number of military service–connected disabilities within each category as outlined in Table 5. The musculoskeletal system includes the highest number of military service–connected disabilities and was addressed first. The last body system to be addressed was Infectious Diseases, Immune Disorders and Nutritional Deficiencies, which includes the lowest number of military service–connected disabilities. The discussion for each body system will focus on the most prevalent diagnoses within that system. For example, within the auditory body system, hearing loss is highly common diagnosis. Educationally, the discussion will include recommended reasonable accommodations appropriate for the various diagnoses.

1.11.1 The Musculoskeletal System

The musculoskeletal system includes the largest number of military service–connected disabilities at 11.7 million, representing 37.7% of the total number of disabilities (Table 5), nearly triple the next highest category. “Disability of the musculoskeletal system is primarily the inability, due to damage or infection in parts of the system, to perform the normal working movements of the body with normal excursion, strength, speed, coordination and endurance” (National Archives and Records Administration, 2022, para. 1). Four of the 10 most prevalent military service–connected disabilities involve the musculoskeletal system: limitation of (flexion) knee, lumbosacral or cervical strain, limitation of motion of the ankle, and degenerative arthritis of the spine

(Table 9). Together, these four musculoskeletal disabilities comprise 35.3% of the Musculoskeletal body system category (Table 10).

Table 10: Disability by Musculoskeletal System.

DISABILITY	MUSCULOSKELETAL BODY SYSTEM	
Limitation of Flexion, Knee	**1,474,667**	**12.6%**
Lumbosacral or Cervical Strain	**1,217,631**	**10.4%**
Limitation of Motion of the Ankle	**840,514**	**7.2%**
Degenerative Arthritis of the Spine	**601,102**	**5.1%**
TOTALS	**11,724,365**	**35.3%**
Source: FY2021 Veterans Benefits Administration Annual Benefits		

For Student–Veterans with musculoskeletal system disabilities who have driving restrictions, remote participation may be an appropriate reasonable accommodation, particularly if classes are streamed or recorded. Special equipment may also be an appropriate reasonable accommodation for student–students with musculoskeletal system disabilities. Adjustable desks that can be alternated between sitting and standing positions may be more comfortable for Student–Veterans with musculoskeletal system disabilities who cannot sit or stand for long periods of time. For Student–Veterans with limitation of the arm disabilities, allowing a recording device or providing note takers or scribes may be an appropriate reasonable accommodation. Test taking accommodations may be another appropriate reasonable accommodation for this type of disability, such as allowing exams to be recorded orally rather than in written format. Encouraging Student–Veterans with musculoskeletal system disabilities to take frequent breaks and to move away from their desks/chairs at least once every hour is advisable.

Comorbidity, the presence of more than one medical condition, may be an additional issue impacting student Veterans with musculoskeletal system disabilities (Sreenivas, 2021). For example, "research shows that those with chronic pain are four times more likely to have anxiety or depression than those who are pain–free" (Mental Health America, 2022, para. 7). Table 11 outlines several reasonable accommodations that might be appropriate for Student–Veterans with musculoskeletal system disabilities who are also experiencing anxiety.

Table 11: Reasonable Accommodations for Anxiety.

REASONABLE ACCOMMODATIONS FOR ANXIETY	
1	**Taking exams in a separate, quite area**
2	**Extended time for taking exams**
3	**Preferential seating such as sitting near an exit**
4	**Identifying safe, quiet areas for calming**
5	**Alternate exam structures such as reports, papers or projects**
6	**Alternate ideas for projects if current assignment triggers trauma**
7	**Procedures or allowances for making up missed work**
8	**Allowing tape recorders in class or lectures**
9	**Email or web access to class notes**
10	**Advance notice of all tests and assignments**
11	**Providing pre-planned breaks during long classes or lectures**
12	**A clear syllabus the student can follow throughout the class.**
13	**Professors can help by providing pre-planned breaks during long classes or lectures, , and a clear syllabus the student can follow throughout the class.**
Source: Bailey, 2020	

Mental health reasonable accommodations were addressed within the mental disorders category of military service–connected disabilities further along in this dissertation.

1.11.2 Impairment of Auditory Acuity

Impairment of auditory acuity pertains to hearing impairment and is the second largest category of military service–connected disabilities at 4.1 million or 13.1% of the total number of disabilities (Table 5). As of 2021, two of the three more prevalent military service–connected disabilities were tinnitus (2.5 million) and hearing loss (1.4 million) (Table 12). Tinnitus comprised 61.5% and hearing loss comprised 33.9% of the Auditory Acuity body system category (Table 12). Tinnitus is a disorder that causes a person to experience ringing or other noises in one or both ears (Mayo Clinic, 2021). Together, tinnitus and hearing loss comprise 95.4% of the Auditory Acuity body system category (Table 12).

Table 12: Disability by Auditory Acuity Body System.

DISABILITY	AUDITORY ACUITY BODY SYSTEM	
Tinnitis	**2,500,581**	**61.5%**
Hearing Loss	**1,377,713**	**33.9%**
TOTALS	**4,064,400**	**95.4%**
Source: FY2021 Veterans Benefits Administration Annual Benefits		

"While tinnitus does not make it more difficult to hear, it is distracting and can affect any task that requires concentration, such as reading, writing, studying, learning, or problem–solving" (Karp, 2020, paras. 3-4). For Student–Veterans with tinnitus, reasonable accommodations might include the use of low–level noise during class and during testing. Sitting near an open window, listening to low–level music on a portable music player, wearing noise cancelling headphones, or some other form of low–level background noise might be an appropriate reasonable accommodation. For Student–Veterans with hearing loss disabilities, reasonable accommodations might include special

seating, video recordings, and assistive listening systems. “Reducing barriers that result from distance and surrounding noise, assistive listening technologies range from large systems that are built into classrooms or auditoriums to small, portable devices that can be carried from class to class” (National Deaf Center on Postsecondary Outcomes, 2019, para. 2). The smaller systems are often referred as assistive listening devices, or ALDs. “Sometimes described as ‘binoculars for the ears,’ assistive listening technologies allow the listener to tune directly into a speaker’s voice” (National Deaf Center on Postsecondary Outcomes, 2019, para. 3).

1.11.3 Neurological Conditions and Convulsive Disorders

Neurological conditions and convulsive disorders is the third largest category of military service–connected disabilities at 3.8 million or 12.1% of the total number of disabilities (Table 5). Disability in this category is rated “in proportion to the impairment of motor, sensory or mental function. Particular consideration is given to psychotic manifestations, complete or partial loss of use of one or more extremities, speech disturbances, impairment of vision, disturbances of gait, tremors, visceral manifestations, injury to the skull, etc.” (National Archives and Records Administration, 2022, para. 8). Paralysis of the sciatic nerve is the most common neurological disability at 1.1 million diagnoses or 30.5% of the neurological body system category (Veterans Benefits Administration, 2021). Migraine headaches are the second most common at 743K diagnoses or 19.7% of this category (Veterans Benefits Administration, 2021). Together, these two neurological disabilities comprise 50.2% of the Neurological Conditions and Convulsive Disorders body system category (Table 13).

Table 13: Disability by Neurological Body System.

DISABILITY	NEUROLOGICAL BODY SYSTEM	
Paralysis of the Sciatic Nerve	**1,149,565**	**30.5%**
Migraine	**743,156**	**19.7%**
TOTALS	**3,770,120**	**50.2%**
Source: FY2021 Veterans Benefits Administration Annual Benefits		

The symptoms of sciatica are somewhat similar to musculoskeletal conditions. Sciatic pain originates in the spine and radiates down the back of the leg. Sciatica typically affects only one side of the body. Common symptoms include pain in the back, buttocks, hip, or lower extremities, which can be mild, severe, radiating, or sharp (Mayo Clinic, 2020). Muscular symptoms may include difficulty walking or muscle weakness, while sensory symptoms may include leg numbness or pins and needles (Mayo Clinic, 2020). Other common symptoms include burning sensation, foot numbness, or weakness (Mayo Clinic, 2020). Because of the correlation with musculoskeletal system disabilities, reasonable accommodations for this type of disability would tend to mirror those previously described for the musculoskeletal system.

The Mayo Clinic describes a migraine as “a headache that can cause severe throbbing pain or a pulsing sensation, usually on one side of the head, which is often accompanied by nausea, vomiting, and extreme sensitivity to light and sound. Migraine attacks can last for hours to days, and the pain can be so severe that it interferes with activities of daily living” (Mayo Clinic, 2021, para. 2). With regard to learning, clinic–based studies showed that “migraine affected certain cognitive domains in particular, such as processing speed, attention, memory, verbal skills and executive function (e.g. working memory, divided attention/inhibition, set–shifting, and planning)” (The Journal

of Headache and Pain, 2018, p. 11). There are a number of reasonable accommodations that may be implemented to support a Student–Veteran with a migraine disability (Table 14).

Table 14: Reasonable Accommodations for Migraine.

REASONABLE ACCOMMODATIONS FOR MIGRAINE	
1	**Modified homework assignments and extended time to complete those assignments may be necessary as productivity can be greatly reduced during an attack.**
2	**Extended time for tests is medically necessary as processing speed is slowed by the cognitive dysfunction that occurs as part of migraine, chronic pain, and multiple medications.**
3	**Testing time should not exceed two hours (or as tolerated).**
4	**Testing in a small quiet distraction-free environment.**
5	**Breaks as needed, and not counted as part of testing time.**
6	**Access to a calculator for all math and science requiring calculations.**
7	**No Scantron "bubble" tests, write answers in a test booklet.**
8	**Teacher or peer notes and study guides.**
9	**Ability to take tests orally when needed.**
10	**Ability to dictate written assignments.**
Source: National Headache Foundation, 2020	

1.11.4 The Skin

The Skin ranks fourth as a category of military service–connected disabilities at 3.4 million or 10.8% of the total number of disabilities (Table 5). This disability involves diagnoses pertaining to skin such as 'burn scar(s) of the head, face, or neck; scar(s) of the head, face, or neck due to other causes; or other disfigurement of the head, face, or neck (National Archives and Records Administration, 2022, para. 3). Similarly, this category includes "burn scar(s) or scar(s) due to other causes, not of the head, face, or neck, that are associated with underlying soft tissue damage" (National Archives and Records

Administration, 2022, para. 21). General scars and burn scars number 1.6 million military service–connected disabilities or 47.2% of the Skin body system category (Table 15).

Table 15: Disability by Skin Body System.

DISABILITY	SKIN BODY SYSTEM	
Scars, General	**992,770**	**29.5%**
Scars, Burns (2nd degree)	**595,492**	**17.7%**
TOTALS	**3,364,340**	**47.2%**
Source: FY2021 Veterans Benefits Administration Annual Benefits		

Multiple factors are taken into consideration for military service–connected disabilities involving scars. Beyond disfigurement, some of these factors include "pain, instability, and residuals of associated muscle or nerve injury," which may include limitation of motion (National Archives and Records Administration, 2022, para. 19). Comorbidity is also associated with scarring, because disfigurement can include emotional effects, both physical and psychological. For example, a facial scar can be very distressing causing a Student–Veteran to avoid people, become socially isolated, and thus susceptible to depression (National Health Service United Kingdom, 2020). Additionally, scars near joints can often prove itchy or painful and can restrict movement. (National Health Service United Kingdom, 2020).

For Student–Veterans with facial scar disabilities, an appropriate reasonable accommodation might include remote class participation using an online videoconferencing platform. This technology would enable the Student–Veteran to be able to participate in class with the option of choosing whether or not to show their face during class. For Student–Veterans with scars that cause pain or limit motion, an

appropriate reasonable accommodation might include special seating designed to accommodate these physical conditions.

1.11.5 Mental Disorders

Mental disorders rank fifth as a category of military service–connected disabilities at 2.2 million or 7.0% of the total number of disabilities (Table 5). Mental disorders "consider the frequency, severity, and duration of psychiatric symptoms, the length of remissions, and the Veteran's capacity for adjustment during periods of remission" (National Archives and Records Administration, 2022, para. 3). The rating is "based on all the evidence of record that bears on occupational and social impairment rather than solely on the examiner's assessment of the level of disability at the moment of the examination" (National Archives and Records Administration, 2022, para. 3). Post–Traumatic Stress Disorder (PTSD) numbers 1.3 million military service–connected disabilities representing 4.0% of total disabilities (Table 8) or 58.2% of the Mental body system category (Table 16).

Table 16: Disability by Mental Body System.

DISABILITY	MENTAL BODY SYSTEM	
Post-Traumatic Stress Disorder	**1,257,940**	**58.2%**
TOTALS	**2,163,197**	
Source: FY2021 Veterans Benefits Administration Annual Benefits		

PTSD is a mental health problem that some people develop after experiencing or witnessing a life–threatening event, like combat, a natural disaster, a car accident, or sexual assault (U.S. Department of Veterans Affairs, 2022). While most people who go through traumatic events may have temporary difficulty adjusting and coping, those with

PTSD have symptoms that worsen, persist for months or even years, and interfere with day–to–day functioning (U.S. Department of Veterans Affairs, 2022). “PTSD symptoms are generally grouped into four types: intrusive memories, avoidance, negative changes in thinking and mood, and changes in physical and emotional reactions” (Mayo Clinic, 2018, para. 5). “Symptoms of changes in physical and emotional reactions (also called arousal symptoms) may include being easily startled or frightened, always being on guard for danger, and trouble concentrating” (Mayo Clinic, 2018, para. 6).

For Student–Veterans with mental disorders, reasonable accommodations involve “modifying the learning environment to compensate for delays in executive functioning, such as memorization, recall, and complex analysis. “The reasonable accommodations also may be structured in a way that avoids exacerbating an underlying mental health diagnosis, such as PTSD or anxiety” (Mitchell, 2016, p. 36). Other reasonable accommodations might include a quiet space for exams, service animal in class, audio–recording of class lectures, extensions on homework or assignments, and extra time for exams. Table 17 outlines several reasonable accommodations that might be helpful to U.S. Student–Veterans suffering from PTSD. There are many functional limitations caused by mental disorders that can interfere with learning. Table 18 outlines a number of these limitations. Additional reasonable accommodations for mental disorders are outlined in Table 11 (Anxiety), Table 22 (Depression), and Table 23 (Mental Disorders).

Table 17: Reasonable Accommodations for Post–Traumatic Stress Disorder (PTSD).

REASONABLE ACCOMMODATIONS FOR POST-TRAUMATIC STRESS DISORDER (PTSD)	
COPING WITH STRESS	
1	Additional time for assignments
2	Allow short breaks (5-10 min) during class sessions
3	Permit flexibility in class session attendance as long as absences do not conflict with core requirements
DEALING WITH EMOTIONS	
4	Allow for a support animal
5	Allow telephone calls to doctors, counselors
6	Encourage student-veteran to walk away and take a break if an unhealthy interaction is occurring
7	Provide education about college counseling services, VA services, and Vet centers to students
PANIC ATTACKS	
8	Allow for a break or place to go to use relaxation techniques or contact a support person
9	Identify and remove environmental triggers if possible
FLASHBACKS	
10	Encourage student-veterans to keep their eyes open and notice where they are
11	Remind the student-veteran where they are, what year it is, and that they are safe.
12	Encourage student-veteran to get up and move around if necessary
13	Encourage student-veteran to get a drink of water and splash water on their face
14	Orient to present (flashbacks will take a person to the "past")
SOURCE: U.S. Department of Veterans Affairs, 2015	

Table 18: Functional Limitations of Psychiatric Disabilities that May Impede Learning.

FUNCTIONAL LIMITATIONS OF PSYCHIATRIC DISABILITIES THAT MAY IMPEDE LEARNING	
1	Difficulty with medication side effects: side-effects of psychiatric medications that affect academic performance include drowsiness, fatigue, dry mouth and thirst, blurred vision, hand tremors, slowed response time, and difficulty initiating interpersonal contact.
2	Screening out environmental stimuli: an inability to block out sounds, sights, or odors that interfere with focusing on tasks. Limited ability to tolerate noise and crowds.
3	Sustaining concentration: restlessness, shortened attention span, distraction, and difficulty understanding or remembering verbal directions.
4	Maintaining stamina: difficulty sustaining enough energy to spend a whole day on campus attending classes; combating drowsiness due to medications.
5	Handling time pressures and multiple tasks: difficulty managing assignments, prioritizing tasks, and meeting deadlines. Inability to participate in multi-task work.
6	Interacting with others: difficulty getting along, fitting in, contributing to group work, and reading social cues.
7	Fear of authority figures: difficulty approaching instructors or TAs.
8	Responding to negative feedback: difficulty understanding and correctly interpreting criticism or poor grades. May not be able to separate person from task (personalization or defensiveness due to low self-esteem).
9	Responding to change: difficulty coping with unexpected changes in coursework, such as changes in the assignments, due dates or instructors. Limited ability to tolerate interruptions.
10	Severe test anxiety: the individual is rendered emotionally and physically unable to take an exam.
SOURCE: Center for Psychiatric Rehabilitation, Boston University, 2020	

1.11.6 The Respiratory System

The respiratory system ranks sixth as a category of military service–connected disabilities at 1.4 million or 4.6% of the total number of disabilities (Table 5). 452K or 31.7% of respiratory disabilities involve sleep apnea syndromes (obstructive, central., and mixed) (Veterans Benefits Administration, 2021). “Obstructive sleep apnea is the most common sleep–related breathing disorder, causing a person to stop and start breathing repeatedly while sleeping” (Mayo Clinic, 2021, para. 1). Allergic rhinitis is the second most common respiratory disorder at 365K or 25.6% of this category(Veterans Benefits Administration, 2021). Together, these two respiratory disabilities comprise 57.3% of the respiratory body system category (Table 19).

Table 19: Disability by Respiratory System.

DISABILITY	RESPIRATORY BODY SYSTEM	
Sleep Apnea Syndromes	**452,343**	**31.7%**
Allergic Rhinitis	**365,140**	**25.6%**
TOTALS	**1,427,166**	**57.3%**
Source: FY2021 Veterans Benefits Administration Annual Benefits Report		

Some of the daytime signs and symptoms of obstructive sleep apnea include morning headache, difficulty concentrating during the day, excessive daytime sleepiness, and mood changes, such as depression or irritability (Mayo Clinic, 2021). Possible reasonable accommodations for this type of disability are outlined in Table 20.

Table 20: Reasonable Accommodations for Narcolepsy.

REASONABLE ACCOMMODATIONS FOR NARCOLEPSY	
1	Help with note-taking in class
2	Access to teacher lecture slides and notes
3	A seat at the back of the classroom and permission to stand up or move during class
4	A designated place and time (such as a nurse's office after lunch) to take a nap
5	Additional time for taking tests or quizzes and flexible assignment deadlines
6	A flexible class schedule
7	Highlighted editions or audio recordings of textbooks to help focus when reading
Source: Narcolepsy Sleep–Disorders.net, 2020	

For Student–Veterans experiencing depression related to obstructive sleep apnea, symptoms that may impede learning are outlined in Table 21 with examples of appropriate reasonable accommodations detailed in Table 22.

Table 21: Symptoms of Depression.

SYMPTOMS OF DEPRESSION	
1	Feelings of sadness, tearfulness, emptiness or hopelessness
2	Angry outbursts, irritability or frustration, even over small matters
3	sports
4	Sleep disturbances, including insomnia or sleeping too much
5	Tiredness and lack of energy, so even small tasks take extra effort
6	Reduced appetite and weight loss or increased cravings for food and weight gain
7	Anxiety, agitation or restlessness
8	Slowed thinking, speaking or body movements
9	Feelings of worthlessness or guilt, fixating on past failures or self-blame
10	Trouble thinking, concentrating, making decisions and remembering things
11	Frequent or recurrent thoughts of death, suicidal thoughts, suicide attempts or suicide
12	Unexplained physical problems, such as back pain or headaches
Source: Mayo Clinic, 2018	

Table 22: Reasonable Accommodations for Depression.

REASONABLE ACCOMMODATIONS FOR DEPRESSION	
CLASSROOM ADJUSTMENTS	
1	**Preferential seating, especially near the door to allow leaving class for breaks.**
2	**Prearranged or frequent breaks.**
3	**Early availability of syllabus and textbooks.**
4	**Availability of course materials (lectures, handouts) on disk.**
ASSIGNMENT ADJUSTMENTS	
5	**Advance notice of assignments.**
6	**Written assignments in lieu of oral presentations or vice versa.**
7	**Extended time to complete assignments.**
EXAMINATION ADJUSTMENTS	
8	**Exams in alternate format (e.g., from multiple choice to essay; oral, or**
9	**Extended time for test taking.**
10	**Exam in a separate, quiet, and non-distracting room.**
Source: DO-IT (Disabilities, Opportunities, Internetworking, and Technology),	

1.11.7 The Digestive System

The digestive system ranks seventh as a category of military service–connected disabilities at 1.2 million or 4.0% of the total number of disabilities (Table 5). Hiatal hernia is the most common digestive disorder at 408K or 33.2% of the digestive system category (Veterans Benefits Administration, 2021). Hemorrhoids are the second most common digestive disorder at 285K or 23.2% of the digestive system category (Veterans Benefits Administration, 2021). These two digestive system disabilities combine to comprise 56.5% of the Digestive body system category (Table 23).

Table 23: Disability by Digestive Body System.

DISABILITY	DIGESTIVE BODY SYSTEM	
Hiatal Hernia	**407,960**	**33.2%**
Hemorrhoids	**285,334**	**23.2%**
TOTALS	**1,228,124**	**56.5%**
Source: FY2021 Veterans Benefits Administration Annual Benefits Report		

A hiatal hernia is a condition in which the upper part of the stomach bulges through the diaphragm, a large muscle separating the abdomen and chest (Mayo Clinic, 2021). Symptoms of larger hiatal hernias are outlined in Table 24.

Table 24: Symptoms of Hiatal Hernia.

	SYMPTOMS OF HIATAL HERNIA
1	Heartburn
2	Regurgitation of food or liquids into the mouth
3	Backflow of stomach acid into the esophagus (acid reflux)
4	Difficulty swallowing
5	Chest or abdominal pain
6	Feeling full soon after you eat
7	Shortness of breath
8	Vomiting of blood or passing of black stools, which may indicate gastrointestinal bleeding
Source: Mayo Clinic, 2021	

Because eating moderate to small portions of foods can help control the symptoms of hiatal hernia, an appropriate reasonable accommodation for this digestive disability might include permission to snack during class or an exam (Johns Hopkins Medicine, 2022). For Student–Veterans with hemorrhoid and irritable bowel syndrome disabilities, an appropriate reasonable accommodation might be preferred seating near the classroom door facilitating discrete access to a bathroom.

1.11.8 The Cardiovascular System

The cardiovascular system ranks eighth as a category of military service–connected disabilities at 1.1 million or 3.4% of the total number of disabilities (Table 5). Hypertensive vascular disease is the most common disability in the cardiovascular category at 436K diagnoses or 42.0% (Veterans Benefits Administration, 2021). Arteriosclerotic heart disease (coronary artery disease) ranks second at 231K diagnoses or 22.3% of this category. Hypertension is another name for high blood pressure, a common condition that can lead to health problems, such as heart disease (Mayo Clinic, 2021). "Most people with high blood pressure have no signs or symptoms, even if blood pressure readings reach dangerously high levels" (Mayo Clinic, 2021, para. 7).

For Student–Veterans with cardiovascular disabilities, an appropriate reasonable accommodation might be permission to snack during class as part of a heart–healthy diet. Additionally, because research indicates that mental health issues are common in patients with heart disease (De Hert et al., 2018), other reasonable accommodations that might be helpful to Student–Veterans are outlined in Table 11 (Anxiety), Table 22 (Depression), and Table 26 (Mental Disorders).

1.11.9 The Genitourinary System

The genitourinary system ranks ninth as a category of military service–connected disabilities at 990K or 3.2% of the total number of disabilities (Table 5). "Diseases of the genitourinary system generally result in disabilities related to renal (kidney) or voiding dysfunctions, infections, or a combination of these" (National Archives and Records Administration, 2022, para. 2). Penile deformity (loss of erectile power) is the most common disability in the genitourinary category at 426K diagnoses or 43.0% (Veterans

Benefits Administration, 2021). Malignant growths of the genitourinary system rank second at 147K diagnoses or 14.8% of this category (Veterans Benefits Administration, 2021). As depicted in Table 28, these two disabilities combined comprise 57.8% of the Genitourinary body system category (Table 25).

Table 25: Disability by Genitourinary Body System.

DISABILITY	GENITOURINARY BODY SYSTEM	
Penile deformity (loss of erectile power)	**425,903**	**43.0%**
Malignant growths of genitourinary system	**146,506**	**14.8%**
TOTALS	**989,955**	**57.8%**
Source: FY2021 Veterans Benefits Administration Annual Benefits Report		

"When compared with the general population, Veterans with posttraumatic stress disorder are at increased risk of sexual dysfunction. A review study published online in the Journal of Sexual Medicine on Feb. 9, 2015, found that male Veterans with PTSD were significantly more likely than their civilian counterparts to report erectile dysfunction (ED) or other sexual problems' (U.S. Department of Veterans Affairs, 2015, para. 1). According to a 2002 study, "combat Veterans with PTSD experience a significantly higher rate of sexual dysfunction than do Veterans without PTSD and show impairment in some, but not all, specific domains of sexual function" (Cosgrove et al., 2002, p. 81). "It is not uncommon for men with ED to feel angry, frustrated, sad, or even unsure of themselves" (Bandukwala, 2021, para. 1). "While there are many medical causes of ED, studies have shown that men with ED may be twice as likely to develop clinical depression as compared to those without ED" (Bandukwala, 2021, para. 1).

For Student–Veterans experiencing mental health challenges resulting from their genitourinary system military service–connected disabilities, reasonable accommodations might include those outlined in Table 22 (Depression) and Table 26 (Mental Disorders).

Table 26: Reasonable Accommodation for Mental Disorders.

REASONABLE ACCOMMODATIONS FOR MENTAL DISORDERS	
CLASSROOM ADJUSTMENTS	
1	**Assigned classmate as volunteer assistant.**
2	**Beverages permitted in class.**
3	**Tape recorder use.**
4	**Notetaker or photocopy of another student's notes.**
5	**Private feedback on academic performance.**
ASSIGNMENT ADJUSTMENTS	
6	**Substitute assignments in specific circumstances.**
7	**Advance notice of assignments.**
8	**Assignment assistance during hospitalization.**
EXAMINATION ADJUSTMENTS	
9	**Use of assistive computer software such as speech recognition for converting the spoken word to printed word on the computer screen.**
10	**Exams individually proctored, including in the hospital.**
11	**Increased frequency of exams.**
Source: DO-IT (Disabilities, Opportunities, Internetworking, and Technology), 2012	

1.11.10 The Endocrine System

The endocrine system ranks tenth as a category of military service–connected disabilities at 514K or 1.7% of the total number of disabilities (Table 5). Diabetes mellitus is far and away the most common disability in the endocrine category at 433K or 84.3% of the Endocrine body system category (Veterans Benefits Administration, 2021). “Diabetes mellitus refers to a group of diseases that affect how the body uses blood sugar (glucose)” (Mayo Clinic, 2020, para. 1). Glucose is vital to health because it is an

important source of energy for the cells that make up muscles and tissues (Mayo Clinic, 2020). “It is also the brain's main source of fuel” (Mayo Clinic, 2020, para. 1). Chronic diabetes conditions include type 1 diabetes and type 2 diabetes (Mayo Clinic, 2020). Some of the signs and symptoms of type 1 diabetes and type 2 diabetes are outlined in Table 27.

Table 27: Diabetes – Type 1 and Type 2 – Symptoms.

DIABETES - TYPE 1 AND TYPE 2 - SYMPTOMS	
1	Increased thirst
2	Frequent urination
3	Extreme hunger
4	Unexplained weight loss
5	Presence of ketones in the urine (ketones are a byproduct of the breakdown of muscle and fat that happens when there's not enough available insulin)
6	Fatigue
7	Irritability
8	Blurred vision
9	Slow-healing sores
10	Frequent infections, such as gums or skin infections and vaginal infections
Source: Mayo Clinic, 2020	

Reasonable accommodations for this type of disability might include unrestricted bathroom breaks and in–class snacking. If the Student–Veteran’s blood sugar is high, the body's natural response is to eliminate the extra glucose through urination (Mayo Clinic, 2020). Relatedly, allowing beverages in class is an important reasonable accommodation for Student–Veterans with diabetes. If the Student–Veteran’s blood sugar is low, in–class snacking will allow for the ingestion of fast–acting carbohydrate snacks such as fruit juice, regular soda, sweets or glucose tablets; these snacks will raise blood glucose levels relatively quickly when ingested (Mayo Clinic, 2020). Because both high and low blood sugar levels may make it difficult for the Student–Veteran to concentrate at times, a

couple of reasonable accommodations that may be helpful include permission to use the bathroom freely and permission to miss class due to medical appointments without penalty (American Diabetes Association, n.d.).

1.11.11 The Organs of Special Sense/ The Eyes

Disability of the Organs of Special Sense involves the eyes and visual impairment. Ranking eleventh as a category of military service–connected disabilities at 329K or 1.1% of the total number of disabilities (Table 5). "The evaluation of visual impairment is based on impairment of visual acuity (excluding developmental errors of refraction), visual field, and muscle function" (National Archives and Records Administration, 2022, para. 1). The three most common military service–connected disabilities of the eye include loss of one eye (vision 20/40 in other); impairment to field of vision; and chronic conjunctivitis (Veterans Benefits Administration, 2021).

There are substantial reasonable accommodations available to Student–Veterans with military service–connected disabilities involving visual impairment. Tables 28 and 29 outline reasonable accommodations for visual impairment.

Table 28: Reasonable Accommodations for Visual Impairment.

REASONABLE ACCOMMODATIONS FOR VISUAL IMPAIRMENT	
1	**Providing accessible materials:** If a Student-Veteran needs materials in an alternative format, such as Braille, the college should provide them.
2	**Extended time:** Student-Veterans with visual impairments who need additional time to complete assignments or tests should be given that extended time.
3	**Access to technology:** Possible accommodations may include screen readers, text-to-speech applications, Braille materials, or video magnification.
4	**Copy of lectures:** Copies of lectures should be provided to Student-Veterans beforehand in the format preferred by the Student-Veteran (Braille, digital copy, audio recording).
5	**Live readers:** If a textbook is not available in Braille or if there is not a digital copy that the Student-Veteran can utilize with a screen reader, a live reader should be used in place of assistive
Source: Sandoval, 2020, para. 16	

Table 29: Reasonable Accommodations for Organs of Special Sense (The Eyes) Disabilities.

REASONABLE ACCOMMODATIONS FOR ORGANS OF SPECIAL SENSE (THE EYES) DISABILITIES	
ACCOMMODATIONS IN MEDIUM USED	
1	Braille
2	Large print
3	Audiotape
4	Electronic text
ACCOMMODATIONS IN WAY MATERIALS ARE PRESENTED	
1	Copies of overhead projector/smartboard activities to be viewed at his/her desk as needed
2	The teacher or presenter should verbalize all information as it is written on the board or overhead
3	Information presented on the board should be in a high contrast color
4	The computer screen should be eye level and tilted to avoid glare
5	Use recorded text as needed
6	Classroom recording of lectures/instruction by the student
7	Large Print textbooks/materials
8	Braille textbooks/materials
ACCOMMODATIONS IN TIME REQUIREMENTS	
1	Consideration for the student's reading/writing speed
2	Consideration for the time needed to use adaptive equipment
3	Consideration for eye fatigue and scanning ability
ACCOMMODATIONS IN DEMONSTRATION OF LEARNING	
1	Avoid activities requiring extensive visual scanning
2	Avoid visually cluttered materials
3	Allow use of bold marker, 20/20 pen, mechanical pencil, or another unique writing tool) to complete assignments
4	Use of bold line paper
5	Use of raised line paper
6	Abbreviated homework assignment (includes all concepts, just fewer items)
7	Shorter written assignment.\s
8	Oral testing
ACCOMMODATIONS IN SETTING	
1	Preferential seating in the classroom
2	Seating facing away from windows
3	Permission to move about the room as needed to see information presented away from his/her desk.
ACCOMMODATIONS IN LEARNING ENVIRONMENT	
1	Avoid glare in general from overhead lights; consider placing light filters on fluorescent lights
2	Open and close doors fully (a half-open door can be a dangerous obstacle)
3	Eliminate unnecessary background noise; consider isolation headphones
4	Eliminate clutter from the room, particularly in aisles and movement paths
5	Place materials in consistent places so that students know where particular items are always located
Source: Willings, 2016	

1.11.12 Gynecological Conditions and Disorders of the Breast

At 168K or 0.5% of the total number of disabilities (Table 5), Gynecological Conditions and Disorders of the Breast are the twelfth ranked category of military service–connected disabilities. Removal of uterus, disease or injury of the ovary, and removal of uterus and both ovaries comprise 38.6% of the disabilities in this category (Veterans Benefits Administration, 2021). These procedures involve removal of essential elements of the female reproductive system and thus eliminate fertility.

"In addition to physical changes, a person who undergoes a hysterectomy may also experience changes in their mental health. Hysterectomies mean a person can no longer get pregnant. For some, this causes grief and sadness, particularly if they had hoped to have a child or more children. A person will also not have periods anymore, which can make a female feel they have lost part of their identity or womanhood" (Medical News Today, 2018, para. 1-4). A study of females who underwent hysterectomies over a 22 year period between 1980–2002 found that they had a 6.6% higher risk for new depression diagnoses and a 4.7% higher risk for anxiety diagnoses following their surgery (Laughlin–Tommaso et al., 2020). Thus, "hysterectomy is associated with an increased long–term risk of depression and anxiety, especially when performed in women who are younger" (Laughlin–Tommaso et al., 2020, para. 4).

Similar to men with genitourinary system/ erectile dysfunction disabilities, female Student–Veterans with gynecological military service–connected disabilities are prone to associated mental health disorders. Consequently, Table 22 (Depression) and Table 26 (Mental Disorders) summarize a variety of reasonable accommodations that may be appropriate for Student–Veterans with this type of gynecological disability.

1.11.13 Dental and Oral Conditions

Dental and Oral Conditions rank thirteenth as a category of military service–connected disabilities at 154K or 0.5% of the total number of disabilities (Table 5). Limited motion of the jaw is by far the most prevalent disability within this category at 127K diagnoses comprising 82.3% of this category (Veterans Benefits Administration, 2021). Limited motion of the jaw is based on the degree to which a Veteran has limited ability to open their mouth or move it side–to–side (National Archives and Records Administration, 2022). This disability also takes into account whether a Veteran must soften, chop, or blend (mechanically alter) their food to be able to eat (National Archives and Records Administration, 2022). The schedule of ratings refers to mechanically altered food as soft and semi–solid foods, pureed foods, and full liquid foods (National Archives and Records Administration, 2022).

Temporomandibular disorders (TMDs) are a group of more than thirty conditions that cause pain and dysfunction in the jaw joint and muscles that control jaw movement (National Institute of Dental and Craniofacial Research, 2022). Other symptoms associated with TMD are outlined in Table 30.

Table 30: Temporomandibular Disorder (TMD) Symptoms.

TEMPOROMANDIBULAR DISORDER (TMD) SYMPTOMS	
1	Pain in the chewing muscles and/or jaw joint (most common symptom).
2	Pain that spreads to the face or neck.
3	Jaw stiffness.
4	Limited movement or locking of the jaw.
5	Painful clicking, popping, or grating in the jaw joint when opening or closing the mouth.
6	Ringing in the ears, hearing loss, or dizziness.
7	A change in the way the upper and lower teeth fit together.
Source: National Institute of Dental and Craniofacial Research, 2022	

Similar to the connection between post–traumatic stress disorder (PTSD) and erectile dysfunction, there appears to be a link between PTSD and TMDs. In a study reviewing the literature to describe the relationship between PTSD and TMD, the results showed that PTSD often occurs in patients with TMD and, vice versa, that a higher prevalence of TMD is found in individuals with PTSD (Ferreira et al., 2018). A study involving Veterans of the Iran–Iraq War found a high prevalence of signs and symptoms of TMDs in Veterans suffering from post–traumatic stress disorder (Mottaghi & Zamani, 2014). Another study involving Croatian war Veterans found that PTSD patients are at increased risk for the development of TMDs (Uhač et al., 2006). In this study involving 50 Croation male Veterans with PTSD and 50 healthy male subjects, TMD prevalence was 48% in the Veterans and 8% in the control group (Uhač et al., 2006).

Reasonable accommodations for U.S. Student–Veterans with this type of disability might focus on TMD directly as well as secondary conditions associated with TMD. Reasonable accommodations focusing on TMD directly might include (a) permission to apply heat or cold to the face during class or exams and (b) permission to eat soft foods during class or exams. In addition to PTSD as discussed above, another secondary condition associated with TMD might include depression. (Reiter et al., 2015). For these secondary conditions, the reasonable accommodations detailed in Table 17 (PTSD) and Table 22 (Depression) might be helpful to the U.S. Student–Veteran.

1.11.14 The Hematologic and Lymphatic Systems

The Hematologic and Lymphatic Systems rank fourteenth as a category of military service–connected disabilities at 79K or 0.3% of the total number of disabilities (Table 5). The Hematologic and Lymphatic Systems include the spleen, bone marrow and

stem cells, and the lymph nodes. Anemia, Non–Hodgkin's lymphoma, and Leukemia comprise 56.7% of the disabilities in this category (Veterans Benefits Administration, 2021).

Anemia is a condition in which the body lacks enough healthy red blood cells to carry adequate oxygen to its tissues (Mayo Clinic, 2022). Anemia signs and symptoms vary depending on the cause and severity of anemia (Table 31). "Non–Hodgkin's lymphoma is a type of cancer that begins in the lymphatic system, which is part of the body's germ–fighting immune system. In non–Hodgkin's lymphoma, white blood cells called lymphocytes grow abnormally and can form growths (tumors) throughout the body. Advances in diagnosis and treatment of non–Hodgkin's lymphoma have helped improve the prognosis for people with this disease" (Mayo Clinic, 2021, para. 1). "Leukemia is cancer of the body's blood–forming tissues, including the bone marrow and the lymphatic system. Leukemia usually involves the white blood cells, which normally help the body fight infection. However, in people with leukemia, the bone marrow produces an excessive amount of abnormal white blood cells, which do not function properly" (Mayo Clinic, 2021, para. 1,3).

Table 31: Anemia – Symptoms.

ANEMIA - SYMPTOMS	
1	Fatigue
2	Weakness
3	Pale or yellowish skin
4	Irregular heartbeats
5	Shortness of breath
6	Dizziness or lightheadedness
7	Chest pain
8	Cold hands and feet
9	Headaches Having anemia, also referred to as low hemoglobin, can make you feel tired and weak.
Source: Mayo Clinic, 2022	

For U.S. Student–Veterans with an iron deficiency anemia, reasonable accommodations might be permission to snack on iron–rich foods and drink citrus fruits high in vitamin C during class. For U.S. Student–Veterans with Sickle Cell Anemia, an appropriate reasonable accommodation might be an opportunity to make–up an exam because the Student–Veteran was hospitalized during the regularly scheduled exam. For U.S. Student–Veterans with non–Hodgkin's lymphoma or leukemia, Table 32 details a number of reasonable accommodations that may be appropriate.

Table 32: Reasonable Accommodations for Cancer Patients and Survivors.

REASONABLE ACCOMMODATIONS FOR CANCER PATIENTS AND SURVIVORS	
Attendance	**Working out accommodations for attendance and make-up policies**
Participating in class	**Remote participation**
	Preferred seating
	Notetakers or notes from the professor
	Audio recording class
	Scribe for class
	Heads up about group work or supports when group work is required
	Ability to use a fidget device
	Captions for movies and films
	Frequent bathroom breaks without permission
	Being able to leave the room briefly for self-care
Reading	**Getting e-books or digital text**
	Receiving handouts before class
	Getting a heads-up about certain content
Physical activity and access	**The classroom will need to be in an accessible building**
	The classroom will need different furniture
	Orientation to the building and classroom before the first day of classes
Testing and homework	**Test accommodations, such as extra time, non-distracting room, a scribe, background or white noise, noise-blocking headphones**
	Being able to leave the room briefly for self-care
	Supports for oral presentations or papers
Managing my course load	**Access to extra tutoring sessions or strategies instruction at tutoring center or disability services**
	Help with facilitating communication with faculty
Source: St. Jude Children's Research Hospital, 2020	

1.11.15 Infectious Diseases, Immune Disorders and Nutritional Deficiencies

Infectious Diseases, Immune Disorders and Nutritional Deficiencies rank fifteenth (and last) as a category of military service–connected disabilities at 58K diagnoses or 0.2% of the total number of disabilities (Table 5). Malaria is the most common disability at 22K diagnoses or 437.5% of this category. Chronic fatigue syndrome is the second most common disability at 17K or 28.8% of this category (Veterans Benefits Administration, 2021).

Malaria is a disease caused by a parasite that is spread to humans through the bites of infected mosquitoes" (Mayo Clinic, 2021). "If the right drugs are used, people

who have malaria can be cured and all the malaria parasites can be cleared from their body; however, the disease can continue if it is not treated or if it is treated with the wrong drug or the right drug but the wrong dose" (Centers for Disease Control and Prevention, 2022, para. 39). "Malaria infection exerts a tremendous impact on the body, which can have long–term health repercussions, ranging from accrued susceptibility to bacterial infection to cognitive impairment" (Wassmer and Mohanty, 2021, para. 1).

Chronic fatigue syndrome (CFS) is a complicated disorder characterized by extreme fatigue that lasts for at least six months and that cannot be fully explained by an underlying medical condition (Mayo Clinic, 2020). "The fatigue worsens with physical or mental activity, but does not improve with rest. There is no cure for chronic fatigue syndrome, and treatment focuses on symptom relief" (Mayo Clinic, 2020, para. 2). Table 33 outlines several signs and symptoms of CFS, and Table 34 details a number of reasonable accommodations appropriate for CFS.

Table 33: Chronic Fatigue Syndrome Signs and Symptoms.

CHRONIC FATIGUE SYNDROME SIGNS AND SYMPTOMS	
1	Fatigue
2	Problems with memory or concentration
3	Sore throat
4	Headaches
5	Enlarged lymph nodes in your neck or armpits
6	Unexplained muscle or joint pain
7	Dizziness that worsens with moving from lying down or sitting to standing
8	Unrefreshing sleep
9	Extreme exhaustion after physical or mental exercise
Source: Mayo Clinic, 2020	

Table 34: Reasonable Accommodations for Chronic Fatigue Syndrome (CFS).

REASONABLE ACCOMMODATIONS FOR CHRONIC FATIGUE SYNDROME (CFS)	
Participation in Class	Remote participation via video conferencing
	Notetakers or notes from the professor
	Audio recording class
Assignments	Flexibility when possible, emphasizing mastery over quantity of work
Exams	Additional time
	Scheduled and/or spontaneous rest breaks
	Allowance of food and drink as needed
	Alternative testing modalities (e.g., online, oral)
	Scheduling exams so that students can take advantage of their higher energy times
	Spacing out examinations (e.g., allowing two two-hour final tests to be taken on separate days rather than one four-hour final test the same day)
Source: Chu et al., 2020	

CHAPTER 2 – LITERATURE REVIEW

While the Americans with Disabilities Act (ADA) was enacted over three decades ago, the literature is surprisingly scant with studies measuring the educational impact of reasonable accommodations for students with disabilities. Of the limited research that does exist, the majority is focused on the preschool through grade 12 (PK–12) students with learning disabilities population, which is most likely due to passage of both the 1990 ADA combined with the 2002 No Child Left Behind Act (NCLB). The legal context below will provide more details as to why this is likely the case. In contrast, the absence of a NCLB equivalent may well be the predominant reason why the literature is less focused on the impact of reasonable accommodations on higher education student achievement. When focusing on the Student–Veteran population, literature measuring the impact of reasonable accommodations on student achievement seems to be nonexistent.

2.1 Legal Context

The Americans with Disabilities Act of 1990 (ADA) is an equal opportunity law for people with disabilities (U.S. Department of Justice Civil Rights Division, 2013). While the ADA protects people with disabilities from discrimination by state–funded schools and virtually all private colleges and universities (U.S. Department of Education Office for Civil Rights, 2020), it does not require higher educational institutions to identify their students with learning disabilities and provide them with reasonable accommodations. Higher education students must self–report to access reasonable accommodations in colleges and universities.

The Individuals with Disabilities Education Act (IDEA), however, does require all PK–12 public schools to “make available a free appropriate public education (FAPE)

to eligible children with disabilities throughout the nation and ensures special education and related services to those children" (U.S. Department of Education, 2017, para. 1). The combination of this legal mandate with the standardized testing requirements of NCLB seems to have resulted in a much greater focus on the educational achievement of PK–12 students with learning disabilities compared to higher education students with learning disabilities. For the past two decades, U.S. states have been accountable to the federal government for the performance of all students, which includes students with learning disabilities. The proverbial stick held by the federal government has been the threat of losing federal Title I money. "Title I, Part A (Title I) of the 1965 Elementary and Secondary Education Act, as amended by the 2015 Every Student Succeeds Act (ESEA) provides financial assistance to local educational agencies for children from low–income families to help ensure that all children meet challenging state academic standards" (National Center for Education Statistics, 2020, para 2). Even though Title 1 funding is generally a relatively small portion of a public school district budget, about five% (Dyrnarski & Kainz, 2015), it is sufficient to wield enormous influence because so–called Title 1 schools are by definition in cash–strapped, low–income areas where economic resources are very limited.

While these laws entitle students to accommodations at both the public PK–12 level and the post–secondary level, there are significant differences regarding how those services are accessed. At the public PK–12 level, the district is responsible for identifying students with disabilities, as well as testing and providing services. In college and graduate school, it is the student's responsibility to locate the office that provides services for students with disabilities, self-report, request accommodations, and provide adequate

documentation supporting the need for accommodation (Rae–O'Donnell, 2015). At the public PK–12 level, it is the school's responsibility to provide reasonable accommodations through an Individualized Education Plan (IEP) or 504 plan. In college, students must request accommodations. "Concerned professors sometimes refer students to the disability services office if they feel assistance might be needed, but there is no requirement for instructors to refer students" (Smith, 2019, para. 3).

2.2 Search Method

Resources employed during the development of this literature review primarily include the online libraries available to University of Massachusetts (UMASS) Amherst students. Within these resources, the Education Resources Information Center (ERIC) database was utilized extensively. "ERIC is a comprehensive, easy-to-use, searchable, Internet-based bibliographic and full-text database of education research and information. It is sponsored by the Institute of Education Sciences within the U.S. Department of Education" (Institute of Education Sciences, n.d., para. 1). The Institute of Education Sciences (IES) was also an important resource for this literature review, which includes the National Center for Education Research, the National Center for Education Statistics, the National Center for Education Evaluation and Regional Assistance, and the National Center for Special Education Research. IES was the statistics, research, and evaluation arm of the U.S. Department of Education (U.S. Department of Education, 2022). A third major source of information for this literature review was the use of Google Scholar and Google. Key search terms employed while conducting this research are listed in Table 35.

Table 35: Key Search Terms.

KEY SEARCH TERMS
veteran
education
benefits
college
university
achievement
disability
service-connected
reasonable accommodation
academic adjustment
disability law
Americans with Disabilities Act
Individuals with Disabilities Education Act
Every Student Succeeds Act
Post 9/11 GI Bill

2.3 Reasonable Accommodations in Higher Education

"More often than not, college students can receive many of the same accommodations they did in high school. However, there are some that are typically not appropriate in college, because they overstep the boundary of simply providing equal access. For example, an accommodation allowing multiple attempts at tests to achieve a particular score would not be allowed." (Smith, 2019, para. 1). "There is no exhaustive list of reasonable accommodations in college because accommodations are considered on an individual basis; however, there are some prevalent accommodations across institutions" (Smith, 2019, para 2). This literature review focuses on the more commonly available reasonable accommodations detailed in Table 36. One hundred studies were reviewed and incorporated into this literature review.

Table 36: Commonly Available Reasonable Accommodations in College.

COMMONLY AVAILABLE REASONABLE ACCOMMODATIONS IN COLLEGE	
1	Extended time on exams
2	Test Breaks
3	Testing over multiple days
4	Small group and individual administration
5	Noise reduction
6	Use of calculators for tests and exams
7	Note-taker or scribe
8	Audio recordings of classes
9	Speech-to-text (voice recognition)
10	Text-to-speech (digital)
11	Text-to-speech (human)
12	Manipulatives
13	Audiobooks
14	Preferential seating
Source: Hamblet, 2022; includenyc.org, 2021; Stefanakos, 2021	

In terms of impact on student achievement, extended–time–on–exams is the most heavily researched reasonable accommodation by far with 27 studies identified by the Principle Investigator of this dissertation (Table 37). Ranging from nine to 11 studies per accommodation, the next tier of research examining the impact of reasonable accommodations on student achievement includes use of calculators for tests and exams, audio recordings of classes, text–to–speech, and audiobooks (Table 37). The remaining nine reasonable accommodations have been less researched in terms of impact on student achievement with a range of zero to six studies per accommodation (Table 37). Only four of the 14 researched learning accommodations address higher education student achievement, representing a glaring minority (28.6%) of the literature identified (Table 37). Ten of the 14 (71.4%) learning accommodations researched address PK–12 student achievement (Table 37). In general., the limited body of research including the apparent absence of research at the higher education level, is insufficient to indicate conclusively

whether any of these commonly available learning accommodations provide a significant effect on the educational achievement of students with disabilities.

Of note, not a single study was identified that specifically examined the impact of reasonable accommodations on the educational achievement of Student–Veterans with military service–connected disabilities. Further, none of the 100 studies, neither PK–12 nor higher education, specifically examined the impact of reasonable accommodations on student graduation status.

Table 37: Reasonable Accommodation Studies Identified – Higher Education and PK–12.

	REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	HIGHER EDUCATION	PK-12
1	Recording of classes/lectures	9	9	0
2	Extended time on exams	27	7	20
3	Audiobooks	10	2	8*
4	Text-to-speech (digital)	10	1	9
5	Use of calculators for tests and exams	11	0	11
6	Text-to-speech (human)	6	0	6
7	Manipulatives	6	0	6
8	Speech-to-text (voice recognition)	6	0	6
9	Testing over multiple days	4	0	4
10	Note-taker or scribe	3	0	3
11	Test Breaks	3	0	3
12	Small group and individual administration	3	0	3
13	Noise reduction	2	0	2
14	Preferential seating	0	0	0
TOTAL STUDIES IDENTIFIED		100	19	73
PERCENTAGE OF TOTAL STUDIES IDENTIFIED			19.0%	81.0%
* Two of the audiobooks studies involved adults and coursework at the secondary level.				
NOTE: Zero studies were identified examining the impact of reasonable accommodations on student-Veteran educational achievement.				

2.3.1 Extended–Time–On–Exams

Extended–time–on–exams is an accommodation allowing extra time to a student to complete an assessment. Extended–time–on–exams is one of the more common testing accommodations provided to students with learning disabilities (Lovett, 2010). Twenty–

seven studies addressing extended–time–on–exams were reviewed with 12 studies finding positive impact, six studies finding mixed results, and nine studies finding no impact. Six of these studies were conducted at the higher education level, and 21 were conducted at the PK–12 level. These studies are summarized in Table 38, and details are provided next, stratified by type of impact.

Table 38: Reasonable Accommodation – Extended Time on Exams.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
EXTENDED TIME	27	12	44.4%	6	22.2%	9	33.3%	0	0.0%
	HIGHER EDUCATION								
	7	4	57.1%	2	28.6%	1	14.3%	0	0.0%
	PK-12								
	20	8	40.0%	4	20.0%	8	40.0%	0	0.0%

Twelve studies found the extended–time–on–exams accommodation to have positive impact:

1. Higher Education. A study involving 1,248 undergraduate students examined the effects of accommodations on grade point average (GPA). The researchers found that "test accommodations, particularly the extension of time and the modification of exam materials, had a positive impact on GPA" (Kim & Lee, 2016, p. 40).
2. PK–12. A study involving 145 students between the ages of thirteen and eighteen concluded that "allowing extended–time–on–exams for adolescents with Attention–Deficit/Hyperactivity Disorder (ADHD) to complete tests involving reading may help to compensate for their impairments of working memory and processing speed, allowing them to score closer to their actual verbal abilities" (Brown et al., 2011, p. 1).

3. Higher Education. A study involving 127 undergraduate students with learning disabilities investigated the relationship between the use of extended–time–on–exams testing accommodations and academic achievement. The researcher found that the students with disabilities who used the extended–time–on–exams accommodation achieved a statistically significantly higher GPA than the students with disabilities who did not use the same accommodation (Baker, 2006).
4. PK–12. A study involving 67 high school students with learning disabilities and a timed writing test found that additional time contributed to improved performance citing a significant relationship between the quality of sentence structure and extended–time testing conditions (Antalek, 2005).
5. PK–12. A study involving 213 fifth grade students and eighth grade students and a writing performance assessment found that the fifth grade students with learning disabilities performed significantly better with extended–time–on–exams than the eighth grade students (Crawford et al., 2004).
6. PK–12. A study involving 97 eighth grade students and a mathematics assessment found that extended–time–on–exams benefited all students, but students with learning disabilities and students at risk in math showed higher gains than students without learning disabilities (Elliott & Marquart, 2004).
7. PK–12. A study involving 47 fifth grade students found that "extended–time–on–exams seemed to benefit some fifth–grade students on problems that required substantial reading during a mathematics assessment" (Kappel, 2002, p. iii).
8. Higher Education. A study involving 60 undergraduate students, 30 with learning disabilities and 30 without learning disabilities, examined the relationship

between processing speed and the accommodation of extended test time for students with learning disabilities. Results showed that students with learning disabilities performed significantly lower on processing speed tests and derived greater benefit from the extended–time–on–exams accommodation compared to students without learning disabilities (Ofiesh, 2000).

9. PK–12. Another study involving 715,636 high school students found that allowing learning disabled students to retest with extended–time–on–exams clearly enabled them to improve their SAT I scores, but gains were generally modest with mean gains of 32 and 26 points on the verbal and math scales, respectively (Camara & Schneider, 2000).
10. PK–12. A study of a statewide assessment of 1,564 fourth grade students in Rhode Island found that extended–time–on–exams resulted in higher performance levels than those in other accommodation conditions (Elliott et al., 1999). The researchers theorized that perhaps the mere presence of no time constraint lowered the anxiety of the students and resulted in higher test scores (Elliott et al., 1999).
11. PK–12. A study involving approximately two million high school students found "the mean score gain for students with learning disabilities first completing a standard–time SAT I and retesting under an extended–time SAT I was more than three times as large as the mean score gain for both students without learning disabilities testing under standardized conditions and students with learning disabilities testing with extended–time–on–exams on both occasions" (Camara et al., 1998, p. 1).

12. Higher Education. A study involving 121 undergraduate students, 32 with learning disabilities and 89 without learning disabilities, evaluated whether providing additional time to complete classroom tests increased test scores. The researcher found that the extended–time–on–exams accommodation on tests benefited all students, particularly the students with learning disabilities, to the extent that their scores increased to the level of nondisabled students (Jarvis, 1997).

Six studies found the extended–time–on–exams accommodation to have mixed results:

13. Higher Education. A study involving 76 undergraduate students, 38 with attention–deficit/hyperactivity disorder (ADHD) and 38 without ADHD, examined the effects of extra time on reading comprehension performance. The researchers found that "extra time conferred an advantage to the ADHD group, suggesting that extended–time–on–exams accommodations are not specific and perhaps not necessary for all undergraduate students with an ADHD diagnosis" (Miller et al., 2013, p. 678).
14. Higher Education. A study involving 107 undergraduate students, 26 with learning disabilities and 81 without learning disabilities, examined the effects of the extended–time–on–exams accommodation on reading comprehension performance. The researchers found that, when only students with learning disabilities were given extended time, they outperformed nondisabled peers (Lewandowski et al., 2012). However, when both students with and without learning disabilities were granted the extended–time–on–exams accommodation,

the researchers found that the students without learning disabilities benefited more than the students with learning disabilities, indicating that extended–time–on–exams is not a test accommodation that is specific to those with a disability (Lewandowski et al., 2012).

15. PK–12. A meta–analysis was conducted to address whether test scores from extended–time–on–exams accommodated and standard test administrations are comparable for high school students with learning disabilities and their peers without learning accommodations. The results of the meta–analyses raised more questions than answers and highlighted the need for future research in this area. (Gregg & Nelson, 2010)
16. PK–12. A study involving 62 second through eighth–grade students who were deaf or hard of hearing found that extended–time–on–exams was used most frequently with mixed effects on student reading and language achievement performance; changes in language scores, but not in reading scores, were found (Wolf, 2007).
17. PK–12. A study involving 72 high school students explored the impact of providing standard time, time and a half (1.5 time) with and without specified section breaks, and double time without specified section breaks on the verbal and mathematics sections of the SAT. “Results were mixed indicating that time and a half with separately timed sections benefited students with and without disabilities, and the effects of extended–time–on–exams were more pronounced for the mathematics sections of the SAT” (Mandinach et al., 2005, p. 1).

18. PK–12. A meta–analysis of 36 studies that researched frequently allowed test accommodations, including extended time, found mixed results indicating both support and nonsupport for providing the extended–time–on–exams as an accommodation to students with learning disabilities (Bolt & Thurlow, 2004).

Nine studies found the extended–time–on–exams accommodation to have no significant effect:

19. PK–12. A study analyzed 222 individualized education plans (IEP)s of eighth through eleventh grade students comparing accommodations in the classroom with reading, writing, and math assessments of secondary students with various disabilities who had emotional and behavioral problems. This study found "no differences associated with students' academic, emotional., and behavioral functioning on standardized tests with or without extended–time–on–exams" (Goldstone et. al., 2021, para. 11)
20. PK–12. "A study reviewed the individualized education programs (IEPs) of 66 third through eighth–grade students with learning disabilities that indicated extended–time–on–exams was the most used accommodation in a reading assessment. The results showed no statistical significance resulting from the use of extended–time–on–exams as an accommodation" (Rudzki, 2015; Goldstone et al., 2021, para. 8).
21. Higher Education. A study involving 129 undergraduate students, 61 with attention–deficit/hyperactivity disorder (ADHD) and 68 without ADHD, investigated whether extended–time–on–exams affects math test scores. The researchers found that "extended test time had no significant effect on math test

scores or on the amount of time students took to complete the test. However, students with ADHD, on average, took more time to complete the test, attained lower test scores, and had lower state self–esteem than students without ADHD" (Wadley & Liljequist, 2013, p. 263).

22. PK–12. A study involving 65 fifth through seventh grade students with and without attention deficit hyperactivity disorder (ADHD) found that the ADHD group did not make more gains than the control group with extended–time–on–exams (Lewandowski et al., 2007). However, the ADHD group did demonstrate lower processing speed, math fluency, and achievement (Lewandowski et al., 2007). These findings suggest that, although students with ADHD tend to work with less overall efficiency in terms of processing speed and task fluency, they do not benefit significantly more than nondisabled students when given extended–time–on–exams on a speed–based math task (Lewandowski et al., 2007).
23. PK–12. A study involving the Scholastic Aptitude Reasoning Test (SAT®, 2005) was examined across two groups of students (students without disabilities tested under standard time conditions, and students with disabilities tested with extended time) to determine whether the test measures the same construct for both groups (Lindstrom & Gregg, 2007). The researchers found that extended–time–on–exams yielded no statistical impact on student scores across the two groups on the Critical Reading, Math, and Writing sections of the SAT Reasoning Test (Lindstrom & Gregg, 2007).
24. PK–12. A study involving 2,500 ninth grade students and a statewide mathematics test found that found that extended–time–on–exams contributed little

to understanding why accommodated and non–accommodated students differed in their test performance (Cohen et al., 2005). The researchers suggested that mathematics competency differentiated the groups of student learners regardless of their accommodation (Cohen et al., 2005).

25. PK–12. A study involving 97 eighth grade students with disabilities found that the math scores of students with disabilities did not improve significantly more than those of students without disabilities in the extended–time–on–exams accommodated condition as compared with the non–extended–time–on–exams accommodated condition (Elliott & Marquart, 2004).
26. PK–12. A study involving 49 fifth grade students and the reading subtests of the California Achievement Tests found that students with learning disabilities did not use significantly more time even when given the option and were not found to benefit from the extended–time–on–exams accommodation (Beuhler, 2001).
27. PK–12. A study involving 373 fourth and fifth grade students found that extended–time–on–exams may benefit most students suggesting that the use of extended–time–on–exams as an accommodation may inflate the scores of students with learning disabilities (Fuchs et al., 2000).

Summary of Extended–Time–on–Exams Research

"Extended–time–on–exams may benefit some students with various disabilities across the grade span from primary to secondary levels" (Goldstone, et al., 2021, para. 3). The research on the effects of extended–time–on–exams on the educational achievement of students with disabilities is inconclusive with some studies finding benefit and others finding mixed effects, or no effect" (Goldstone, et al., 2021, para 16). Given this range of

findings, it is not clear whether the extended–time–on–exams accommodation provides a significant effect on the educational achievement of students with disabilities. Adding further uncertainty to the issue, Bridgeman et. al (2004) found that high–scoring (non–disabled) students tended to benefit more than the lower–scoring students when allotted extra time on the SAT.

2.3.2 Use of Calculators for Tests and Exams

The calculator accommodation involves the use of an electronic device to make mathematical calculations and is one of the most common accommodations given to students with disabilities (Goldstone, et al., 2021). "Calculator use may be beneficial for many students with disabilities, including those with learning disabilities, emotional disabilities, and sensory or physical disabilities" (Bolt & Ysseldyke, 2008; Goldstone et al., 2021). "Students with mild intellectual disabilities may also find them useful" (Yakubova & Bouck, 2014; Goldstone et al., 2021). Eleven PK–12 studies were identified with seven studies finding positive impact, two studies finding mixed results, one study finding no impact, and one study finding negative impact (Table 39).

Table 39: Reasonable Accommodation – Use of Calculators for Tests and Exams.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
USE OF CALCULATORS FOR TESTS AND EXAMS	11	7	63.6%	2	18.2%	1	9.1%	1	9.1%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	11	7	63.6%	2	18.2%	1	9.1%	1	9.1%

Seven studies found the use of a calculator accommodation to have positive impact:

1. PK–12. A study involving five eighth grade students with disabilities compared the performance of the students on computational–based mathematics assessments

with and without the use of calculators. The researchers found that, “in general., students attempted most problems regardless of the availability of a calculator but earned more points when they had access to and used a calculator. Although students indicated positive perspectives in terms of calculator use, most students used a calculator on less than half of the intervention problems” (Bone & Bouck, 2018, p. 2).

2. PK–12. A study involving 42 sixth, seventh and eighth graders with students with learning disabilities explored whether the use of calculators for tests and exams as a standard accommodation during math instruction and assessment contributed to improved performance. The researcher found that “when using the calculator, students with learning disabilities in grades six, seven and eight performed significantly better on a statewide end of the year math assessment when compared to the previous similar assessment, which was administered without the calculator accommodation” (Russell, 2014, p. 152).
3. PK–12. A study involving five fifth grade students with mild learning disabilities explored the effects of the calculator accommodation on mathematical performance. The researchers found that use of a calculator increased the accuracy and efficiency of the mathematical performance of all five students (Yakubova & Bouck, 2014). The positive impact of a calculator was particularly noticeable with regards to students’ responses to word problems (Yakubova & Bouck, 2014).
4. PK–12. A study involving 868 seventh grade students explored whether or not modifications in test administration influence item functioning for students with

disabilities on a high–stakes statewide problem–solving assessment. The researchers found that all students, with and without learning disabilities, performed statistically better than students who did not have access to a calculator (Randall et al., 2011). However, students with learning disabilities did not benefit more than students without learning disabilities from the use of a calculator (Randall et al., 2011).

5. PK–12. A study involving 40 seventh graders explored the performance of students with and without disabilities on a mathematics assessment aligned to state standards using graphing calculators as an accommodation. The study utilized a pre–test post–test design in which the students did not use a calculator on the pre–assessment, and approximately half had access to a calculator on the post–assessment. "The results indicate that students with disabilities made gains from preassessment to post–assessment, but students without disabilities performed statistically significantly better on the post–assessment than did students with disabilities. The results raise concern about the validity of calculators as assessment accommodations for students with disabilities" (Bouck, 2008, p. 207).
6. PK–12. A study involving 89 sixth grade students explored the impact of a calculator as an accommodation on the performance of students with and without disabilities on a mathematics assessment aligned to state standards. The study utilized a pre–test post–test design in which no student was given access to a calculator on the pre–test, and approximately half of the students had access to a calculator on the post–test. "The results suggest that both students with disabilities

and students without disabilities benefited from access to a calculator (Bouck & Bouck, 2008). The findings raise concern about the use of calculators for tests and exams as a valid accommodation on assessments" (Bouck & Bouck, 2008, p. 17).

7. PK–12. A study involving 373 fourth grade students examined the use of a data–based assessment process to supplement teacher judgments about test accommodations. "Students with learning disabilities, as a group, profited differentially from accommodations (including use of calculators) on problem-solving curriculum-based measurements. These accommodations also boosted performance differentially on large-scale assessments" (Fuchs et al., 2000, p. 65).

Two studies found the use of a calculator accommodation to have mixed results:

8. PK–12. A study involving more than 73,000 eighth grade students explored factors that explain performance differences between examinees allowed to use a calculator or who were afforded item presentation accommodations versus those who did not receive the same accommodations. The researcher "found calculator use was effective for items requiring basic arithmetic but did not benefit students with disabilities who used calculators on difficult items requiring abstract thinking" (Scarpatti et al., 2011; Goldstone et al., 2021).
9. PK–12. A study involving 1,944 students examined the effects of calculator accommodation on the mathematics performance of students within the context of a large–scale statewide assessment. Students in third grade (947) and sixth grade (997) took a statewide assessment and retested a year later in fourth and seventh grade. The researchers found that "calculator use had mixed results, with increased math scores for students with disabilities in third and fourth grades, but

decreased scores for students with disabilities in sixth and seventh grades" (Engelhard et al., 2011; Goldstone et al., 2021).

One study found the use of a calculator accommodation to have no effect:

10. PK–12. A study involving 30 middle school students with and without learning disabilities examined the effects of calculators on mathematical problem–solving abilities and anxiety levels. The 15 students with learning disabilities were also diagnosed with attention deficit–hyperactivity disorder (ADHD). The researcher found that "calculators do not have a significant impact on the mathematical problem-solving abilities or anxiety levels of middle school students" (Parks, 2009, p. 90).

One study found the use of a calculator accommodation to have a negative effect:

11. PK–12. A study involving 100 sixth through twelfth grade students with disabilities examined whether or not the use of a calculator accommodation impacted test performance and other areas of achievement, such as grade point averages (GPA). The researcher found that the special education students who used the calculator accommodation scored lower on both the English Language Arts and Mathematics exams (Taylor, 2017). Additionally, the study indicated no difference between the two groups with respect to overall GPA (Taylor, 2017).

Summary of Calculators Research

The performance of students with disabilities across all grade levels "increased when a calculator was used regardless of the type of calculator (e.g., four-function, graphing, etc.) used" (Goldstone et al., 2021, para. 20). Studies on the educational impact of the use of calculators for tests and exams accommodation is generally positive with a

minority suggesting mixed, neutral., or negative impact. While it appears that the use of calculators for tests and exams accommodation is promising, it should also be noted that several studies questioned the validity of the accommodation because it benefitted students without disabilities to an even greater extent. Moreover, there is an apparent absence of research investigating the impact of the use of calculators for tests and exams on student achievement at the college level.

2.3.3 Text–to–Speech (Digital)

Text–to–speech (digital) refers to technology that reads aloud written test items using computer software to generate a digitized voice. "This version of audio delivery is different from others that use the human voice, either in–person by a test administrator at the time of the assessment or a previously recorded human voice" (Goldstone, et al., 2021). Nine PK–12 studies were located that addressed text–to–speech (digital) as an accommodation with three studies finding positive impact, four studies finding mixed results, one study finding no impact, and two studies finding negative impact (Table 40) One higher education study found mixed results (Table 40).

Table 40: Reasonable Accommodation – Text–to–Speech (Digital).

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
TEXT-TO-SPEECH (DIGITAL)	10	3	30.0%	4	40.0%	1	10.0%	2	20.0%
	HIGHER EDUCATION								
	1	0	NA	1	NA	0	NA	0	NA
	PK-12								
	9	3	33.3%	3	33.3%	1	11.1%	2	22.2%

Three studies found the text–to–speech (digital) accommodation to have positive impact:

1. PK–12. A study involving four ninth grade students with disabilities investigated the effectiveness of text–to–speech on the reading comprehension and oral reading fluency of students with learning disabilities. The researcher found that "three of four high school students with learning and additional disabilities improved their performance on an assessment measuring vocabulary, literary analysis, and comprehension when provided with the computer-generated text-to-speech" (Young, 2017; Goldstone et al., 2021).
2. PK–12. A study involving 104 high school students with disabilities and reading difficulties evaluated the effectiveness of a text–to–speech software intervention on reading performance. "The results indicated that study participants significantly improved their reading skills, which the researchers attribute to students' exposure to more text and incidental vocabulary learning through the use of the TTS software" (Stodden et al., 2012, p. 360).
3. PK–12. A study involving seven high school students with disabilities examined the effects of a text–to–speech screen reader program on academic achievement. The researchers' "findings suggest that the text–to–speech support increased unit quiz and reading comprehension performance with large effect sizes" (Izzo et al., 2009, p. 9).

Four studies found the text–to–speech (digital) accommodation to have mixed results:

4. PK–12. A study involving 90 second grade Japanese students learning English found use of a speaking pen improved overall skills, particularly listening ability. "In terms of reading, the results shows that the children who used a speaking–pen five to seven times a week tended to score higher on tests than those who seldom used a speaking–pen. In terms of listening, the speaking–pen was effective for boys but significantly negative for girls. In terms of speaking, the speaking–pen was effective for the children who had previously learned at a private English school" (Tsubak & Maeda, 2019, pp. 751-752).
5. Higher Education. A study involving three post–secondary students with university–recognized reading disabilities investigated the effects of reading pen assistive technology on reading comprehension accuracy and rate. The researchers found that "use of a reading pen did not uniformly improve the comprehension of the post–secondary students. The study indicated that the student with the poorest reading skills benefitted the most" (Schmitt et al., 2012).
6. PK–12. A study involving nine ninth grade students with disabilities assessed the use of text–to–speech on reading comprehension. "Results varied across students; however, the majority of students showed improved comprehension scores" (Stetter & Hughes, 2011, p. 88).
7. PK–12. A study involving six fifth grade students investigated the effects of text–to–speech and word prediction on four narrative composition–writing skills (writing fluency, syntax, spelling accuracy, and overall organization). "The results

indicated that word prediction alone or in combination with text-to-speech had a positive effect on the narrative composition-writing skills of the targeted students. With text-to-speech alone, inconsequential results were observed" (Silió & Barbetta, 2010, p. 17).

One study found the text–to–speech (digital) accommodation to have no impact:

8. PK–12. A study involving three junior high school students with disabilities examined the effectiveness of text–to–speech on oral reading fluency, comprehension, and task completion time. While the results "hold promise as a compensatory tool for adolescents with learning disabilities in accessing grade-level expository text, the text-to-speech (digital) accommodation did not affect students' fluency, comprehension, or task completion time" (Meyer & Bouck, 2014, p. 21).

Two studies found the text–to–speech (digital) accommodation to have negative impact:

9. PK–12. A study involving four secondary students with learning disabilities examined the effectiveness of live and text–to–speech read–aloud accommodations on reading comprehension and task completion time. "Compared to reading independently during baseline, live read–aloud accommodations increased comprehension, but text–to–speech read–alouds resulted in negative effects for comprehension" (Meyer & Bouck, 2017).
10. PK–12. A study involving 22,544 fourth grade students examined the effect of the read–aloud test accommodation on student achievement on the National Assessment of Educational Progress (NAEP) in Reading for students with

disabilities. The researcher found “the mean scores for those who received the read–aloud accommodation were lower than those who did not receive the accommodation” (Ricci, 2015, p. 4).

Summary of Text–to–Speech (Digital) Research

Across studies, students with (and without) disabilities have experienced positive effects, mixed results, no effects, and negative effects from using the text–to–speech (digital) accommodation. Students had positive perceptions of text–to–speech (digital), even in situations where there were no performance benefits from using the accommodation. “Some students who have print–related disabilities may find it useful, including those with reading–related learning disabilities (Young, 2017) and visual impairments” (Hansen et al., 2016; Goldstone et al., 2021). The mixed results in the literature, as well as the apparent absence of research involving college students, does not conclusively indicate whether or not the text–to–speech accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.4 Audiobooks

An audiobook is a voice recording of a book that you can listen to rather than read (Merriam–Webster.com, 2022). Audiobooks can be exact word–for–word versions (unabridged) or shortened, abridged versions (Audible Inc., 2022). Unabridged audiobooks contain all of the details, while abridged versions provide the main idea (Audible Inc., 2022). Whereas text–to–speech allows students to see text and hear it aloud at the same time, audiobooks allow students to hear books read aloud (Understood.org, 2022). Ten studies were located that addressed audiobooks as an accommodation with five finding positive impact, two studies finding mixed results, two

studies finding no impact, and one study finding negative impact (Table 41). Two of these studies were conducted at the higher education level, two at the adult education level, and six at the PK–12 level (Table 41).

Table 41: Reasonable Accommodation – Audiobooks.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
AUDIOBOOKS	10	5	50.0%	2	20.0%	2	20.0%	1	10.0%
	HIGHER EDUCATION								
	2	1	50.0%	0	0.0%	0	0.0%	1	50.0%
	PK-12								
	6	3	50.0%	2	33.3%	1	16.7%	0	0.0%
	ADULT EDUCATION								
	2	1	50.0%	0	0.0%	1	50.0%	0	0.0%

Five studies found the audiobooks accommodation to have positive impact:

1. PK–12. A study involving 28 ninth grade Kazakhstani English as a foreign language (EFL) students examined the effects of an intervention using audiobooks for the development of reading fluency in terms of reading speed and reading comprehension. Silent reading with audiobooks (experimental group) and silent reading only (control group) were compared with a mixed–method study design. "The experimental group (silent reading with audiobooks) was found to significantly outperform the control group (silent reading only) in reading speed while preserving substantial comprehension of the texts" (Tusmagambet, 2020, 41).
2. Higher Education. A study involving 66 undergraduate English as a Foreign Language (EFL) students at a state university in Turkey investigated the effects of audiobooks on listening comprehension skills. The findings showed that using audiobooks had a positive impact on students' listening comprehension skills and pronunciation (Kartal & Simsek, 2017).

3. Adult. A study involving 27 adult students with low reading comprehension skills explored whether an instructional unit infused with audiobook technology could show substantial learning gains. The researcher found a stated improvement in reading comprehension ability for learners when an audiobook is introduced into a research–informed instructional unit suggesting that audiobook technology is a viable strategy to help adult learners increase their reading comprehension skills (Wagar, 2016).
4. PK–12. A study involving 21 fourth and fifth grade students examined the impact of the use of audiobooks with struggling readers in a school library audiobook club. Standardized test data as well as pre– and post–study interviews and surveys, teacher questionnaires, parent questionnaires, and student interviews were analyzed. The researchers found that struggling readers' use of audiobooks had a positive impact on reading skills (Whittingham et al., 2013).
5. PK–12. A study involving 20 upper elementary students with reading disabilities compared the efficacy of assisted reading with digital audiobooks with the traditional practice of sustained silent reading in terms of reading fluency. The results showed that while all students demonstrated growth in reading fluency as calculated by words read correctly per minute, the growth of the treatment group far outweighed that of the control group (Esteves & Whitten, 2011). The researchers concluded that teachers could promote greater growth in reading fluency when assisted reading with digital audiobooks is implemented in the place of sustained silent reading (Esteves & Whitten, 2011).

Two studies found the audiobooks accommodation to have mixed results:

6. PK–12. Moore and Cahill (2016) reviewed the literature on audio delivery of content to three adolescent groups: adolescents with visual impairments or learning disabilities, adolescent second language learners, and typically developing adolescents. The researchers found that "the studies of audio delivery of content are mixed, and great variability in outcomes have been reported, depending on the characteristics of the groups studied. Numerous gaps exist in the research surrounding adolescents' use of audiobooks, including examinations of the effectiveness of commercially produced audiobooks and explorations of adolescents' listening preferences" (Moore & Cahill, 2016, p. 1).
7. PK–12. A study involving 25 fifth through eighth grade students explored how the use of audiobooks versus print books impacts English Language Learners and Special Education student achievement in reading comprehension and the impact on student motivation to meet learning goals. The results indicate that "the use of audiobooks improves student reading comprehension scores, and there is some evidence to show that the use of audiobooks motivates increased student reading" (Thooft, 2011, p. 4). "While the average reading comprehension score for students who listened to audiobooks was 6% higher than the scores of independent book readers, there were four students who listened to audiobooks that showed a decrease in their reading comprehension score. Some students may have a more difficult time with the audiobook format due to lack of focus, poor listening skills, language barriers, etc." (Thooft, 2011, pp. 25-26).

Two studies found the audiobooks accommodation to have no impact:

8. Adult. In a study involving 91 adults between the ages of 25 and 40, the same instructional material (the preface and a chapter from a non–fiction book) was delivered in a different input modality (digital audiobook, e–text, dual modality) to three separate groups. The researchers found no significant differences in reading comprehension based on whether a portion of a non–fiction book was presented via audiobook, e–text, or dual modality (Rogowsky et al., 2016). "Additional analyses showed that both males and females in each condition recalled an equal amount of information, regardless of whether they listened to an audiobook, read from an electronic tablet, or both listened and read simultaneously (dual modality)" (Rogowsky et al., 2016, p. 1). The researchers concluded that, "for the average, college–educated, native language English reader, comparable comprehension and retention of text occur regardless of the modality of presentation" (Rogowsky et al., 2016, p. 8).
9. PK–12. A study involving 25 middle–school remedial readers examined the effects of listening–while–reading and silent reading using text–to–speech assistive technology on reading comprehension. Participants completed reading comprehension assessments after listening–while–reading and silent reading using text–to–speech assistive technology. The researchers found "no significant differences between listening–while–reading and silent reading using text–to–speech assistive technology" (Schmitt et al., 2011, p. 37).

One study found the audiobooks accommodation to have negative impact:

10. Higher Education. A study involving 48 undergraduate students examined the retention of students who listened to podcasts of a primary source to the retention of students who read the source as text. "Assessments revealed that the podcast group performed more poorly than did students who read the text, suggesting that audio podcasts are not effective learning tools for the mastery of primary course content, such as vocabulary and core concepts" (Daniel & Woody, 2010). The researchers were not surprised by these results citing basic research from the 1980s (e.g., Dixon et al., 1982; Green, 1981; Hildyard & Olson, 1978) and suggested that podcasts do not deliver primary content as well as textbooks (Daniel & Woody, 2010, p. 199).

Summary of Audiobooks Research

Across 10 studies, students with (and without) disabilities experienced positive effects, mixed results, no effects, and negative effects from using the audiobooks accommodation. Six of the 10 studies involved PK–12 students; two studies involved adult education students; and two studies involved undergraduate students. While half of the studies found positive impact on student achievement, the mixed results combined with the limited number of studies (2) involving undergraduate students does not conclusively indicate whether or not the audiobooks accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.5 Recording–of–Classes/Lectures

Lecture/class recordings are increasingly used to supplement lecture/class attendance within higher education, but their impact on student learning remains unclear.

Students with this accommodation may have a perceptual., physical or some other disability which impedes their ability to process information at the same rate as other students. Nine higher education studies involving undergraduate students were identified, four with positive impact, one with mixed results, two with no impact, and two with negative impact (Table 42)

Table 42: Reasonable Accommodation – Recording of Classes/Lectures.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
RECORDING-OF-CLASSES/LECTURES	9	4	44.4%	1	11.1%	2	22.2%	2	22.2%
	HIGHER EDUCATION								
	9	4	44.4%	1	11.1%	2	22.2%	2	22.2%
	PK-12								
	0	0	NA	0	NA	0	NA	0	NA

Four studies found the recording–of–lectures/classes accommodation to have positive impact:

1. Higher Education. A study involving 498 undergraduate students examined the impact of the availability of recorded lectures on student achievement. The researchers found that the availability of lecture recordings had a positive impact on student achievement and no impact on class attendance; the lecture recordings were viewed more often by students who regularly attended the lectures than those who were absent (Spittaels & Vanacker, 2019).
2. Higher Education. A study involving 54 undergraduate students compared the academic performance of three sections of the same course taught by the same professor at a small college. One section had access to recordings before class, one had access after class, and one had no access. The researcher found that students with access before class received slightly higher scores on quizzes, tests,

and final course grade, although only the difference in test scores was statistically significant (Bruxvoort, 2012). The results of this study suggest that lecture capture technology may have a positive effect on student learning, particularly when used to support the flipped classroom model (Bruxvoort, 2012).

3. Higher Education. A study involving 100 college seniors aimed to combine podcasts of lectures with mobile assessments (completed via SMS on mobile telephones) to assess the effect on examination performance. Students were randomly divided into equal–sized control and trial groups. The trial group was given access to podcasts and mobile formative assessments for lectures. Towards the end of the course, all students completed a mock examination on the material in the lectures. Students in the trial group who listened to podcasts of the lectures and completed mobile assessments performed significantly better in the formative assessment than other students (Morris, 2010). The results of this study indicate that providing supporting resources does have positive impact on student performance (Morris, 2010).
4. Higher Education. iTunes University, a website with downloadable educational podcasts, sought to determine the effectiveness of audio lectures in higher education. College students participated in one of two conditions. In the lecture condition, participants listened to a 25–minute lecture given in person by a professor using PowerPoint slides. Copies of the slides were given to aid note–taking. In the podcast condition, participants received a podcast of the same lecture along with the PowerPoint handouts. One week from the initial session students returned to take an exam on lecture content. Results indicated that

students in the podcast condition who took notes while listening to the podcast scored significantly higher than the lecture condition (McKinney et al., 2009).

One study found the recording–of–lectures/classes accommodation to have mixed results:

5. Higher Education. A study involving 168 undergraduate physics students investigated the impact of recorded lectures on overall student achievement. The researchers found that "the type of lecture (recorded or face–to–face) did not serve to significantly impact overall student achievement; however, results of this study also suggest weaker performing students self-select higher levels of recorded lecture use, and the use of these video lectures may assist this specific group of students in closing the gap between themselves and students who were initially higher performing and more engaged" (Murphy & Stewart, 2015, p. 9).

Two studies found the recording–of–lectures/classes accommodation to have no impact:

6. Higher Education. A two–year study involving 69 college sophomore students evaluated the use and impact of lecture recordings. The researchers found that recording was not associated with a significant change in final exam scores between years one and two (Leadbeater et al., 2013). A second analysis compared a cohort of audio recording users to a cohort of non–users and found no discernable impact of lecture recording on users' exam grades (Leadbeater et al., 2013).
7. Higher Education. A study involving 206 first and second year medical school students evaluated whether recorded lectures impacted student performance.

"While student perception of the recordings was positive, the researchers found that lecture recordings did not have an impact, either in a positive or negative direction on exam performance across seven first– and second–year basic science courses" (Franklin et al., 2011, p. 21).

Two studies found the recording–of–lectures/classes accommodation to have negative impact:

8. Higher Education. A study involving 847 undergraduate students examined the impact of the availability of audio/video recordings of lectures on academic performance in a large enrollment, two–term, second year biomedical science course. Academic performance was compared between two matched cohorts enrolled in the same biomedical science course taught by the same instructor in which one course had access to lecture recordings and the other did not. The researchers found that, while the cohorts had similar in–class attendance and GPA, the students with the lecture recordings performed more poorly than the students without the accommodation (Baillie et al., 2022).
9. Higher Education. A study involving a matched cohort before (N = 161) and after (N = 160) of undergraduate students examined the impact of recorded lectures in a compulsory second year research methods module. The researchers found that recorded lectures resulted in lower attendance but did not compensate for this lower attendance; the net effect of recorded lectures on student achievement was generally negative (Edwards & Clinton, 2018).

Summary of Recording–of–Classes/Lectures Research

The range of findings, along with the apparent absence of studies involving college students with disabilities, is insufficient to indicate conclusively whether the recording of classes accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.6 Text–to–Speech (Human)

Text–to–Speech (human) is a text–to–speech test accommodation in which written materials are presented orally by a person while a student listens. A test administrator may read the test directions, test questions, answer choices, and sometimes entire passages (Cawthon, 2008; Meloy et al., 2002; Randall & Engelhard, 2010). Text–to–speech (human) is typically combined with other accommodations such as extended–time–on–exams and small group setting (Fletcher et al., 2006; 2009). Six PK–12 studies were located that addressed text–to–speech (human) as an accommodation in assessments with three studies finding positive impact, one study finding mixed results, one study finding no impact, and one study finding negative impact (Table 43).

Table 43: Reasonable Accommodation – Text-to-Speech (Human).

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
TEXT-TO-SPEECH (HUMAN)	6	3	50.0%	1	16.7%	1	16.7%	1	16.7%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	6	3	50.0%	1	16.7%	1	16.7%	1	16.7%

Three studies found the text–to–speech (human) accommodation to have positive impact:

1. PK–12. A study involving 89,214 students in grade 10 examined the effect of human read aloud accommodations on test structure and student performance on the mathematics portion of the South Carolina High School Exit Examination. This study found that "students with disabilities who received the human read aloud accommodation performed better than students with disabilities who did not receive the human read aloud accommodation" (Huynh et al., 2004, p. 39).
2. PK–12. A study involving 260 middle school students examined the effect of a human read aloud testing accommodation on students with and without a learning disability in reading. The students were administered the Iowa Tests of Basic Skills including Usage and Expression, Math Problem–Solving and Data Interpretation, and Science. All three of these content areas tested reading ability in addition to the content skills/ knowledge they were designed to measure. "Students in both groups achieved significantly higher test scores with the read aloud testing accommodation. While it was expected that the students with disabilities would achieve higher test scores with the human read aloud accommodation, it was not expected that the students without disabilities would make substantial gains as well" (Meloy et al., 2002, p. 252). Importantly, this finding indicates that the human read aloud accommodation yields higher test scores for all students, which calls into question the validity of the accommodation. A valid test accommodation compensates for the disability of the

student and should not be equally helpful to both students with and without disabilities (Fuchs et al., 2017).

3. PK–12. A study involving 81 high school students with learning disabilities compared the effects of human read aloud test accommodation, to computer–based test accommodation, to a noncomputer–based test accommodation, and to no accommodation on mathematics performance assessment. “Results indicated that providing a reader, either human or computer, increased scores, but no significant difference was seen among human read aloud, computer read, and computer read with video” (Calhoon et al., 2000, p. 65).

One study found the text–to–speech (human) accommodation to have mixed results:

4. PK–12. A study involving 1,940 students with disabilities in grades three through seven examined the effects of the human read aloud accommodation on the reading performance of students within the context of a large–scale statewide assessment in Georgia. Students took the standardized operational version of the assessment in grades three and grade six, and then they were retested the following spring in grades four and seven with the human read aloud accommodation. “Results suggest that the use of resource guides was not effective and that they may have been distracting for the students. The findings also indicate that the use of the read-aloud test modification provided a differential boost in reading performance for students with disabilities in the fourth grade but not for seventh-grade students” (Randall & Engelhard, 2010, p. 79).

One study found the text–to–speech (human) accommodation to have no impact:

5. PK–12. A study involving 5,835 students with disabilities in grades six, seven, and eight compared student achievement between students who received a human (teacher) read aloud accommodation and a computer read aloud accommodation. The results indicated no significant difference in student achievement across these two modes (Harris, 2008). This study revealed no differences between the two test accommodations in the four depth of knowledge categories, constructed response items, or extended response items in all grades (Harris, 2008).

One study found the text–to–speech (human) accommodation to have negative impact:

6. PK–12. A study involving 100 students in grades six through 12 with learning disabilities assessed the impact of the human read aloud accommodation on student achievement on the Massachusetts Comprehensive Assessment System. "Results showed negative impact as students with disabilities who did not receive the accommodations outperformed those who did receive the accommodations" (Taylor, 2017, p. 5). This study also evaluated the impact of the human read aloud accommodation on other areas of achievement, such as grade point average (GPA) and frequency of disciplinary referrals. "The researcher found no difference between the two student groups with respect to GPA or disciplinary referrals" (Taylor, 2017, p. 5).

Summary of Text–to–Speech (Human) Research

"Human read aloud may benefit some elementary or secondary students with disabilities (Flowers et al., 2011), including some students with learning disabilities

(Calhoon et al., 2000; Fletcher, 2006; 2009; Kappel, 2002), dyslexia (Fletcher, 2006; 2009), visual impairments including blindness (Barton, 2001), and deaf/hard-of-hearing (Cawthon, 2008) whose disabilities impact their skills in decoding text, language processing, or accessing text across different academic content assessments (Cawthon, 2008; Fincher, 2013)" (Goldstone et al., 2022, para. 3). The mixed results in the literature do not conclusively indicate whether or not the human read aloud accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.7 Speech–To–Text

Speech–to–text is the use of a software program to accommodate students when writing. "Speech–to–text technology differs from other methods of transferring spoken words to text, such as scribing, in that no additional person is needed for a student's words to be typed on a screen" (Liu et al., 2019, p. 1). Rather, students simply speak into a device with speech recognition capabilities, and a speech–to–text software program converts their speech into typed words on a computer monitor or device screen (Liu et al., 2019). Six PK–12 studies were located that addressed speech–to–text as an accommodation in writing assessments (Table 44). Three studies found the speech–to–text accommodation to have positive impact, and three studies found the speech–to–text accommodation to have mixed results (Table 44).

Table 44: Reasonable Accommodation – Speech-to-Text.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
SPEECH-TO-TEXT	6	3	50.0%	3	50.0%	0	0.0%	0	0.0%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	6	3	50.0%	3	50.0%	0	0.0%	0	0.0%

Three studies found the speech–to–text accommodation to have positive impact:

1. PK–12. A study involving three middle school students with mild–to–moderate Traumatic Brain Injury (TBI) and writing difficulties compared the effects of handwriting with an assistive technology accommodation. The study compared the effects of handwriting responses to story prompts to the use of speech–to–text assistive technology to record participant responses. “All three participants showed marked improvement with the application of speech–to–text assistive technology demonstrating significantly improved performance across writing indicators” (Noakes et al., 2019, p. 5). “The students each improved in the quality, construction, and duration of their written expression as evidenced in the significant gains in total words written, words spelled correctly, and correct written sequences” (Noakes et al., 2019, p. 6).
2. PK–12. A study involving four fourth grade students investigated the use of speech recognition technology as a means of remediating the writing problems of students with learning disabilities. “The results indicated that both speech recognition software and digital voice recorder modes were notably superior to the handwriting mode in terms of the fluency and mechanical aspect of writing, but there was little to mild difference between the dictation modes and the handwriting mode in terms of the syntactic complexity and story structure level of the writing. While all four students performed better using dictation–related technology, the type of technology facilitating these positive outcomes varied by student” (Lee, 2011, p. 5).

3. PK–12. A study involving 31 high school students investigated the feasibility and impact of using dictation to a scribe and dictation with speech recognition software as test accommodations with students with learning disabilities. “The results demonstrate that both dictation conditions did help students with learning disabilities produce better essays. The best essays were produced when dictating to a scribe. In this condition, students were free to concentrate on the content, organization, and wording of their essays without concern for mechanics” (MacArthur and Cavalier, 2004, p. 54). “Essays that were produced by students with learning disabilities dictating into speech recognition software were not as high in quality as when using a scribe, but were better in quality than their handwritten essays. In this condition, students did not need to think about spelling and handwriting, but they had new cognitive burdens, such as speaking clearly and monitoring their writing for errors” (MacArthur and Cavalier, 2004, p. 55).

Three studies found the speech–to–text accommodation to have mix results:

4. PK–12. A study involving three school–age students examined the potential of speech–to–text software dictation as a means of composing a written piece for students with disabilities. “All students used more words, more multisyllabic words, and followed an appropriate writing sequence with improved spelling and punctuation, but the effect was greatest for students with specific learning disabilities (McCollum et al., 2014)” (Goldstone et al., 2021, para. 6).
5. PK–12. A study involving five high school students with physical disabilities that affected hand use compared writing samples created by using word processing with samples created using speech recognition software. This study analyzed

first–draft writing samples in the areas of fluency, accuracy, type of word errors, recall of intended meaning, and length. “Data on fluency, calculated in words correct per minute, indicated that all participants wrote much faster with speech recognition compared to word processing. However, accuracy, calculated as percent correct, was much lower when participants used speech recognition compared to word processing. In terms of length, all participants wrote longer drafts when using speech recognition software, primarily because their fluency was higher, and they were able, therefore, to write more words. However, because their accuracy was low, it is difficult to determine whether or not speech recognition is a viable solution for all individuals with physical disabilities” (Garrett, 2007, pp. 7-8).

6. PK–12. A study involving students ages 11–14 investigated the effects of speech recognition technology on children’s writing processes. Fluent and less fluent writers composed four narratives, via handwriting and speech recognition software. Less fluent children’s handwritten narratives were significantly inferior to those of fluent children in terms of length, quality, and surface errors (such as misspellings as well as mistakes in grammar and punctuation) (Quinlan, 2004). For less fluent writers, speech recognition software significantly increased the length of their writing and decreased the frequency surface errors (Quinlan, 2004). While narrative length related positively to holistic quality, speech recognition software did not significantly improve quality (Quinlan, 2004).

Summary of Speech–to–Text Research

Speech–to–text has been shown to improve writing performance in elementary students with specific learning disabilities and emotional disturbance (McCollum, 2014), secondary students with learning disabilities (MacArthur & Cavalier, 2004) and intellectual disabilities (McCollum, 2014), and elementary and secondary students with traumatic brain injuries (Noakes, 2017; Noakes et al., 2019). “Overall, students produced longer written text with fewer errors. However, speech-to-text is more effective for improving writing quality for secondary students compared to elementary students because they do more in-depth writing using more complex sentences, advanced vocabulary, and greater narrative development” (Goldstone et al., 2021, para. 10.

2.3.8 Manipulatives

Manipulatives can be either physical or virtual and are typically used to help with mathematical calculations. Physical manipulatives are three dimensional physical objects that students can touch with their hands (Ha & Fang, 2018). Often, physical manipulatives are some form of blocks used for counting. Virtual manipulatives are three–dimensional computer graphics that students can see and manipulate on a computer screen (Ha & Fang, 2018). There are also interactive virtual and physical manipulatives that combine the two types of manipulatives in which students can observe virtual manipulatives in real–time while they handle physical manipulatives (Goldstone, et al., 2021). Six PK–12 studies were located that addressed manipulatives as an accommodation with three studies finding positive impact and three studies finding mixed results (Table 45).

Table 45: Reasonable Accommodation – Manipulatives.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
MANIPULATIVES	6	3	50.0%	3	50.0%	0	0.0%	0	0.0%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	6	3	50.0%	3	50.0%	0	0.0%	0	0.0%

Three studies found the manipulatives accommodation to have positive impact:

1. PK–12. A study involving fourth and fifth grade students evaluated the impact of virtual manipulatives on student achievement in rational numbers and fractions. Ten hours of traditional worksheet practice time were replaced with 10 hours of a math learning software that incorporated virtual manipulatives. Analysis showed that student performance gains on assessment items (National Assessment of Educational Progress and Trends in International Mathematics and Science Study) corresponded to a 10.9 percentile improvement (Bush, 2021).
2. PK–12. A study involving three middle school students with disabilities explored the impact of physical and virtual manipulatives on students' accuracy, independence, and task completion time for solving addition of fractions with unlike denominators. The researchers found that "all three students were equally successful in terms of accuracy, and differences with independence were minimal. However, when comparing the two manipulative types, two students were more independent with the concrete manipulative and one with the app-based manipulative" (Bouck et al., 2018, p. 1).
3. PK–12. A study involving three secondary students with a learning disability in mathematics assessed the benefits of an instructional strategy using a virtual manipulative balance paired with explicit instruction to teach multistep linear

equations and multistep algebraic equations. “Results showed increased percentage accuracy and independence scores for all three students across an intervention and maintenance phase, indicating that virtual manipulatives were beneficial for teaching higher–order mathematical concepts” (Sastangi et al., 2018, p. 227).

Three studies found the manipulatives accommodation to have mixed results:

4. PK–12. A study involving three middle school students with intellectual and developmental disabilities compared the use of physical manipulatives with virtual manipulatives to support the acquisition, fluency, and generalization of linear algebra. “All three participants were successful in solving two–step addition and subtraction linear algebra problems with both manipulative types. However, the students struggled to generalize to solving the problems without the use of either manipulative” (Long et al., 2020, p. 197).
5. PK–12. A study involving three elementary students with autism spectrum disorder compared the use of concrete and app–based manipulatives to teach students how to solve subtraction problems. “The results indicate students completed more steps independently per minute during the app–based manipulative condition, which may be a function of the students’ ability to use the app manipulatives more efficiently than the physical manipulatives” (Bassette et al., 2019, p. 110). For example, while the app–based manipulatives would automatically regroup the virtual blocks, the students had to manually count out new blocks to regroup the physical manipulatives. This physical counting required a greater response effort and, at times, resulted in errors if students did

not count the blocks correctly (Bassette et al., 2019). “Accuracy improved during both intervention conditions, but only two participants demonstrated improved maintenance scores” (Bassette et al., 2019, p. 110).

6. PK–12. A study involving three elementary students diagnosed with autism spectrum disorder explored the effectiveness of physical and virtual manipulatives to teach single– and double–digit subtraction skills. Participants in this study included three elementary–aged students (ages ranging from 6 to 10) diagnosed with ASD. “Both forms of manipulatives successfully assisted students in accurately and independently solving subtraction problem. However, all three students demonstrated greater accuracy and faster independence with the virtual manipulatives compared to the concrete manipulatives. Beyond correctly solving the subtraction problems, students were also able to generalize their learning of subtraction through concrete and virtual manipulatives to more real–world applications” (Bouck et al., 2013, p. 180).

Summary of Manipulatives Research

“The research showed that the use of either physical or virtual manipulatives improved mathematics performance and may be especially helpful for students with learning disabilities, autism spectrum disorder, and mild intellectual disabilities” (Goldstone, et al., 2021, para. 14). “Research showed that the students who benefited most from using manipulatives often were students with learning disabilities, autism spectrum disorder, or mild intellectual disabilities (Bassette et al., 2019; Bouck et al., 2018, 2020)” (Goldstone, et al., 2021, para. 6). Virtual manipulatives were preferred by students, but physical manipulatives may be more effective in terms of student

achievement. “All studies examined the use of manipulatives during math assessments; no research was found that examined the effectiveness of manipulatives for other content assessments (e.g., science)” (Goldstone et al., 2021, para. 14). While encouraging, the limited research that is available is insufficient to indicate conclusively whether the manipulatives accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.9 Testing Over Multiple Days

Testing over multiple days is a learning accommodation that allows assessments to be broken into multiple parts and completed on different, but typically consecutive, days (Goldstone, et al., 2021). Four PK–12 studies addressing testing over multiple days were reviewed with one study finding positive impact, two studies finding mixed results, and one study finding negative impact (Table 46).

Table 46: Reasonable Accommodation – Testing Over Multiple Days.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
TESTING OVER MULTIPLE DAYS	4	1	25.0%	2	50.0%	0	0.0%	1	25.0%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	4	1	25.0%	2	50.0%	0	0.0%	1	25.0%

One study found the testing over multiple days accommodation to have positive impact:

1. PK–12. A study involving 122 seventh grade students investigated the effectiveness of a package of accommodations for poor readers. Students with and without word reading disabilities were randomly assigned to take an experimental version of a high–stakes reading comprehension test. The test was administered in three formats: (a) standard administration, (b) read aloud accommodations with one–day administration, or (c) read aloud accommodations with two–day administration. "The results suggested that accommodations helped both poor and average readers. Of particular note, there was a clear effect of the accommodations in the poor readers who received both the read aloud accommodations and the structured extended–time–on–exams" (Fletcher et al., 2009, pp. 447-449).

Two studies found the testing over multiple days accommodation to have mixed results:

2. PK–12. A study involving 91 third grade students with word decoding difficulties were randomly assigned to take the same version of the Texas reading accountability assessment under accommodated and standard administrations. Decoding is a key skill for learning to read in which readers use decoding to sound–out words they do not recognize (Rawe, 2021). "The results clearly showed that students with poor decoding skills who received accommodations had significantly higher reading scale scores than those with poor decoding skills who did not receive accommodations. The students with poor decoding skills who

received accommodations demonstrated a seven–fold increase in the odds of passing the test. In contrast, there was no significant difference between the performance of average decoders who received accommodations and those who took standard administrations of the reading test" (Fletcher et al., 2006, pp. 143-145).

3. PK–12. A study involving 353 fifth grade and eighth grade students completed a 30–minute writing performance assessment and completed a writing performance assessment over three days. Assessments were evaluated on four traits (ideas, organization, conventions, and sentence fluency). "At the fifth grade level, a significant interaction was found between length of time allotted for the assessment and students' educational classification (general or special education). Fifth grade students performed significantly better on the three–day writing assessment, with students in special education benefiting the most. At the eighth grade level, there were no differences between scores on the 30–minute and the three–day assessments. No significant differences were found in students' writing performance across various types of discourse (narrative, imaginative, persuasive, and expository); however, significant differences were reported across certain writing traits" (Crawford et al., 2004, p. 132).

One study found the testing over multiple days accommodation to have negative impact:

4. PK–12. A study involving 113 seventh grade and eighth grade students examined the effects of allowing students to take a reading test over multiple days versus taking a reading test within one day. "The results of this study indicated that a

multiple–day test accommodation did not enhance the test scores of students with learning disabilities. In contrast, it did significantly affect the test performance of general education students, with lower performance taking the test across multiple days. In fact, the results showed slightly higher performance for both groups under the one–day unaccommodated condition, which contradicted the theory that a one–day test would cause student fatigue resulting in lower test scores" (Waltz et al., 2000, para. 26).

Summary of Testing Over Multiple Days Research

The research on testing over multiple days is limited and somewhat dated, which makes it difficult to draw conclusions about its impact on educational achievement. "Students in the elementary grades who struggle with decoding benefited more from testing over multiple days than older students" (Crawford et al., 2004; Fletcher et al., 2006, 2009; Goldstone et al., 2021, para. 3). The limited research that is available, as well as the apparent absence of research at the college level, is insufficient to indicate conclusively whether the testing over multiple days accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.10 Note–Taker or Scribe

A note–taker or scribe is a learning accommodation usually involving the use of a person to write or type a student's oral responses to an assessment. A note-taker or scribe "has the potential to improve the writing performance of students with learning disabilities by removing the barrier created by their difficulties with mechanics (e.g., spelling, grammar, punctuation, etc.)" (Bolt, 2004; MacArthur & Cavalier, 2004, p. 46). "Students with learning disabilities, other health impairments, and significant cognitive

disabilities are amongst the groups most frequently provided with this accommodation" (Hall, 2002; Goldstone et al., 2021 para. 3). Three PK–12 studies involving elementary and middle school students were identified, one with positive impact and two with mixed results (Table 47).

Table 47: Reasonable Accommodation – Note-Taker or Scribe.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
NOTE-TAKER OR SCRIBE	3	1	33.3%	2	66.7%	0	0.0%	0	0.0%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	3	1	33.3%	2	66.7%	0	0.0%	0	0.0%

One study found the note–taker or scribe accommodation to have positive impact:

1. PK–12. "A study involving 11,130 fifth grade students with learning disabilities found that students with learning disabilities tended to perform better than their peers without disabilities on a state summative assessment when they dictated responses to scribes, especially on science and social studies assessments" (Hall, 2002; Goldstone et al., 2021 para. 5).

Two studies found the note–taker or scribe accommodation to have mixed results:

1. PK–12. A review of research identified 36 studies examining five frequently allowed test accommodations, including dictated response (scribe). "Results indicate mixed support and nonsupport for providing this accommodation to students with disabilities" (Bolt & Thurlow, 2004, p. 141).
2. PK–12. A study involving 31 high school students with learning disabilities found that, relative to their handwritten essays, student essays were best in quality when using a scribe and better in quality when using speech recognition software

(MacArthur & Cavalier, 2004). In contrast, these researchers found that high school students without learning disabilities showed no improvement in the quality of their writing when using a dictated response accommodation (MacArthur & Cavalier, 2004). Researchers found that the effects of the note–taker or scribe accommodation varied depending on what other accommodations were bundled with it (MacArthur & Cavalier, 2004).

Note–Taker or Scribe Research Summary Note

"In general., research shows that students with disabilities who have difficulty with writing mechanics or the physical act of writing may benefit from the use of a scribe on both writing assessments and assessments of other content" (Goldstone et al., 2021, para. 14). The limited research that is available, as well as the apparent absence of studies at the college level, is insufficient to indicate conclusively whether the note–taker or scribe accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.11 Test Breaks

The test breaks accommodation is the allowance of more breaks than is provided as part of the standard test administration. These breaks may be provided as needed, as scheduled, or as some combination of the two. The time used for breaks is not subtracted from the time allowed as part of the standard test administration. The test breaks accommodation is most often "bundled" with other accommodations such as extended–time–on–exams and setting (e.g., individual administration, small group administration) (One Feather, 2010). Three PK–12 studies addressing test breaks were reviewed with one finding mixed results and two finding no impact (Table 48).

Table 48: Reasonable Accommodation – Test Breaks.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
TEST BREAKS	3	0	0.0%	1	33.3%	2	66.7%	0	0.0%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	3	0	0.0%	1	33.3%	2	66.7%	0	0.0%

One study found the test break accommodation to have mixed results:

1. PK–12. A study involving 51,591 third through eighth grade students examined the validity of test accommodation using differential item functioning (DIF) and mixture Item Response Theory (IRT) models. "The researchers found no consistent interaction between students' accommodation status and academic ability with regard to DIF. This finding varied by grade level. Third and fifth–grade students with disabilities whose item responses were similar to those from non–accommodated students without disabilities had significantly higher mathematical proficiency than their counterparts whose responses were congruent with those from accommodated students with disabilities. However, in the other four grades, the same pattern was not observed" (Cho et al., 2012, p. 301).

Two studies found the test break accommodation to have no impact:

2. PK–12. A study involving 156 students (84 fifth and 72 eighth grade) compared the test scores of students with disabilities with and without accommodations on the writing section of the New England Common Assessment Program (NECAP). The researcher found that short, supervised test breaks had no statistically significant impact on the test scores of either the fifth or eighth grade students who received the test break accommodation compared to the students who did not receive the test break accommodation (Joakim, 2015).

3. PK–12. A study involving 738 eighth grade students, 117 with disabilities, explored the embedding of test breaks into exams by separating reading comprehension passages into shorter segments. The hypothesis behind this study was the theory that segmenting reading comprehension tests into shorter segments would maximize students' working memory capacity and reduce the potential for disengagement during a long test (Abedi et al., 2008). However, "the results of this study indicated that segmenting did not affect the reading performance of students with and without disabilities" (Abedi et al., 2008, p. 5).

Summary of Test Breaks Research

"Test breaks comprise one of the more frequently included accommodations on student IEPs, but research on test breaks as an assessment accommodation on its own, not bundled with other accommodations, is limited" (Goldstone, et al., 2021, para. 16). "Test breaks may be useful for some students who have an emotional difficulty that might interfere with performance, students with attention and concentration issues, or challenges related to fatigue and frustration" (Ganguly, 2010; Goldstone et al., 2021, para. 3). The limited research that is available, as well as the apparent absence of research at the college level, is insufficient to indicate conclusively whether the test breaks accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.12 Small Group and Individual Administration

"Small group and individual administration are accessibility features or accommodations where students who are easily distracted, or whose assessment administration may distract others, are assessed in an alternate setting (e.g., separate

room, in a room with a small group of students receiving the same accommodation, etc.) (Goldstone, et al., 2021, para. 2). “Small group and individual administration are often bundled with other accommodations” (Cawthon et al., 2012; Davis, 2011; Noakes, 2017; Goldstone, et al., 2021, para. 2). Three PK–12 studies addressing small group and individual administration were reviewed with one study finding positive impact, one study finding no impact, and one study finding negative impact (Table 49).

Table 49: Reasonable Accommodation – Small Group and Individual Administration.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
SMALL GROUP AND INDIVIDUAL ADMINISTRATION	3	1	33.3%	0	0.0%	1	33.3%	1	33.3%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	3	1	33.3%	0	0.0%	1	33.3%	1	33.3%

One study found the small group and individual administration accommodation to have positive impact:

1. PK–12. A study involving 26 pre–school and elementary students with autism compared standardized test scores between exams administered by familiar test proctors and exams administered by unfamiliar test proctors. This study found a “statistically significant difference in favor of the children tested by the familiar examiners on the cognitive verbal subscale and on the cognitive performance subscale, indicating that examiner familiarity had positive effects on the test performance of children with autism” (Szarko et al., 2013, p. 37).

One study found the small group and individual administration accommodation to have no impact:

2. PK–12. A study involving 1,500 fourth grade students investigated the mathematics test scores for students with learning disabilities who were read an assessment in comparison with general education students and students with learning disabilities for whom the assessment was not read. Among the results of this study, the researchers found that "the scores from a group of students with learning disabilities who were read mathematics items were almost identical to the scores from students with learning disabilities without a reading accommodation" (Pomplun & Omar, 2000, p. 28). This finding suggests that a small group/ individual reading accommodation does not enhance the mathematics test scores of students with learning disabilities.

One study found the small group and individual administration accommodation to have negative impact:

3. PK–12. A study involving fourth grade students with learning disabilities analyzed reading (n = 2,170) and mathematics (n = 2,180) outcomes from the 2005 National Assessment of Educational Progress (NAEP). This study found that there was no effect of accommodations (presentation, response, setting, or timing) on mathematics item performance; however, students with learning disabilities who received presentation and setting accommodations scored lower on reading items than those who did not (Cawthon et al., 2012). This finding was contrary to the researchers' expectations based on the literature and the fundamental purpose of accommodations, which is to increase, not decrease,

student achievement (Cawthon et al., 2012). The researchers hypothesized that this unanticipated finding might be the result of a selection effect in which the educators assigned accommodations for the students with more severe learning disabilities or lower level of academic proficiency (Cawthon et al., 2012).

Summary of Small Group and Individual Administration Research

Because the small group and individual accommodation is often bundled with other accommodations, there is limited research on its specific impact on educational achievement. “Research has shown that students who benefit from small group and individual accommodations include students who are deaf or hard of hearing (Cawthon, 2008), have learning disabilities (Cawthon et al., 2012), mild disabilities (Davis, 2011), traumatic brain injuries (Noakes, 2017), attention deficit hyperactivity disorder (ADHD) (Parks, 2009), and autism or related developmental disorders (Szarko, 2000)” (Fleming, et al., 2022, para. 3). The limited research that is available, as well as the apparent absence of research at the college level, is insufficient to indicate conclusively whether the small group and individual administration accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.13 Noise Reduction

Noise reduction is a learning accommodation that minimizes auditory distractions by reducing noise in the testing environment (Smith, 2010). To reduce noise, a student may use buffers, such as noise–reducing headphones, to minimize audible noise while completing an assessment (Smith, 2010; Smith & Riccomini, 2013). “Both elementary and secondary students may benefit from using this accommodation” (Batho et al., 2020; Smith, 2010; Smith & Riccomini, 2013) (Goldstone et al., 2021, para. 3).

A recent scoping review of the literature identified a total of 13 empirical studies involving the academic benefits of wearing noise–cancelling headphones during class for typically developing students and students with special needs (Kulawiak, 2021). "The researcher found a wide range of outcomes (cognition, learning, academic performance, behavior, and emotions) were reported related to the use of noise cancelling headphones; however, the limited number of studies, small sample sizes, and lack of replication suggest that the current body of evidence does not meet the standards for evidence–based practices in both general and special education" (Kulawiak, 2021, para. 1). Two PK–12 studies were identified that specifically measured the impact of noise reduction accommodations on academic achievement with one finding a positive impact and the other finding mixed results (Table 50).

Table 50: Reasonable Accommodation – Noise Reduction.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
NOISE REDUCTION	2	1	50.0%	1	50.0%	0	0.0%	0	0.0%
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	2	1	50.0%	1	50.0%	0	0.0%	0	0.0%

One study found the noise reduction accommodation to have positive impact:

1. PK–12. A study involving 254 third, fourth, and fifth grade students with learning disabilities compared reading comprehension assessments with students wearing and not wearing noise–reducing headphones (Smith, 2010). This study indicated a positive relationship between the wearing of noise–reducing headphones and the results of the reading comprehension assessments for students with learning disabilities (Smith, 2010, p. ii). The results suggest that allowing students to use a

relatively inexpensive and simple sound–reducing device (e.g., noise–canceling headphones) may help students academically by lessening possible distractions caused by noise during academic tasks, such as reading (Smith & Riccomini, 2013).

One study found the noise reduction accommodation to have mixed results:

2. PK–12. A study examined the effects of environmental noises (classroom noise and white noise) compared to a no noise control condition on the performance of 52 students between the ages of fourteen and sixteen with ADHD. "Participants in the white noise condition took less time to read the passage and wrote more words on the essay compared with participants in the other conditions, though white noise did not improve academic accuracy. Although white noise appears to improve reading time and writing fluency, the findings suggest that white noise does not improve performance accuracy"

Summary of Noise Reduction Research

"Studies on the educational impact of the noise reduction accommodation are very limited. Noise reduction may be beneficial for many students with disabilities, including some students with learning disabilities and attentions–deficit/hyperactivity disorder (ADHD). Both elementary and secondary students may benefit from using this accommodation (Batho et al., 2020; Smith, 2010; Smith & Riccomini, 2013)" (Goldstone, et al., 2021, para. 3). The limited research that is available, as well as the apparent absence of research at the college level, is insufficient to indicate conclusively whether the noise reduction accommodation provides a significant effect on the educational achievement of students with disabilities.

2.3.14 Preferential Seating

Preferential seating is a learning accommodation often interpreted differently by many educators and researchers (Goldstone, et al., 2021). Common interpretations include the student being "close to the teacher," "away from distractions," and "in the front of the room" (Byrnes, 2008). "According to Bruins (2005) and Packer (2005), preferential seating has benefited some students with learning disabilities who are easily distracted" (Goldstone, et al., 2021, para. 3). "Two studies found that preferential seating was one of the most frequently used testing accommodations (Bruins, 2005) and instructional accommodations (Byrnes, 2008)" (Goldstone, et al., 2021, para. 5). Importantly, however, no studies were identified that examined the effects of preferential seating on student achievement (Table 51).

Table 51: Reasonable Accommodation – Preferential Seating.

REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	EDUCATIONAL ACHIEVEMENT							
		POSITIVE IMPACT		MIXED RESULTS		NO IMPACT		NEGATIVE IMPACT	
PREFERENTIAL SEATING	0	0	NA	0	NA	0	NA	0	NA
	HIGHER EDUCATION								
	0	0	NA	0	NA	0	NA	0	NA
	PK-12								
	0	0	NA	0	NA	0	NA	0	NA

Summary of Preferential Seating Research

Given the absence of research on this accommodation, it is unknown as to whether preferential seating provides a significant effect on the educational achievement of students with disabilities.

2.4 Literature Review Concluding Remarks

In this literature review, I found that the current body of research examining the impact of reasonable accommodations on student achievement is largely focused on the

PK–12 level. As depicted in Table 37, only 19 of the 100 identified studies addressed the impact of reasonable accommodations on higher educational achievement. Moreover, only four of the 14 more common higher educational learning accommodations identified by the Principle Investigator of this dissertation address student achievement (extended–time–on–exams , recording of classes/ lectures, and audiobooks). Further, of these four learning accommodations, only one did not include any studies found to have a negative impact on educational achievement (extended time) (Table 52). Of note, none of the 19 identified higher education studies specifically addresses the academic achievement of Student–Veterans.

Table 52: Summary of Reasonable Accommodation.

	REASONABLE ACCOMMODATION	STUDIES IDENTIFIED	HIGHER EDUCATION	IMPACT ON HIGHER EDUCATIONAL			
				POSITIVE IMPACT	MIXED RESULTS	NO IMPACT	NEGATIVE IMPACT
1	Recording of classes/lectures	9	9	44.4%	11.1%	22.2%	22.2%
2	Extended time on exams	27	7	57.1%	28.6%	14.3%	0.0%
3	Audiobooks	10	2	50.0%	0.0%	0.0%	50.0%
4	Text-to-speech (digital)	10	1	0.0%	100.0%	0.0%	0.0%
5	Use of calculators for tests and exams	11	0	-	-	-	-
6	Text-to-speech (human)	6	0	-	-	-	-
7	Speech-to-text (voice recognition)	6	0	-	-	-	-
8	Manipulatives	6	0	-	-	-	-
9	Testing over multiple days	4	0	-	-	-	-
10	Note-taker or scribe	3	0	-	-	-	-
11	Test Breaks	3	0	-	-	-	-
12	Small group & individual administratior	3	0	-	-	-	-
13	Noise reduction	2	0	-	-	-	-
14	Preferential seating	0	0	-	-	-	-
TOTAL STUDIES IDENTIFIED		100	19	47.4%	21.1%	15.8%	15.8%
PERCENTAGE OF TOTAL STUDIES IDENTIFIED			19.0%	9.0%	4.0%	3.0%	3.0%
NOTE: Zero studies were identified examining the impact of reasonable accommodations on student-Veteran educational							

In addition to the sheer dearth of studies examining the impact of reasonable accommodations on higher educational student achievement, it should also be noted that the practice of using reasonable accommodations, particularly in the testing environment, is itself considered controversial. In a review of numerous studies focused on the effects of accommodations on test performance, Sireci et al. did not find consistent conclusions

across studies because of the wide variety of accommodations, the various ways in which they were implemented, and the heterogeneity of students to whom they were given (Sireci et al., 2005). However, the researchers did identify "two consistent findings: (a) extended–time–on–exams tended to improve the performance of all students, although students with disabilities tended to exhibit relatively greater score gains; and (b) oral accommodations on math tests were associated with increased test performance for some students with disabilities" (Sireci et al., 2005, p. 457).

In another review of research pertaining to the use of test accommodations for students with disabilities, Sireci and O'Riordan examined how practices relate to issues of score comparability and fairness in assessment. The researchers found that, "while test accommodations are often determined based on a student's individualized education program (IEP) or 504 plan, teachers and other IEP team members may not be familiar with all accommodations offered by a testing program or how they are best implemented" (Sireci & O'Riordan, 2020, p. 200). Relatedly, Abedi and Ewers found insufficient research–based evidence justifying the use of many reasonable accommodations. The authors assert that "an accommodation is effective if it makes assessments more accessible for the recipients but emphasize that an effective accommodation may not necessarily provide valid assessment outcomes if the accommodation alters the focal construct. When an accommodation does more than what is intended to do, resulting in unfair advantage to the recipients, then the accommodated and non–accommodated assessment outcomes may not be comparable and may not be aggregated" (Abedi & Ewers, 2013, p. 14).

While this proposed study would begin to address the absence of research examining the impact of reasonable accommodations on Student–Veteran higher educational achievement, it would not address the several related concerns raised by Sireci et al. These concerns would constitute a limitation of this study.

CHAPTER 3 – METHOD

In this chapter, I discuss research design, data, and data analysis that examine the six research questions outlined in Table 53.

Table 53: Research Questions.

	RESEARCH QUESTIONS
1	**Do Student-Veterans with military service-connected disabilities who receive reasonable learning accommodations achieve better educational outcomes than Student-Veterans with military service-connected disabilities who do not receive such accommodations?**
2	**Does higher educational achievement of Student-Veterans with military service-connected disabilities who receive or do NOT receive reasonable learning accommodations vary by sex/gender?**
3	**Does higher educational achievement of Student-Veterans with military service-connected disabilities who receive or do NOT receive reasonable learning accommodations vary by race?**
4	**Does higher educational achievement of Student-Veterans with military service-connected disabilities who receive or do NOT receive reasonable learning accommodations vary by age?**
5	**Does higher educational achievement of Student-Veterans with military service-connected disabilities who receive or do NOT receive reasonable learning accommodations vary by severity rating?**
6	**Is satisfaction with college/university experience higher for Student-Veterans with disabilities who receive reasonable accommodations than for Student-Veterans with disabilities who do not receive reasonable accommodations?**

A quantitative research design was used to investigate whether there is a relationship between Student–Veteran type and severity of military service–connected disability, Student–Veteran utilization of reasonable accommodations support, and Student–Veteran higher educational achievement. Student–Veteran military service–connected disability and Student–Veteran utilization of reasonable accommodations were

used to predict Student–Veteran higher educational achievement, measured in terms of graduation status, GPA, and satisfaction.

Several variables were used in this study that need to be clearly defined. The disability type was treated as a nominal variable and was grouped into the 15 categories outlined in Table 54.

Table 54: Disability Type.

NOMINAL VARIABLE	
BODY SYSTEM CATEGORY	
1	**The Musculoskeletal System**
2	**The Organs of Special Sense**
3	**Impairment of Auditory Acuity**
4	**Infectious Diseases, Immune Disorders and Nutritional Deficiencies**
5	**The Respiratory System**
6	**The Cardiovascular System**
7	**The Digestive System**
8	**The Genitourinary System**
9	**Gynecological Conditions and Disorders of the Breast**
10	**The Hematologic and Lymphatic Systems**
11	**The Skin**
12	**The Endocrine System**
13	**Neurological Conditions and Convulsive Disorders**
14	**Mental Disorders**
15	**Dental and Oral Conditions**
Source: National Archives and Records Administration's Office of the Federal Register (OFR) and the Government Publishing Office, 2021	

The disability severity rating is an ordinal variable ranging from zero percent to 100% in increments of 10% (Table 55). A zero percent disability severity rating means a disability is military service–connected, but not severe enough to be deemed compensable by the U.S. Department of Veterans Affairs (U.S. Department of Veterans Affairs, 2022). Monetary compensation to U.S. Veterans with military service–connected

disabilities begins at the 10% disability severity rating and increases to the most severely disabled rating of 100% (U.S. Department of Veterans Affairs, 2022).

Table 55: Ordinal Variable – Disability Severity Rating.

ORDINAL VARIABLE	
DISABILITY SEVERITY RATING	
1	0%
2	10%
3	20%
4	30%
5	40%
6	50%
7	60%
8	70%
9	80%
10	90%
11	100%
Source: U.S. Department of Veterans Affairs, 2022	

Reasonable accommodations, a nominal variable, were organized by type (Table 56).

Table 56: Nominal Variable – Reasonable Accommodations.

NOMINAL VARIABLE	
REASONABLE ACCOMMODATIONS	
1	Extended time on exams
2	Use of calculators for tests and exams
3	Text-to-speech (digital)
4	Audiobooks
5	Recording of classes/lectures
6	Text-to-speech (human)
7	Manipulatives
8	Speech-to-text (voice recognition)
9	Testing over multiple days
10	Note-taker or scribe
11	Test Breaks
12	Small group and individual administration
13	Noise reduction
14	Preferential seating

3.1 Data

Two data sets (Table 57) were combined to identify: (a) Veterans with military service–connected disabilities who have utilized the Post 9/11 GI Bill and (b) Veterans with military service–connected disabilities who have college degrees but did not utilize the Post 9/11 GI Bill. As previously noted, the Post 9/11 GI Bill provides eligible Veterans the ability to transfer their educational benefits to immediate family members (spouse and/or children). The USVETS database specifically tracks Veterans who use their GI Bill benefit for themselves. Both of these data sets were acquired through the Veterans Health Administration (VHA). VHA Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files will also provide the individual Veteran's name, type of disability, severity of disability, and contact information (email address).

Table 57: Data Sources.

DATA SOURCES	
VA DATA	**SURVEY DATA**
CDW / ADUSH/ USVETS	**Survey**
Veteran Name	**Area of Study**
Gender	**College Credits Completed**
Race	**Graduation Status**
Email Address	**Grade Point Average**
Military Service-Connected Disability	**Disclosure of military service-connected disability to college/university**
Body System Category of Disability	**Reasonable Accommodation Supports**
Rating of Disability	**Satisfaction with Reasonable Accommodations Supports**
Post 9/11 GI Bill Utilization	
College Degree	

Note: Survey instrument is located in Appendix C.

3.1.1 Veterans Affairs Information Resource Center

The Veterans Affairs Information Research Center (VIReC) is one of three Health Services Research and Development Service (HSR&D) resource centers that supports VA health research. VA is a national leader in health research. In FY2022 the approved budget for VA Medical and Prosthetic Research was $902 million (House Committee on Appropriations, 117th Congress, United States of America, 2021). This funding supported approximately 2,563 total projects, including more than 1,700 researchers, and partnering with more than 200 medical schools and other academic institutions (House Committee on Appropriations, 117th Congress, United States of America, 2021). VIReC develops resources for and provides guidance to VA researchers using data (U.S. Department of Veterans Affairs, 2022). VIReC staff, scientists, and advisors include

database and informatics experts, research methodologists, and experts for various database content areas (U.S. Department of Veterans Affairs, 2022).

Veterans With Military Service–Connected Disabilities

Data about Veterans with military service–connected disabilities is housed within VHA's Corporate Data Warehouse (CDW) and VHA Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files (U.S. Department of Veterans Affairs, 2022).

3.1.2 VA Corporate Data Warehouse

CDW is a national repository comprising data from several VHA clinical and administrative systems, including the Electronic Health Record (EHR) (U.S. Department of Veterans Affairs, 2022). The objective of CDW is to facilitate reporting and data analysis at the enterprise level by incorporating data from multiple data sets throughout the VHA into one standard database structure (U.S. Department of Veterans Affairs, 2022). Containing data from October 1999 to present, CDW is an evolving repository of national VHA data containing clinical., enrollment, financial., administrative, utilization, Veteran benefits information and more (U.S. Department of Veterans Affairs, 2022). The military service–connected condition data are contained within CDW Part 4 Section 26 (U.S. Department of Veterans Affairs, 2022). The rated disability data are contained within CDW Part 4 Section 27 (U.S. Department of Veterans Affairs, 2022).

3.1.3 VHA Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files

Data about Veterans with military service–connected disabilities are also housed within the VHA Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files (U.S. Department of Veterans Affairs, 2021). ADUSH Enrollment Files are a group of

monthly and fiscal year–end data sets comprising enrollment, eligibility, demographic, cost, and location information for VHA enrollees and non–enrollees who have received VA care (U.S. Department of Veterans Affairs, 2021).

Veterans Who Have Utilized the Post 9/11 Gi Bill Benefits

Data about Veterans who have utilized the post 9/11 GI bill benefits (for themselves) is housed within VHA's United States Veterans Eligibility Trends and Statistics (USVETS).

3.1.4 United States Veterans Eligibility Trends and Statistics (USVETS)

United States Veterans Eligibility Trends and Statistics (USVETS) is a group of integrated datasets that combine data from VA, the Department of Defense (DoD), and commercial sources for Veterans enrolled in VA and those who are not (U.S. Department of Veterans Affairs, 2022). It contains information about all living and deceased Veterans residing in the continental US and US territories and includes their utilization of VA services and benefits, military history, geography, demographics, and socioeconomic factors (U.S. Department of Veterans Affairs, 2022). The static dataset represents a unique record of each living and deceased Veteran and is currently approaching 40 million individuals (U.S. Department of Veterans Affairs, 2022).

The education level of Veterans is sourced commercially by VA and is tracked within USVETS. Education level is defined as the highest known education of the Veteran. Four levels of education are annotated including: (a) completed high school; (b) completed college; (c) completed graduate school; and (d) attended vocational/ technical school.

3.2 Accessing VA Data

The Principle Investigator of this dissertation is an employee of the Cooperative Studies Program Coordinating Center located on the campus of the West Haven, Connecticut, Veterans Affairs Medical Center (WH–CSPCC). “The VA Cooperative Studies Program (CSP) is the Division of VA Research and Development responsible for planning and conducting large multicenter clinical trials and epidemiological studies in the VA” (U.S. Department of Veterans Affairs, 2018, para. 1). “CSP is comprised of professional experts at five data and statistical coordinating centers, a clinical research pharmacy coordinating center, and four epidemiological resource centers” (U.S. Department of Veterans Affairs, 2018, para. 3). WH–CSPCC is one of the five data and statistical CSP coordinating centers. “Through collaborative efforts within VA and with other federal., international., university, and private industry partners, CSP accomplishments have included key research findings across a range of diseases and have helped to provide definitive evidence for clinical practice within VA and the nation” (U.S. Department of Veterans Affairs, 2018). From its initial beginnings in the 1940s, CSP continues to be a national and international leader in clinical research (U.S. Department of Veterans Affairs, 2018, para. 6).

3.2.1 Data Access Request Tracker (DART)

To access the aforementioned VA data, the Principle Investigator of this dissertation submitted a proposal for this study to the West Haven Connecticut Veterans Affairs Medical Center (WH–VAMC) Research and Development (R&D) Committee during February 2022. The components of this proposal are detailed in Table 58 and are available upon request. The WH–VAMC R&D Committee approved this proposed study

on 3/30/2022 (Appendix C). With this approval., access to VIReC data was facilitated to the Principle Investigator through the Data Access Request Tracker (DART). The DART Research Request Process facilitates requests for permission to access VHA data for approved research projects (U.S. Department of Veterans Affairs, 2022). The request for data to conduct this proposed study was approved through the DART process during early January 2023. The Principle Investigator met with a DART data manager soon thereafter to discuss the data needed for this proposed study. Following this consultation, the DART data manager submitted a data request for this proposed study. A data manager within VA Informatics and Computing Infrastructure (VINCI) gathered the requested data and copied the files to a secure workspace assigned to the Principle Investigator.

3.2.2 VA Informatics and Computing Infrastructure (VINCI)

"VINCI is an initiative to improve researchers' access to VA data and to facilitate the analysis of those data while ensuring Veterans' privacy and data security" (U.S. Department of Veterans Affairs Office of Research & Development, 2022, para. 1). VINCI is a partner with CDW and hosts all data available through CDW as well as some unique data (U.S. Department of Veterans Affairs Office of Research & Development, 2022). VINCI hosts many types of analytical applications including SAS Grid, Stata MP, and R (U.S. Department of Veterans Affairs Office of Research & Development, 2022). VINCI provides a secure workspace where researchers can access the data along with the tools for reporting and analysis. "The VINCI workspace is provisioned so that each study has its own project site where multiple people can collaborate using a common set of

software tools and files" (U.S. Department of Veterans Affairs Office of Research & Development, 2022, para. 6).

Table 58: Submission of Proposed Study to Institutional Review Board.

IMPACT OF REASONABLE ACCOMMODATIONS ON DISABLED STUDENT-VETERAN HIGHER EDUCATIONAL ACHIEVEMENT	
ITEM	SUBMISSION OF PROPOSED STUDY TO INSTITUTIONAL REVIEW BOARD WEST HAVEN CONNECTICUT VETERANS AFFAIRS MEDICAL CENTER RESEARCH AND DEVELOPMENT COMMITTEE
1	VA CT R&D Committee Study Approval Letter
2	VA CT Abstract Guidelines
3	Project Description
4	Project Data Sheet
5	Study Protocol
6	VA CT Request to Review Research Project (Initial Review Application)
7	VA CT IRB Information Sheet
8	Survey Instrument
9	Informed Consent Script for Survey
10	VA CT Human Research Protection Program Exemption Checklist
11	VA Exemption Request for Limited IRB Review
12	VHA Research Protocol Privacy Review Checklist
13	VA CT Request for Waiver of HIPAA Authorization
14	VA CT Research Protocol Safety Survey
15	VA Enterprise Research Data Security Plan
16	VA CT Associate Chief of Staff for Research and Development Review
17	VA CT Financial Conflict of Interest Disclosure Checklist
18	VA CT Principle Investigator Attestation
19	VA CT Principle Investigator Scope of Practice
20	VA CT Principle Investigator Data Sheet
21	Principle Investigator Curriculum Vitae
22	Principle Investigator Military Biography
23	Principle Investigator VA Privacy and HIPAA Training Certificate
24	Principle Investigator VA Human Subjects Protection Training Certificate
25	Principle Investigator VA Privacy & Information Security Awareness Training Certificate
26	Principle Investigator VA Technology Transfer Program Training Certificate
27	Principle Investigator VA Government Ethics Training Certificate
28	Principle Investigator VA Info Resource Center Database & Methods Seminar Training Certificate

3.3 Survey

An electronic survey was designed and developed using the VHA Office of Research and Development (ORD) Qualtrics portal (Appendix C). VHA ORD is using the DesignXM – Enterprise Edition of Qualtrics. While the enterprise edition has many advanced features, Qualtrics is fundamentally a web–based survey tool for conducting

survey research. Importantly, the ORD Qualtrics tool can traverse the VA firewall. The Principle Investigator will initiate the survey from within the VA firewall using the FedRAMP Qualtrics system; FedRAMP is the standard of U.S. government security compliance. A link to the study survey was emailed to the subject Student–Veteran population. Respondents were able to complete the survey from their personal computer using an internet connection.

Pilot Survey

The survey was piloted to a group of 200 Student–Veterans from the target subject population. The survey was structured with the least sensitive questions positioned at the beginning of the survey (Tables 59 and 60). Survey 1a was completed by Student–Veterans who disclosed their disability to their college or university, and Survey 1b was completed by Student–Veterans who did not disclose their disability to their college or university. Feedback from this pilot survey was used to inform minor modifications to the survey questions prior to full implementation.

Table 59: Survey 1A – Veteran Disclosed Disability.

	SURVEY VERSION 1A - VETERAN DISCLOSED DISABILITY
1	**Did you disclose your military service-connected disability to your college or university?**
2	**What was your level of comfort in doing so?**
3	**Colleges and universities typically provide the following types of reasonable accommodation supports. Which types did you receive?**
4	**How helpful were the provided reasonable accommodations to your learning?**
5	**What degree did you pursue or are pursuing?**
6	**What was/is your field of study?**
7	**Approximately how many credits have you completed thus far in your current degree?**
8	**Approximately what was/is your GPA? (4.0 Scale)**
9	**What is your graduation status?**
10	**How satisfied are you with your college experience?**
11	**Additional feedback.**

Table 60: Survey 1B – Veteran Did Not Disclose Disability.

	SURVEY VERSION 1B - VETERAN DID NOT DISCLOSE DISABILITY
1	**Did you disclose your military service-connected disability to your college or university?**
2	**What influenced your decision not to disclose your military service-connected disability**
3	**What degree did you pursue or are pursuing?**
4	**What was/is your field of study?**
5	**Approximately how many credits have you completed thus far in your current degree?**
6	**Approximately what was/is your GPA? (4.0 Scale)**
7	**What is your graduation status?**
8	**How satisfied are you with your college experience?**
9	**Additional feedback.**

3.4 Informed Consent

Informed consent was required for this proposed study and is detailed in Appendix E. "VA is a world leader in research, and, as such, is committed to upholding the principles for the ethical conduct of research. VA's clinical research enterprise depends on the voluntary and informed participation of thousands of human subjects who deserve to be treated with respect and dignity. Because it is the right thing to do, and VA is subject to federal regulations for the protection of all human research participants, no VA research may involve a person as a participant without first obtaining his or her legally effective informed consent. The only exceptions are those cases in which the Institutional Review Board (IRB), with oversight responsibility for a given study, approves a waiver of informed consent" (U.S. Department of Veterans Affairs Office of Research and Development, Informed Consent for Human Subjects Research, 2002, pp. 15-16).

3.5 Participant Recruitment

Targeting a lower bound sample size of ≈8,500 and assuming a response rate of ≈2.0%, the survey was distributed electronically to 425,083 Veterans with military service–connected disabilities who utilized the Post 9/11 GI Bill or did not utilize the Post 9/11 GI Bill but have a college degree (Figure 1).

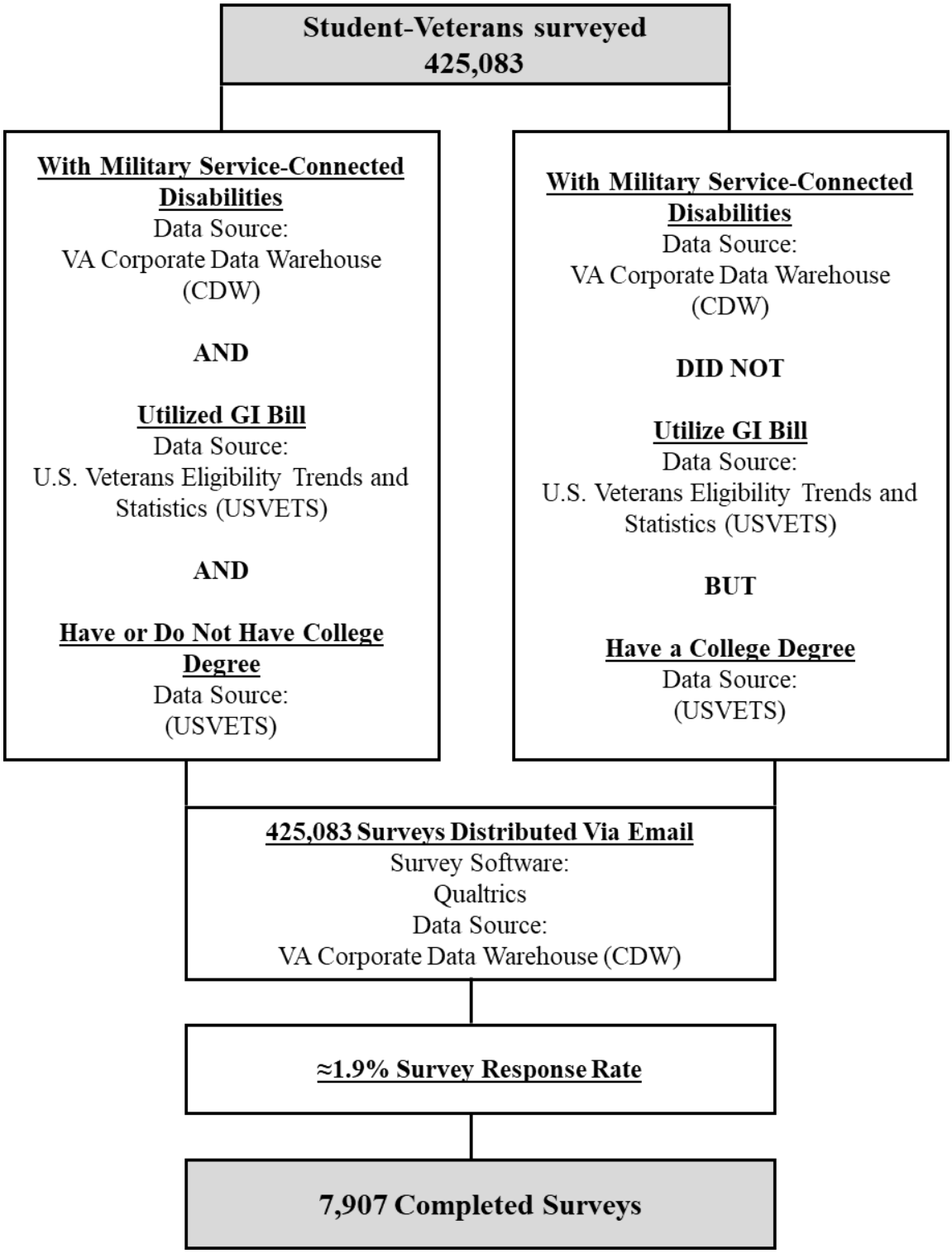


Figure 1: Participant Recruitment.

3.6 Data Analysis

Descriptive analysis was conducted incorporating the survey results. Student–Veterans were grouped by sex/gender, race, body system, age, severity rating, and satisfaction (Table 61). For each of these six groups, educational outcome data points were captured including graduation status and GPA. Additionally, Student-Veteran satisfaction with their college-graduate school experience was recorded. Descriptive analyses were conducted across the six Student–Veteran groups and two educational outcomes.

Table 61: Student-Veteran Group - Impact on Graduation Status, GPA, and Satisfaction.

STUDENT-VETERAN GROUP IMPACT ON GRADUATION STATUS, GPA, AND SATISFACTION				
	Student-Veteran Group	**Graduation Status**	**GPA**	**Satisfaction**
1	**Student-Veterans with military service-connected disabilities - SEX**	**Descriptive Analysis**	**Descriptive Analysis**	**Descriptive Analysis**
2	**Student-Veterans with military service-connected disabilities - RACE**	**Descriptive Analysis**	**Descriptive Analysis**	**Descriptive Analysis**
3	**Student-Veterans with military service-connected disabilities - BODY SYSTEM**	**Descriptive Analysis**	**Descriptive Analysis**	**Descriptive Analysis**
4	**Student-Veterans with military service-connected disabilities - AGE**	**Descriptive Analysis**	**Descriptive Analysis**	**Descriptive Analysis**
5	**Student-Veterans with military service-connected disabilities - SEVERITY RATING**	**Descriptive Analysis**	**Descriptive Analysis**	**Descriptive Analysis**
6	**Student-Veterans with military service-connected disabilities - SATISFACTION**	**Descriptive Analysis**	**Descriptive Analysis**	**Descriptive Analysis**

Multiple regression was used to analyze the relationship between multiple predictor (independent) variables (Table 62) and each educational achievement outcome (dependent) variable (Table 63).

Table 62: Predictor Variables.

EDUCATIONAL ACHIEVEMENT	
PREDICTOR VARIABLES	
	STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES
1	Received reasonable accommodations
2	Did NOT receive reasonable accommodations
3	Received reasonable accommodations - BY SEX
4	Did NOT receive reasonable accommodations - BY SEX
5	Received reasonable accommodations - BY RACIAL CATEGORY
6	Did NOT receive reasonable accommodations - BY RACIAL CATEGORY
7	Received reasonable accommodations - BY AGE
8	Did NOT receive reasonable accommodations - BY AGE
9	Received reasonable accommodations - VARY BY BODY SYSTEM CATEGORY
10	Did NOT receive reasonable accommodations - VARY BY BODY SYSTEM CATEGORY
11	Received reasonable accommodations - VARY BY SEVERITY RATING
12	Did NOT receive reasonable accommodations - VARY BY SEVERITY RATING

Table 63: Outcome Variables.

EDUCATIONAL ACHIEVEMENT	
OUTCOME VARIABLES	
	STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES
1	Graduation Rate
2	GPA
3	Satisfaction

Multiple regression hypothesis

For each of the six research questions, the mathematical function/hypothesis of the multiple regression was of the form:

$\hat{y} = \beta_0 + \beta_1.x_1 + \beta_2x_2 + \ldots + \beta_{\#}x_{\#}$

where:

$\hat{y}$: The estimated response value.

β_0: The average value of y when all predictor variables are equal to zero.

$B_{\#}$: The average change in y associated with a one unit increase in $x_{\#}$.

$X_{\#}$: The value of the predictor variable $x_{\#}$. A list of predictor variables is presented in the next section.

Null and alternative hypotheses

H_0: $\beta_1 = \beta_2 = \ldots = \beta_{\#} = 0$

None of the predictor variables has a statistically significant relationship with the response variable, y. There is no statistical relationship between the Student–Veteran Group (x) variables and the Educational Outcome (y) variables. The predicted y values are no closer to the actual y values than one would expect by chance.

H_A: $\beta_1 = \beta_2 = \ldots = \beta_{\#} \neq 0$

Not every coefficient is simultaneously equal to zero.

Statistical significance

A significance value (p–value) of .05 was used to identify statistically significant results. Effect sizes (e.g., Cohen's delta) were used to evaluate the practical significance of any tests that are statistically significant.

3.7 Research Questions

1. Do Student–Veterans with military service–connected disabilities who receive reasonable learning accommodations achieve better educational outcomes than Student–Veterans with military service–connected disabilities who do NOT receive such accommodations (Table 64)?

2. Does higher educational achievement of Student–Veterans with military service–connected disabilities who receive or do not receive reasonable learning accommodations ***vary by sex/gender*** (Table 64)?
3. Does higher educational achievement of Student–Veterans with military service–connected disabilities who receive or do not receive reasonable learning accommodations ***vary by race*** (Table 64)?
4. Does higher educational achievement of Student–Veterans with military service–connected disabilities who receive or do not receive reasonable learning accommodations ***vary by age*** (Table 64)?
5. Does higher educational achievement of Student–Veterans with military service–connected disabilities who receive or do not receive reasonable learning accommodations ***vary by severity rating*** (Table 64)?
6. Is satisfaction with college/university experience higher for Student-Veterans with disabilities who receive reasonable accommodations than for Student-Veterans with disabilities who do not receive reasonable accommodations (Table 64)?

Table 64: Statistical Tests.

STUDENT-VETERAN GROUP IMPACT ON GRADUATION STATUS, GPA, AND SATISFACTION				
	Predictor Variables	**Outcome Variables**		
	Student-Veteran Group	**Graduation Status**	**GPA**	**Satisfaction**
1	**Student-Veterans with military service-connected disabilities who receive reasonable accommodations**	**Discrete**	**Continuous**	**Ordinal**
2	**Student-Veterans with military service-connected disabilities who do NOT receive reasonable accommodations**	**Discrete**	**Continuous**	**Ordinal**
3	**Student-Veterans with military service-connected disabilities who receive reasonable accommodations - SEX**	**Discrete**	**Continuous**	**Ordinal**
4	**Student-Veterans with military service-connected disabilities who do NOT receive reasonable accommodations - SEX**	**Discrete**	**Continuous**	**Ordinal**
5	**Student-Veterans with military service-connected disabilities who receive reasonable accommodations - RACE**	**Discrete**	**Continuous**	**Ordinal**
6	**Student-Veterans with military service-connected disabilities who do NOT receive reasonable accommodations - RACE**	**Discrete**	**Continuous**	**Ordinal**
7	**Student-Veterans with military service-connected disabilities who receive reasonable accommodations - AGE**	**Discrete**	**Continuous**	**Ordinal**
8	**Student-Veterans with military service-connected disabilities who do NOT receive reasonable accommodations - AGE**	**Discrete**	**Continuous**	**Ordinal**
9	**Student-Veterans with military service-connected disabilities who receive reasonable accommodations - SEVERITY RATING**	**Discrete**	**Continuous**	**Ordinal**
10	**Student-Veterans with military service-connected disabilities who do NOT receive reasonable accommodations - SEVERITY RATING**	**Discrete**	**Continuous**	**Ordinal**
	Statistical Test	**Logistic Regression**	**Linear Regression**	**t-test**

Primary Hypothesis

The higher educational achievement (graduation status and GPA) of Student–Veterans with military service–connected disabilities is improved when colleges/universities provide reasonable learning accommodations.

Sub–Hypotheses

1. Student–Veterans with military service–connected disabilities who receive reasonable learning accommodations have better educational outcomes than

Student–Veterans with military service–connected disabilities who do not receive such accommodations.

2. Student–Veterans supported by reasonable accommodations varies by military service–connected disability severity rating.
3. Student–Veteran disclosure of disability to their college or university correlates positively with academic success.
4. Student–Veteran disclosure of disability to their college or university varies by military service–connected disability severity rating.

3.8 Significance of the Study

Because there is a virtual absence of research examining the impact of reasonable accommodations support on Student–Veteran higher educational achievement, there is a compelling need for research in this arena. Additionally, because the primary hypothesis of this study was supported by the data, future research exploring the educational efficacy of particular reasonable accommodations support for Student–Veterans with particular military service–connected disabilities will be critical. Beyond the primary hypothesis, the findings within the sub–hypotheses of this dissertation may well provide specific launch points for future research by highlighting gaps in educational achievement within certain subgroups, i.e., sex/gender, race, type of disability, and severity of disability. The potential impact of this research on higher education instructional practices and ultimately Student–Veteran academic success is compelling.

CHAPTER 4 – RESULTS

4.1 Key Findings from Descriptive and Inferential Statistics

The results indicate that disclosure of disability and the extended–time–on–exams reasonable accommodation have a statistically significant positive impact on Student–Veteran graduation status. While the audiobooks reasonable accommodation had a statistically significant impact on Student–Veteran graduation status, its impact was negative.

Primary Hypothesis

The higher educational achievement (graduation status and GPA) of Student–Veterans with military service–connected disabilities is improved when colleges/universities provide reasonable learning accommodations.

- *The mean graduation status of Student–Veterans with military service–connected disabilities who received reasonable accommodations (68.1%) was higher than the mean graduation status of Student–Veterans who did not receive reasonable accommodations (65.9%) (Table 78).*

Sub–Hypotheses

Student–Veterans with military service–connected disabilities who receive reasonable learning accommodations have better educational outcomes than Student–Veterans with military service–connected disabilities who do not receive such accommodations.

- *Student–Veterans with more severe disability ratings (60%–100%) who received reasonable accommodations graduated at higher levels than Student–Veterans with*

more severe disability ratings who did not receive reasonable accommodations (Table 82).

- *With an odds ratio of 1.55, the odds of a Student–Veteran with a disability rating between 60%–100% graduating were increased by 55% when receiving the extended–time–on–exams reasonable accommodation (Table 84).*
- *With an odds ratio of 0.57, the odds of a Student–Veteran graduating were decreased (–43%) when receiving the audiobooks reasonable accommodation (Table 81).*
- *With an odds ratio of 0.47, the odds of a Student–Veteran with a disability rating between 60%–100% graduating were decreased (–53%) when receiving the audiobooks reasonable accommodation (Table 84).*

Student–Veteran disclosure of disability to their college or university varied by military service–connected disability severity rating.

- *Student–Veteran disclosure of disability to their college or university varied by military service–connected disability severity rating (Table 73).*

Student–Veteran disclosure of disability to their college or university correlated positively with academic success.

- *With an odds ratio of 1.46, the odds of a Student–Veteran graduating were increased by 46% when disabilities were disclosed to the college or university (Table 74).*

Student–Veterans supported by reasonable accommodations varied by military service–connected disability severity rating.

- *Student–Veterans with military service–connected disabilities who received reasonable accommodations varied by military service–connected disability severity rating (Table 82).*

4.2 Survey Response

An electronic survey was conducted using the VHA Office of Research and Development (ORD) Qualtrics portal (Appendix C). A pilot survey was first conducted including 200 Student–Veterans. Of the 200 surveys distributed, nine were completed. Based on this response rate (4.5%), which exceeded the predicted response rate (2%) (Figure 1), a full launch of the survey was subsequently conducted targeting 425,083 Student–Veterans. The survey was distributed electronically a total of four times over a two–week time frame with results outlined in Table 65 and Table 69.

Table 65 details the total number of Student–Veteran responses to each of the dissertation survey questions. A total of 10,306 surveys were started by Student–Veterans, and 7,872 surveys were completed (Table 65). A survey was considered completed by the Qualtrics software program if the Student–Veteran hit the submit button at the very end of the survey. These completed surveys did not require all questions to be answered. As a result, many completed surveys included questions to which the Student–Veterans did not respond. Question 8 reflected the lowest number of Student–Veteran responses at 1,260 (Table 65).

Table 65: Survey Responses – All.

	DISSERTATION SURVEY QUESTIONS	NUMBER OF RESPONSES
1	What degree did you pursue or are pursuing? (Check all that apply)	9,637
2	What was/is your field of study? (Check all that apply)	10,306
3	Approximately how many credits have you completed thus far in your current degree? Type number	6,635
4	Approximately what was/is your GPA? (4.0 Scale)	6,530
5	What is your graduation status?	6,512
6	Did you disclose your military service–connected disability to your college or university?	6,463
7	What was your level of comfort disclosing your military service-connected disability(ies)?	2,761
8	Why were you uncomfortable disclosing your military service-connected disability(ies)? (check all that apply)	1,260
9	Colleges and universities typically provide the following types of reasonable accommodation supports. Which types did you receive? (check all that apply)	4,327
10	How helpful were the provided reasonable accommodations to your learning?	2,724
11	What influenced your decision not to disclose your military service-connected disability? (check all that apply)	4,643
12	How satisfied are you with your college experience?	6,350
13	Additional feedback - Is there anything that you would like to clarify or share about your college experience, particularly pertaining to your military service-connected disability(ies) and your learning?	4,210

With the goal of garnering a representative sample, the dissertation survey was emailed to the entire population of Student-Veterans with military service-connected disabilities identified within VA databases (425,083). Tables 66-68 compare the sample and the population with respect to the demographics of sex, race, and age. The survey respondents included twice the percentage of women, 22% compared to 11% (Table 66), although this finding should be considered in light of the subsequently discussed missing gender data. The survey respondents were younger than the population by an average of eight years of age (Table 67). Regarding race, the percentages were roughly similar

between the survey respondents and the population; however, the percentage of Black or African American survey respondents was six percent greater than the population (Table 68).

Table 66: Population vs. Sample – Gender.

FY2020				
	Population		Sample	
	U.S. Veterans	Percentage	U.S. Veterans	Percentage
Male	16,183,353	89%	3,878	78%
Female	2,066,691	11%	1,092	22%
All Veterans	18,250,044	100%	4,970	100%
Source: National Center for Veterans Analysis and Statistics, 2020				

Table 67: Population vs. Sample – Age.

FY2020				
	Population		Sample	
Age	U.S. Veterans	Percentage	U.S. Veterans	Percentage
20-29	**176,369**	**9%**	**31**	**0.5%**
30-39	**358,001**	**17%**	**885**	**13.9%**
40-49	**413,661**	**20%**	**1502**	**23.6%**
50-59	**417,027**	**20%**	**3057**	**48.1%**
60-69	**429,111**	**21%**	**771**	**12.1%**
70-79	**188,171**	**9%**	**110**	**1.7%**
80-89	**84,351**	**4%**	**3**	**0.05%**
All Veterans	**2,066,691**	**100%**	**6,359**	**100%**
Average Age	**58**		**50**	
Source: National Center for Veterans Analysis and Statistics, 2020				

Table 68: Population vs. Sample – Race.

FY2020				
	Population		Sample	
	U.S. Veterans	Percentage	U.S. Veterans	Percentage
White	12,868,887	71%	3314	76%
Black or African American	2,347,339	13%	814	19%
American Indian and Alaska Native	145,829	1%	66	2%
Asian	337,305	2%	118	3%
Native Hawaiian and Other Pacific Islander	43,119	0%	52	1%
Some other race	335,655	2%	NA	NA
Two or more races	616,113	3%	NA	NA
Hispanic or Latino (of any race)	1,555,798	9%	NA	NA
All Veterans	18,250,044	100%		
Source: National Center for Veterans Analysis and Statistics, 2020				

Among the 7,872 completed surveys (1.9% response rate), 6,359 included responses to survey questions deemed essential for this study (Table 69). The survey questions considered essential were as follows:

- Question #4: Approximately what was/is your GPA?
- Question #5: What is your graduation status?
- Question #6: Did you disclose your military service–connected disability to your college or university?
- Question #9: Colleges and universities typically provide the following types of reasonable accommodation supports. Which types did you receive?
- Question #12: How satisfied are you with your college experience?

Respondents who did not complete all five of these questions (1,513 or 19.2%) were not included in the statistical analysis.

Table 69: Survey Responses– All Essential Questions Answered.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	NUMBERS AND PERCENTAGES
TOTAL VETERANS SURVEYED	425,083
SURVEYS STARTED	10,306
SURVEYS FINISHED	7,872
RESPONSE RATE	1.9%
COMPLETION RATE	76.4%
RESPONDED TO ESSENTIAL QUESTIONS	6,359
RECEIVED REASONABLE ACCOMMODATIONS	1,020
DID NOT RECEIVE REASONABLE ACCOMMODATIONS	5,339

4.3 Student–Veteran Disclosure of Disability

Of the total number of Student–Veterans who responded to survey questions deemed essential for this study, 58% disclosed their disability to their college or university (Table 70).

Table 70: Student–Veteran Disclosure of Disability.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	
TOTAL STUDENT-VETERANS	6,359
DISCLOSED DISABILITY	3,662
PERCENTAGE WHO DISCLOSED DISABILITY	57.6%

4.4 Reasonable Accommodations – Received/ Did Not Receive

The survey results indicate a significant gap between the percentage of Student–Veterans with military service–connected disabilities who received reasonable accommodations (16%) and the percentage of Student–Veterans with military service–connected disabilities who did not receive reasonable accommodations (84%) (Table 71).

Table 71: Received Reasonable Accommodations vs. Did Not Receive Reasonable Accommodations.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED		
RECEIVED REASONABLE ACCOMMODATIONS	**1,020**	**16%**
DID NOT RECEIVE REASONABLE ACCOMMODATIONS	**5,339**	**84%**
TOTAL DISCRETE STUDENT-VETERANS	**6,359**	**100%**

Within the population of Student–Veterans with military service–connected disabilities who disclosed their disability to their college or university, only 28% received reasonable accommodations (Table 72).

Table 72: Percentage Who Received Reasonable Accommodations.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	
DISCLOSED DISABILITY	**3,662**
RECEIVED REASONABLE ACCOMMODATIONS	**1,020**
PERCENTAGE WHO DISCLOSED AND RECEIVED REASONABLE ACCOMMODATIONS	**28%**

As anticipated, Student–Veteran disclosure of disability to their college or university varied by military service–connected disability severity rating (Table 73). The most severe rating (100%) reflected the highest rate of disability disclosure (84.0%). This disclosure rate, however, was an outlier. The remainder of the disclosure rates ranged between 30.4% (30% disability severity rating) and 42.4% (90% disability severity rating) (Table 73).

Table 73: Disclosure by Disability Severity Rating.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES - SEVERITY RATING	NUMBER OF STUDENT-VETERANS	DISCLOSED DISABILITY	RATE OF DISCLOSURE
100%	**1,089**	**915**	**84.0%**
90%	**158**	**67**	**42.4%**
80%	**203**	**72**	**35.5%**
70%	**282**	**115**	**40.8%**
60%	**236**	**82**	**34.7%**
50%	**294**	**111**	**37.8%**
40%	**267**	**89**	**33.3%**
30%	**428**	**130**	**30.4%**
20%	**531**	**169**	**31.8%**
10%	**831**	**319**	**38.4%**
0%	**2,040**	**628**	**30.8%**
TOTALS	**6,359**	**2,697**	**42.4%**

4.5 Educational Outcomes – Graduation Status – Predictor variables – Logistic Regression

A logistic regression was conducted between all six predictor variables and graduation status. Four of the six predictor variables: age, disclosure of disability, gender, and race were statistically significant ($p < .05$) The Wald statistic was significant (> 1.96) for these same four predictor variables.

- *The disclosure of disability odds ratio (1.46) indicates that the odds of a Student–Veteran graduating are increased by 46% when disabilities are disclosed to the college or university (Table 74)*
- *The gender odds ratio (0.73) indicates that the odds of a Student–Veteran graduating are decreased by 27% for non–male Student–Veterans (Table 74).*
- *The race odds ratio (0.80) indicates that the odds of a Student–Veteran graduating are decreased by 20% for non–White Student Veterans (Table 74).*

Table 74: Summary of Logistic Regression Analyses: Graduation Status Including Gender.

LOGISTIC REGRESSION	GRADUATION STATUS					
PREDICTOR VARIABLES	***n***	***coeff***	***s.e.***	***Wald***	***p-value***	***Odds Ratio***
intercept		**0.05**	**0.09**	**0.25**	**0.62**	**1.05**
Age	**6,359**	**0.01**	**0.00**	**53.01**	**0.00**	**1.01**
Disclosure of Disability	**6,359**	***0.38***	**0.06**	***44.22***	***0.00***	***1.46***
Gender	**6,359**	***-0.32***	**0.07**	***22.61***	***0.00***	***0.73***
Race	**6,359**	***-0.23***	**0.06**	***13.24***	***0.00***	***0.80***
Reasonable Accommodations	**1,020**	**0.13**	**0.08**	**3.16**	**0.08**	**1.14**
Disability Severity Rating	**6,359**	**-0.13**	**0.08**	**2.94**	**0.09**	**0.88**

Because gender identification was missing from an inordinate number of Student-Veterans within the sourced VA database (1,389), actually more than the number of females (1,092), a second regression was run excluding gender (Table 75). One change of note in this second regression was a .05 change in the race odds ratio from 0.80 to 0.75. Thus, the race odds ratio (0.75) indicates that the odds of a Student–Veteran graduating are decreased by 25% for non–White Student Veterans (Table 75).

Table 75: Summary of Logistic Regression Analyses: Graduation Status Excluding Gender.

LOGISTIC REGRESSION	GRADUATION STATUS					
PREDICTOR VARIABLES	***n***	***coeff***	***s.e.***	***Wald***	***p-value***	***Odds Ratio***
intercept		**0.14**	**0.09**	**2.42**	**0.12**	**1.16**
Age	**6,359**	**0.01**	**0.00**	**33.47**	**0.00**	**1.01**
Disclosure of Disability	**6,359**	**0.38**	**0.06**	**44.55**	**0.00**	**1.46**
Race	**6,359**	**-0.29**	**0.06**	**21.83**	**0.00**	**0.75**
Reasonable Accommodations	**1,020**	**0.13**	**0.08**	**2.80**	**0.09**	**1.13**
Disability Severity Rating	**6,359**	**-0.14**	**0.07**	**3.39**	**0.07**	**0.87**

For the above logistic regression, gender was coded as male = 0 and non–male = 1 (Table 76); non–male was comprised of females and gender–not–indicated. Race was coded as White = 0 and non–White = 1 (Table 77).

Table 76: Dummy Variables – Gender.

GENDER	DUMMY VARIABLES
Male	0
Female	1
Not Indicated	1

Table 77: Dummy Variables – Race.

RACE	DUMMY VARIABLES
White	0
Black or African American	1
Asian	1
American Indian or Alaska Native	1
Native Hawaiian or Other Pacific Islander	1
Unknown by Student-Veteran	1
Declined to Answer/ Not Available	1

The mean graduation status of Student–Veterans with military service–connected disabilities who received reasonable accommodations (68.1%) was higher than the mean graduation status of Student–Veterans who did not receive reasonable accommodations (65.9%) (Table 78). In ten of 14 reasonable accommodations categories, Student–Veterans graduated at higher rates than Student–Veterans who did not receive reasonable accommodations (Table 78). Student–Veterans who received speech–to–text (voice recognition), manipulatives, and test breaks reasonable accommodations graduated at rates higher than 70% (Table 78). Student–Veterans who received note–taker or scribe, text–to–speech (digital), testing over multiple days, and audiobooks graduated at rates lower than the mean graduation status of Student–Veterans who did not receive reasonable accommodations (Table 78).

Table 78: Student–Veteran Graduation Status – Reasonable Accommodations.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	RECEIVED REASONABLE ACCOMMODATIONS	GRADUATION STATUS	DID NOT RECEIVE REASONABLE ACCOMMODATIONS	DIFFERENCE BETWEEN RA AND NO RA
SPEECH-TO-TEXT (VOICE RECOGNITION)	67	71.6%	STUDENT-VETERANS 5,339	5.7%
MANIPULATIVES	17	70.6%		4.7%
TEST BREAKS	154	70.1%		4.2%
NOISE REDUCTION	246	69.1%		3.2%
PREFERENTIAL SEATING	258	69.0%		3.1%
RECORDING OF CLASSES/LECTURES	341	68.6%		2.7%
EXTENDED TIME ON EXAMS	618	68.4%		2.5%
USE OF CALCULATORS FOR TESTS AND EXAMS	151	67.5%		1.6%
TEXT-TO-SPEECH (HUMAN)	18	66.7%		0.8%
SMALL GROUP AND INDIVIDUAL ADMINISTRATION	175	66.3%		0.4%
NOTE-TAKER OR SCRIBE	145	63.4%		-2.5%
TEXT-TO-SPEECH (DIGITAL)	46	63.0%		-2.9%
TESTING OVER MULTIPLE DAYS	72	62.5%		-3.4%
AUDIOBOOKS	176	57.4%		-8.5%
TOTALS	2,484	68.1%	65.9%	2.2%
DISCRETE STUDENT-VETERANS	1,020			
AVERAGE NUMBER OF REASONABLE ACCOMMODATIONS	2.44			

4.5.1 Standard Deviation – Graduation Status – Reasonable Accommodations

The standard deviation of the graduation status was 3.9% across all 14 reasonable accommodations (Figure 2).

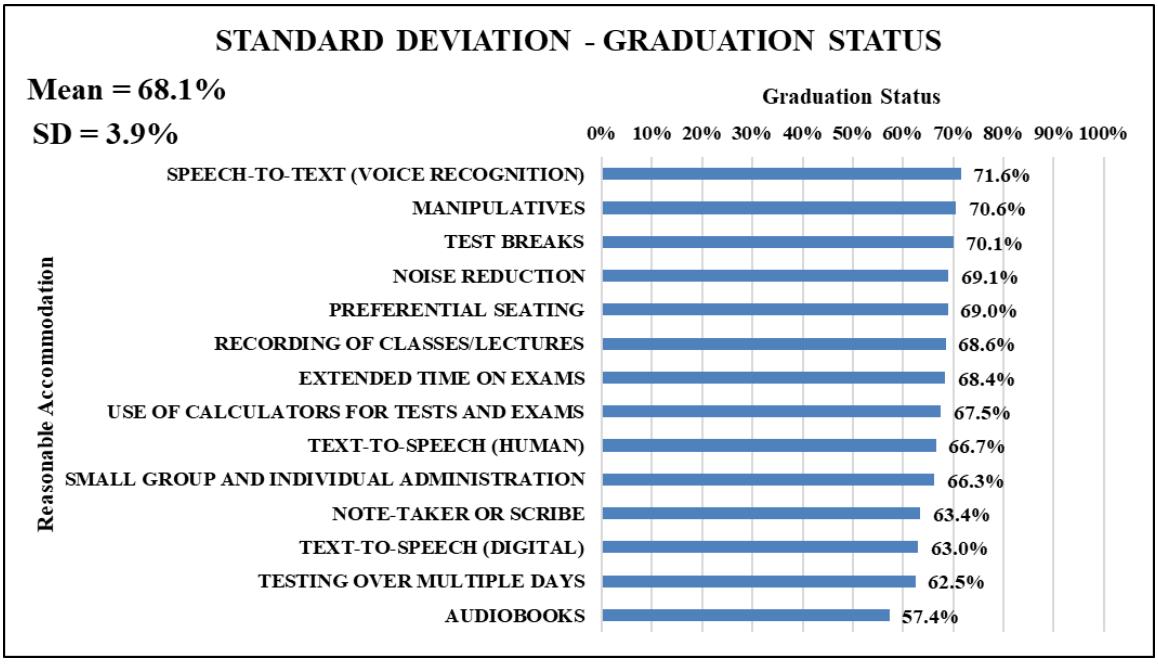


Figure 2: *Student–Veteran Graduation Status – Reasonable Accommodations – Standard Deviation*

4.5.2 Effect Size – Graduation – Reasonable Accommodations

The effect size (Cohen's d) of reasonable accommodations on Student–Veteran graduation status was calculated to be 0.05, indicating a small effect size and limited practical significance (Table 79), *when not also considering disability severity rating and disclosure of disability.*

Table 79: Cohen's d – Graduation Status – Reasonable Accommodations.

GRADUATION STATUS			
	Mean	**SD**	**n**
Received Reasonable Accommodations	**0.68**	**0.47**	**1,020**
Did Not Received Reasonable Accommodations	**0.66**	**0.47**	**5,339**
M_1-M_2			**0.02**
Pooled SD			**0.47**
Cohen's d_s			**0.05**

4.5.3 Correlation – Reasonable Accommodations

A correlation analysis was conducted across the 14 reasonable accommodations assessing multicollinearity. This analysis indicated no strong correlation between any of the reasonable accommodations (Table 80).

Table 80: Correlation Between Predictor Variables – Reasonable Accommodations.

CORRELATION														
REASONABLE ACCOMMODATION	**Extended Time on Exams**	**Recording of Classes/ Lectures**	**Preferential Seating**	**Noise Reduction**	**Audiobooks**	**Small Group and Individual Administration**	**Test Breaks**	**Use of Calculators for Tests and Exams**	**Note-Taker or Scribe**	**Testing Over Multiple Days**	**Speech-to-Text (Voice Recognition)**	**Text-to-Speech (Digital)**	**Text-to-Speech (Human)**	**Manipulatives**
Extended Time on Exams	1.00													
Recording of Classes/Lectures	0.04	1.00												
Preferential Seating	-0.07	0.13	1.00											
Noise Reduction	0.21	0.10	0.11	1.00										
Audiobooks	0.02	0.17	0.03	0.05	1.00									
Small Group and Individual Administration	-0.11	0.09	0.02	0.00	0.03	1.00								
Test Breaks	0.17	0.07	0.08	0.15	0.07	0.11	1.00							
Use of Calculators for Tests and Exams	-0.01	0.20	0.03	0.07	0.11	0.21	0.21	1.00						
Note-Taker or Scribe	0.20	0.25	0.08	0.10	0.16	-0.03	0.08	0.13	1.00					
Testing Over Multiple Days	-0.23	-0.11	-0.11	-0.08	0.03	-0.08	-0.01	-0.03	-0.02	1.00				
Speech-to-Text (Voice Recognition)	0.04	0.22	0.06	0.08	0.20	0.05	0.10	0.16	0.22	-0.01	1.00			
Text-to-Speech (Digital)	0.03	0.15	0.06	0.08	0.18	0.01	0.07	0.10	0.16	0.00	0.34	1.00		
Text-to-Speech (Human)	0.05	0.11	0.02	0.03	0.14	0.10	0.09	0.09	0.12	0.02	0.23	0.26	1.00	
Manipulatives	0.01	0.02	0.03	0.09	0.04	0.04	0.07	0.03	0.01	-0.01	0.03	0.05	0.16	1.00

4.6 Educational Outcomes –Graduation Status – Reasonable Accommodations – Logistic Regression

Based on the absence of a strong correlation between any of the 14 reasonable accommodations, a logistic regression was conducted using all of the reasonable accommodation predictor variables against graduation status. T*he audiobooks reasonable accommodation was statistically significant (p = .001, Wald = 10.33) with an odds ratio (0.57) indicating that the odds of a Student–Veteran graduating are decreased (–43%) when receiving this reasonable accommodation (Table 81).*

Table 81: Graduation Status – Reasonable Accommodations – Logistic Regression.

LOGISTIC REGRESSION	GRADUATION STATUS					
REASONABLE ACCOMMODATIONS	***n***	***coeff***	***s.e.***	***Wald***	***p-value***	***Odds Ratio***
intercept		0.66	0.03	552.05	0.00	1.94
Audiobooks	***176***	***-0.57***	***0.18***	***10.33***	***0.00***	***0.57***
Speech-to-Text (Voice Recognition)	67	0.45	0.32	1.95	0.16	1.56
Note-Taker or Scribe	145	-0.28	0.21	1.81	0.18	0.76
Extended Time on Exams	618	0.14	0.12	1.38	0.24	1.15
Recording of Classes/ Lectures	341	0.16	0.15	1.15	0.28	1.18
Test Breaks	154	0.14	0.20	0.45	0.50	1.15
Text-to-Speech (Digital)	46	-0.23	0.35	0.44	0.51	0.79
Preferential Seating	258	0.10	0.15	0.39	0.53	1.10
Small Group and Individual Administration	175	-0.08	0.18	0.21	0.65	0.92
Testing Over Multiple Days	72	-0.11	0.25	0.18	0.67	0.90
Noise Reduction	246	0.06	0.17	0.13	0.71	1.06
Manipulatives	17	0.16	0.55	0.09	0.77	1.18
Use of Calculators for Tests and Exams	151	0.03	0.20	0.02	0.89	1.03
Text-to-Speech (Human)	18	0.05	0.55	0.01	0.93	1.05

4.7 Educational Outcomes – Graduation Status – Reasonable Accommodations – Disability Severity Rating

Student–Veterans with more severe disability ratings (60%–100%) who received reasonable accommodations graduated at higher levels than Student–Veterans with more severe disability ratings who did not receive reasonable accommodations (Table 82). However, within several less severe disability ratings categories (50 percent, 40 percent, 10 percent, and zero percent), the graduation status of Student–Veterans who received reasonable accommodations were lower than those of Student–Veterans who did not receive reasonable accommodations (Table 82).

- *As hypothesized, Student–Veterans with military service–connected disabilities who received reasonable accommodations did vary by military service–connected disability severity rating; however, the percentage receiving reasonable accommodations did not correlate consistently with severity rating (Table 82).*

- *While the percentage of Student–Veterans with military service–connected disabilities receiving reasonable accommodations was highest for Student–Veterans with a 100% disability severity rating (28.1%) and lowest for those with a 0% disability severity rating (11.2%), the percentages receiving reasonable accommodations between 90% and 10% disability severity ratings varied (Table 82).*

Table 82: Student–Veteran Graduation Status – Reasonable Accommodations – Disability Severity Rating.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES - SEVERITY RATING	NUMBER OF STUDENT-VETERANS	RECEIVED ACCOMMODATIONS	PERCENTAGE OF SEVERITY RATING	GRADUATION STATUS	DID NOT RECEIVE ACCOMMODATIONS	PERCENTAGE OF SEVERITY RATING	GRADUATION STATUS	DIFFERENCE BETWEEN RA AND NO RA
100%	***1,089***	***306***	***28.1%***	***68.0%***	***783***	***71.9%***	***58.9%***	***9.1%***
90%	***158***	***35***	***22.2%***	***74.3%***	***123***	***77.8%***	***64.2%***	***10.1%***
80%	***203***	***37***	***18.2%***	***81.1%***	***166***	***81.8%***	***64.5%***	***16.6%***
70%	***282***	***55***	***19.5%***	***72.7%***	***227***	***80.5%***	***59.9%***	***12.8%***
60%	***236***	***47***	***19.9%***	***68.1%***	***189***	***80.1%***	***60.8%***	***7.2%***
50%	294	34	*11.6%*	58.8%	260	*88.4%*	62.3%	-3.5%
40%	267	46	*17.2%*	63.0%	221	*82.8%*	68.8%	-5.7%
30%	428	55	*12.9%*	69.1%	373	*87.1%*	63.8%	5.3%
20%	531	69	*13.0%*	72.5%	462	*87.0%*	66.2%	6.2%
10%	831	107	*12.9%*	65.4%	724	*87.1%*	67.4%	-2.0%
0%	2,040	229	*11.2%*	65.9%	1,811	*88.8%*	70.2%	-4.2%
SEVERITY RATINGS - ALL	**6,359**	**1,020**		**68.0%**	**5,339**		**65.8%**	**2.20%**

A scatter plot depicting the positive impact of reasonable accommodations on graduation status is presented in Figure 3. A nonlinear relationship is evident with reasonable accommodations being associated with a higher graduation status for the more severe disability ratings categories (60%–100%) (Figure 3).

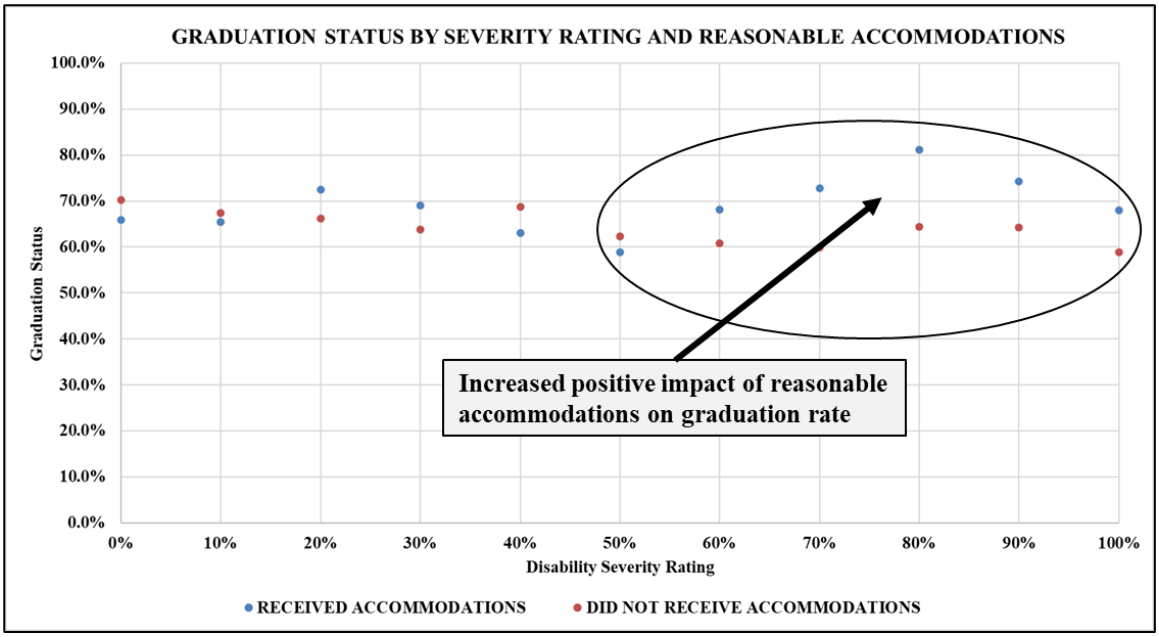


Figure 3: Student–Veteran Graduation Status – Disability Severity Rating – Reasonable Accommodations

4.8 Student–Veteran Graduation Status – Reasonable Accommodations – Disability Severity Rating –Logistic Regression

When regressing reasonable accommodations and disability severity ratings against graduation status, one reasonable accommodations was found to be statistically significant. *The audiobooks reasonable accommodation was statistically significant (p = .001, Wald = 9.36) with an odds ratio of 0.58, indicating the odds of a Student–Veteran graduating are decreased (42%) when receiving this reasonable accommodation (Table 83).*

Table 83: Student–Veteran Graduation Status – Reasonable Accommodations Disability Severity Rating –Logistic Regression.

LOGISTIC REGRESSION	GRADUATION STATUS					
REASONABLE ACCOMMODATIONS	***n***	***coeff***	***s.e.***	***Wald***	***p-value***	***Odds Ratio***
intercept		0.78	0.04	423.81	0.00	2.18
Disability Severity Rating	6359	-0.33	0.07	21.35	0.00	0.72
Audiobooks	**176**	***-0.54***	**0.18**	***9.36***	***0.00***	***0.58***
Extended Time on Exams	618	0.17	0.12	2.22	0.14	1.19
Speech-to-Text (Voice Recognition)	67	0.45	0.32	1.97	0.16	1.57
Note-Taker or Scribe	145	-0.27	0.21	1.70	0.19	0.76
Recording of Classes/ Lectures	341	0.17	0.15	1.24	0.27	1.18
Preferential Seating	258	0.11	0.15	0.54	0.46	1.12
Text-to-Speech (Digital)	46	-0.25	0.35	0.53	0.47	0.78
Test Breaks	154	0.12	0.20	0.36	0.55	1.13
Noise Reduction	246	0.07	0.17	0.17	0.68	1.07
Small Group and Individual Administration	175	-0.07	0.18	0.17	0.68	0.93
Manipulatives	17	0.18	0.55	0.11	0.74	1.20
Testing Over Multiple Days	72	0.05	0.25	0.03	0.85	1.05
Text-to-Speech (Human)	18	0.09	0.55	0.03	0.87	1.10
Use of Calculators for Tests and Exams	151	0.00	0.20	0.00	1.00	1.00

Based on the findings in Table 82 and Figure 3, which suggest reasonable accommodations may impact Student–Veteran graduation status more significantly in the more severe disability ratings categories, a logistic regression was run regressing all reasonable accommodations and disability severity ratings (60% – 100%) against graduation status. Importantly, including only Student–Veterans with more severe disability severity ratings (60% – 100%) reduced the population from n = 6,359 Student–Veterans to n = 1,968 Student–Veterans. *The logistic regression found two reasonable accommodations were statistically significant: audiobooks and extended–time–on–exams (Table 84).*

For Student–Veterans with a disability rating between 60%–100%, the extended–time–on–exams reasonable accommodation was statistically significant (p = 0.02, Wald = 5.52, Table 84). *With an odds ratio of 1.55, the odds of a Student–Veteran with a disability rating between 60%–100% graduating are increased by 55% when receiving*

the extended–time–on–exams reasonable accommodation (Table 84). The audiobooks reasonable accommodation was also statistically significant (p = 0.00, Wald = 7.94, Table 84). *With an odds ratio of 0.47, the odds of a Student–Veteran with a disability rating between 60%–100% graduating are decreased (53%) when receiving the audiobooks reasonable accommodation (Table 84).*

Table 84: Student–Veteran Graduation Status – Reasonable Accommodations Disability Severity Rating 60%–100% – Logistic Regression.

LOGISTIC REGRESSION	**GRADUATION STATUS**					
REASONABLE ACCOMMODATIONS DISABILITY SEVERITY RATING 60%-100%	***n***	***coeff***	***s.e.***	***Wald***	***p-value***	***Odds Ratio***
intercept		0.65	0.28	5.37	0.02	1.92
Disability Severity Rating 60%-100%	1968	-0.24	0.32	0.56	0.45	0.79
Audiobooks	176	***-0.75***	0.26	***7.94***	***0.00***	***0.47***
Extended Time on Exams	618	***0.44***	0.19	***5.52***	***0.02***	***1.55***
Noise Reduction	246	0.49	0.28	2.96	0.09	1.63
Speech-to-Text (Voice Recognition)	67	0.82	0.56	2.16	0.14	2.27
Test Breaks	154	0.50	0.35	2.00	0.16	1.64
Small Group and Individual Administration	175	0.36	0.29	1.53	0.22	1.43
Use of Calculators for Tests and Exams	151	0.39	0.36	1.18	0.28	1.48
Note-Taker or Scribe	145	-0.35	0.33	1.14	0.29	0.70
Manipulatives	17	-0.72	0.69	1.08	0.30	0.49
Text-to-Speech (Digital)	46	-0.38	0.62	0.37	0.54	0.69
Testing Over Multiple Days	72	0.13	0.27	0.23	0.63	1.14
Recording of Classes/ Lectures	341	0.06	0.24	0.06	0.80	1.06
Text-to-Speech (Human)	18	-0.07	0.80	0.01	0.93	0.93
Preferential Seating	258	0.01	0.24	0.00	0.96	1.01

Given this evidence that reasonable accommodations may indeed impact Student–Veteran graduation status more significantly in the more severe disability ratings categories, mean disability severity rating was calculated for each reasonable accommodation (Table 85). The overall mean disability severity rating was 50% with a standard deviation of 11% (Table 85). Of note and consistent with the findings in Table 84, Student-Veterans who received the audiobooks reasonable accommodation had the lowest graduation status (57.4%; Table 85).

Table 85: Disability Severity Rating by Reasonable Accommodations.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	RECEIVED REASONABLE ACCOMMODATIONS	MEAN DISABILITY SEVERITY RATING	GRADUATION STATUS
EXTENDED TIME ON EXAMS	618	50%	68.4%
RECORDING OF CLASSES/LECTURES	341	48%	68.6%
PREFERENTIAL SEATING	258	48%	69.0%
NOISE REDUCTION	246	50%	69.1%
AUDIOBOOKS	176	55%	57.4%
SMALL GROUP AND INDIVIDUAL ADMINISTRATION	175	44%	66.3%
TEST BREAKS	154	46%	70.1%
USE OF CALCULATORS FOR TESTS AND EXAMS	151	41%	67.5%
NOTE-TAKER OR SCRIBE	145	53%	63.4%
TESTING OVER MULTIPLE DAYS	72	85%	62.5%
SPEECH-TO-TEXT (VOICE RECOGNITION)	67	49%	71.6%
TEXT-TO-SPEECH (DIGITAL)	46	47%	63.0%
TEXT-TO-SPEECH (HUMAN)	18	62%	66.7%
MANIPULATIVES	17	57%	70.6%
TOTALS	2,484	50%	68.1%
DISCRETE STUDENT-VETERANS	1,020		
AVERAGE NUMBER OF REASONABLE ACCOMMODATIONS	2.44		

4.9 Correlation –GPA and Graduation Status

To get a sense as to whether the predictor variables might have a similar relationship with GPA as they did with Student–Veteran graduation status, a correlation analysis was conducted between GPA and graduation status. While the correlation between Student–Veteran GPA and graduation is positive, it was surprisingly weak ($r = 0.19$).

4.10 Educational Outcomes – GPA – Predictor variables – Multiple Regression

Multiple regression was conducted between all six predictor variables and GPA. Consistent with the weak correlation between GPA and graduation, the GPA regression results were very different than those of graduation status. Only two of the predictor variables were statistically significant: age and race (Table 86). Age was positively associated with GPA, indicating the GPA of Student–Veterans is predicted to increase by 0.001 points with the addition of older Student–Veterans, keeping all other variables held

constant (Table 86). The regression coefficient of the race predictor variable was negative (–0.10), indicating the GPA of Student–Veterans is predicted to decrease by 0.10 points with the addition of non–White Student–Veterans (Table 86).

Table 86: Student–Veteran GPA – Predictor Variables – Multiple Regression.

SUMMARY OUTPUT	**GPA**
PREDICTOR VARIABLES	

Regression Statistics	
Multiple R	0.10
R Square	0.01
Adjusted R Square	0.01
Standard Error	0.46
Observations	6359

ANOVA

	df	*SS*	*MS*	*F*	***Significance F***
Regression	6	13.60	2.27	10.58	***0.00***
Residual	6352	1360.37	0.21		
Total	6358	1373.97			

Predictor Variables	***Coefficients***	***Standard Error***	***t Stat***	***P-value***
Intercept	3.50	0.02	168.12	0.00
Race	***-0.10***	***0.01***	***-6.90***	***0.00***
Age	***0.001***	***0.00***	***3.76***	***0.00***
Disability Severity Rating	-0.03	0.02	-1.80	0.07
Gender	-0.02	0.01	-1.38	0.17
Disclosure of Disability	0.01	0.01	1.17	0.24
Reasonable Accommodations	0.00	0.02	-0.03	0.97

4.11 Educational Outcomes – GPA – Reasonable Accommodations – Multiple Regression

Multiple regression was conducted between all 14 reasonable accommodation predictor variables and GPA. None of the reasonable accommodations generated a statistically significant p–value (Table 87).

Table 87: Student–Veteran GPA – Predictor variables – Multiple Regression.

SUMMARY OUTPUT PREDICTOR VARIABLES	GPA				
Regression Statistics					
Multiple R	**0.02**				
R Square	**0.00**				
Adjusted R Square	**0.00**				
Standard Error	**0.47**				
Observations	**6359**				
ANOVA					
	df	***SS***	***MS***	***F***	***Significance F***
Regression	**14**	**0.62**	**0.04**	**0.20**	**1.00**
Residual	**6344**	**1373.35**	**0.22**		
Total	**6358**	**1373.97**			
Predictor Variables	***Coefficients***	***Standard Error***	***t Stat***	***P-value***	
Intercept	**3.52**	**0.01**	**564.78**	**0.00**	
Extended Time on Exams	**-0.01**	**0.03**	**-0.21**	**0.83**	
Recording of Classes/ Lectures	**-0.03**	**0.03**	**-1.00**	**0.32**	
Preferential Seating	**0.01**	**0.03**	**0.41**	**0.68**	
Noise Reduction	**0.01**	**0.04**	**0.24**	**0.81**	
Audiobooks	**-0.01**	**0.04**	**-0.18**	**0.86**	
Small Group and Individual Administrati	**-0.01**	**0.04**	**-0.30**	**0.76**	
Test Breaks	**0.04**	**0.04**	**0.88**	**0.38**	
Use of Calculators for Tests and Exams	**-0.01**	**0.04**	**-0.30**	**0.76**	
Note-Taker or Scribe	**0.00**	**0.05**	**-0.05**	**0.96**	
Testing Over Multiple Days	**0.01**	**0.06**	**0.17**	**0.87**	
Speech-to-Text (Voice Recognition)	**0.04**	**0.07**	**0.58**	**0.56**	
Text-to-Speech (Digital)	**0.00**	**0.08**	**-0.04**	**0.97**	
Text-to-Speech (Human)	**-0.05**	**0.12**	**-0.39**	**0.69**	
Manipulatives	**0.00**	**0.12**	**0.03**	**0.98**	

4.12 Educational Outcomes – GPA – Reasonable Accommodations

In contrast to graduation status, the mean GPA of Student–Veterans with military service–connected disabilities who received reasonable accommodations was lower (3.51), albeit slightly, than the overall GPA (3.52) of Student–Veterans who did not receive reasonable accommodations in 10 of 14 reasonable accommodations categories (Table 88). Student–Veterans who received the test breaks reasonable accommodation achieved a mean GPA of 3.54, exceeding the mean GPA of Student–Veterans who did

not receive reasonable accommodations by 0.02 points (Table 88). Student–Veterans who received the text–to–speech (human) reasonable accommodation achieved a mean GPA of 3.47, trailing the mean GPA of Student–Veterans who did not receive reasonable accommodations by 0.05 points (Table 88).

Table 88: Student–Veteran GPA – Received/ Did Not Receive Reasonable Accommodations.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	RECEIVED REASONABLE ACCOMMODATIONS	GRADE POINT AVERAGE - MEAN	DID NOT RECEIVE REASONABLE ACCOMMODATIONS	DIFFERENCE BETWEEN RA AND NO RA
TEST BREAKS	154	3.54		0.02
SPEECH-TO-TEXT (VOICE RECOGNITION)	67	3.53		0.01
TESTING OVER MULTIPLE DAYS	72	3.53		0.01
PREFERENTIAL SEATING	258	3.52		0.002
NOISE REDUCTION	246	3.52		(0.00001)
MANIPULATIVES	17	3.52	DISCRETE STUDENT-VETERANS 5,339	(0.005)
EXTENDED TIME ON EXAMS	618	3.51		(0.01)
TEXT-TO-SPEECH (DIGITAL)	46	3.51		(0.01)
NOTE-TAKER OR SCRIBE	145	3.51		(0.01)
AUDIOBOOKS	176	3.51	GPA MEAN 3.52	(0.02)
USE OF CALCULATORS FOR TESTS AND EXAMS	151	3.50		(0.02)
SMALL GROUP AND INDIVIDUAL ADMINISTRATION	175	3.50		(0.02)
RECORDING OF CLASSES/LECTURES	341	3.49		(0.03)
TEXT-TO-SPEECH (HUMAN)	18	3.47		(0.05)
TOTALS	2,484	3.51	3.52	(0.01)
DISCRETE STUDENT-VETERANS	1,020			
AVERAGE NUMBER OF REASONABLE ACCOMMODATIONS	2.44			

4.12.1 Standard Deviation – GPA – Reasonable Accommodations

The standard deviation of Student–Veteran GPA was 1.7 points across all 14 reasonable accommodations (Figure 4).

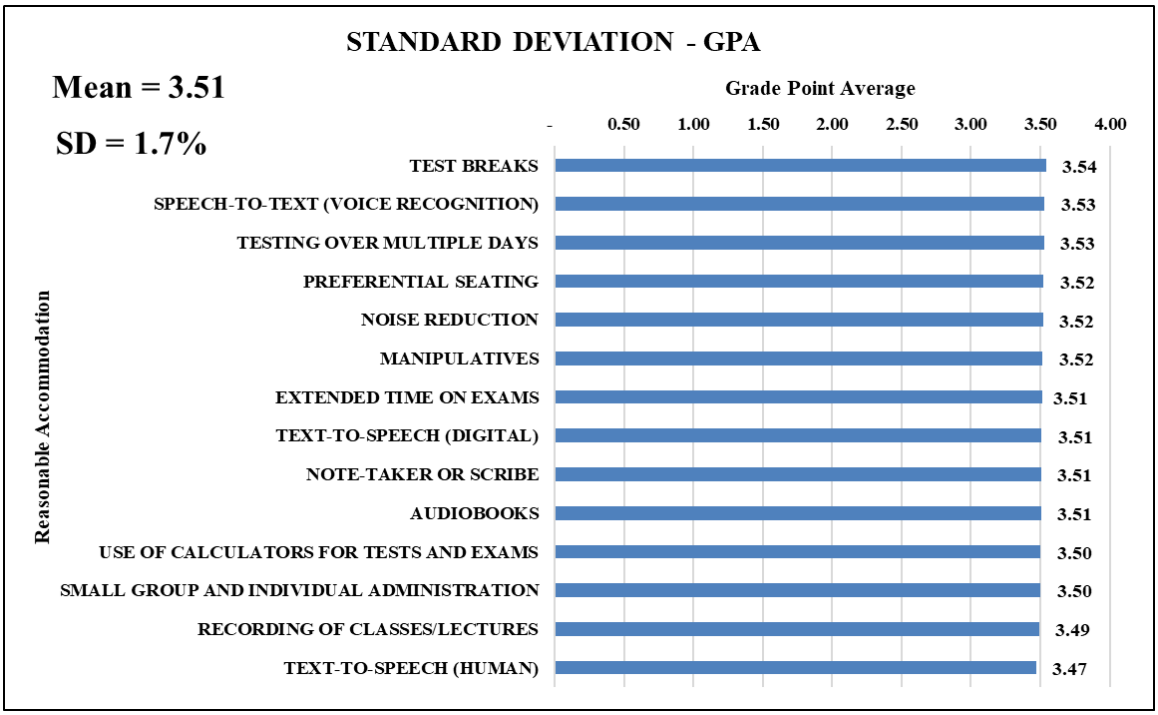


Figure 4: Student–Veteran GPA – Disability Severity Rating – Standard Deviation.

4.12.2 Effect Size – GPA – Reasonable Accommodations

The effect size (Cohen's d) of reasonable accommodations on Student–Veteran GPA was calculated to be –0.03, indicating a small effect size and limited practical significance (Table 89).

Table 89: Cohen's d – GPA – Reasonable Accommodations.

GPA			
	Mean	**SD**	**n**
Received Reasonable Accommodations	**3.51**	**0.46**	**1,020**
Did Not Received Reasonable Accommodations	**3.52**	**0.47**	**5,339**
M_1-M_2			**-1.2%**
Pooled SD			**0.46**
Cohen's d_s			**-0.03**

4.12.3 Educational Outcomes – GPA – Disability Severity Rating– Reasonable Accommodations

Unlike graduation status, the GPA of Student–Veterans with more severe disability ratings who received reasonable accommodations were remarkably similar to those of Student–Veterans with more severe disability ratings who did not receive reasonable accommodations (Table 90). In eight of the 11 disability severity rating categories, the GPA of Student–Veterans who received reasonable accommodations were actually slightly less than those of Student–Veterans who did not receive reasonable accommodations (Table 90). *Of note, Student–Veterans with the most severe disability rating of 100% achieved the lowest GPA (3.45) among Student–Veterans who did not receive reasonable accommodations (Table 90).*

Table 90: Student–Veteran GPA – Disability Severity Rating– Reasonable Accommodations.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES - SEVERITY RATING	NUMBER OF STUDENT-VETERANS	RECEIVED ACCOMODATIONS	RECEIVED ACCOMODATIONS GPA	DID NOT RECEIVE ACCOMMODATIONS	DID NOT RECEIVE ACCOMMODATIONS GPA	DIFFERENCE BETWEEN RA AND NO RA
100%	1,089	306	3.53	783	3.45	0.08
90%	158	35	3.56	123	3.55	0.004
80%	203	37	3.48	166	3.50	(0.02)
70%	282	55	3.51	227	3.54	(0.03)
60%	236	47	3.43	189	3.53	(0.11)
50%	294	34	3.47	260	3.54	(0.07)
40%	267	46	3.51	221	3.56	(0.04)
30%	428	55	3.52	373	3.54	(0.02)
20%	531	69	3.51	462	3.54	(0.03)
10%	831	107	3.60	724	3.54	0.06
0%	2,040	229	3.45	1,811	3.53	(0.07)
SEVERITY RATINGS - ALL	6,359	1,020	3.51	5,339	3.52	(0.01)

Again, unlike graduation status, which showed a separation of achievement in the more severe disability rating categories, Student–Veteran GPA was consistent between

those who received reasonable accommodations and those who did not receive reasonable accommodations in all disability severity rating categories (Figure 5).

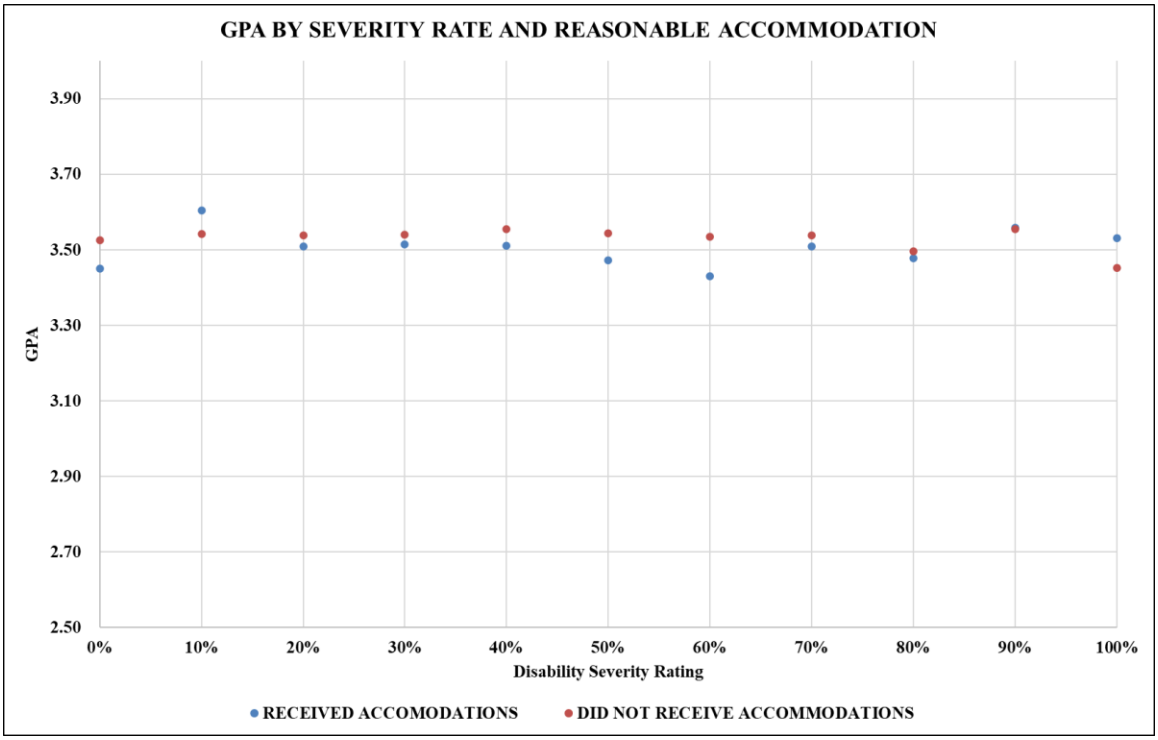


Figure 5: Student–Veteran GPA – Disability Severity Rating – Reasonable Accommodations.

4.13 Student–Veteran Satisfaction with their College-University Experience

Student-Veteran satisfaction with their college-university experience was captured by study survey question number 12. Among the population (1,020) of Student-Veterans who received reasonable accommodations, 81.5% were either very satisfied or somewhat satisfied with their college-university experience compared to 75.4% of Student-Veterans who did not receive reasonable accommodations (Table 91).

Table 91: Student–Veteran Satisfaction with College-University Experience.

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	RECEIVED REASONABLE ACCOMMODATIONS	PERCENTAGE	DID NOT RECEIVE REASONABLE ACCOMMODATIONS	PERCENTAGE
VERY SATISFIED	521	51.1%	2,430	45.5%
SOMEWHAT SATISFIED	310	30.4%	1,596	29.9%
NEITHER SATISFIED NOR DISSATISFIED	67	6.6%	564	10.6%
SOMEWHAT DISSATISFIED	75	7.4%	363	6.8%
VERY DISSATISFIED	44	4.3%	226	4.2%
DID NOT ANSWER	3	0.3%	160	3.0%
TOTAL DISCRETE STUDENT-VETERANS	1,020	100%	5,339	100%

A t-Test (two-sample assuming unequal variances) was conducted to compare the satisfaction means (very satisfied or somewhat satisfied) of the 1,020 Student-Veterans with military service-connected disabilities who received reasonable accommodations to the 5,339 Student-Veterans with military service-connected disabilities who did not receive reasonable accommodations. The resulting t Statistic of 4.48 indicates that there is a significant difference between the means of the two groups (Table 92). *Therefore, the 1,020 Student-Veterans with military service-connected disabilities who received reasonable accommodations were significantly more satisfied with their college-university experience than the 5,339 Student-Veterans with military service-connected disabilities who did not receive reasonable accommodations.*

Table 92: t-Test - Student–Veteran Satisfaction with College-University Experience – Received Reasonable Accommodations vs. Did Not Receive Reasonable Accommodations.

t-Test: Two-Sample Assuming Unequal Variances		
SATISFACTION WITH COLLEGE-UNIVERSITY EXPERIENCE	**VERY SATISFIED OR SOMEWHAT SATISFIED**	**VERY SATISFIED OR SOMEWHAT SATISFIED**
Mean	**0.81**	**0.75**
Variance	**0.15**	**0.19**
Observations	**1,020**	**5,339**
Hypothesized Mean Difference	**0.00**	
df	**1,537**	
t Stat	***4.48***	
P(T<=t) one-tail	**0.00**	
t Critical one-tail	**1.65**	
P(T<=t) two-tail	**0.00**	
t Critical two-tail	**1.96**	

CHAPTER 5 – DISCUSSION, IMPLICATIONS, LIMITATIONS, RECOMMENDATIONS, AND CONCLUSIONS

5.1 Discussion

I am deeply concerned for my Student–Veteran colleagues, particularly those with a more severe military service–connected disability rating between 60% and 100%. Based on the mathematics in this dissertation, I calculated that 1,968 of the 6,359 Student–Veterans (30.9%) who participated in this study had a military service–connected disability rating between 60% and 100% (Table 94). *Within this subgroup of more severely disabled Student–Veterans, the graduation status was 62.7%, which trailed the overall graduation status of Student–Veterans included in this dissertation (66.2%) by 3.5% (Table 93).*

Table 93: Student–Veteran Graduation Status – Based on All Participants in This Dissertation.

	TOTAL STUDENT-VETERANS	TOTAL STUDENT-VETERANS GRADUATED	TOTAL STUDENT-VETERAN GRADUATION RATE	STUDENT-VETERANS RATED 60%-100% DISABLED	GRADUATION RATE STUDENT-VETERANS RATED 60%-100% DISABLED	DIFFERENCE
STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	**6,359**	**4,209**	**66.2%**	**1,968**	**62.7%**	**-3.5%**

- *Within this same subgroup of more severely disabled Student–Veterans (60%–100% ratings), the graduation status dropped to 60.3%, which trailed the overall graduation status of Student–Veterans included in this dissertation by 5.9% (Table 94).*
- *Student–Veterans with a 100% disability rating who did not receive reasonable accommodations dropped to an alarmingly low graduation status*

of 58.9%, which trailed the overall graduation status of Student–Veterans included in this dissertation by 7.3% (Table 94).

Table 94: *Student–Veteran Graduation Status – More Severe Disability Ratings (60%–100%).*

STUDENT-VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES - SEVERITY RATING	NUMBER OF STUDENT-VETERANS	RECEIVED ACCOMMODATIONS	PERCENTAGE OF SEVERITY RATING	GRADUATION STATUS	DID NOT RECEIVE ACCOMMODATIONS	PERCENTAGE OF SEVERITY RATING	GRADUATION STATUS	DIFFERENCE BETWEEN RA AND NO RA
100%	*1,089*	*306*	*28.1%*	*68.0%*	*783*	*71.9%*	*58.9%*	*9.1%*
90%	*158*	*35*	*22.2%*	*74.3%*	*123*	*77.8%*	*64.2%*	*10.1%*
80%	*203*	*37*	*18.2%*	*81.1%*	*166*	*81.8%*	*64.5%*	*16.6%*
70%	*282*	*55*	*19.5%*	*72.7%*	*227*	*80.5%*	*59.9%*	*12.8%*
60%	*236*	*47*	*19.9%*	*68.1%*	*189*	*80.1%*	*60.8%*	*7.2%*
SEVERITY RATINGS - ALL	**1,968**	**480**		**70.0%**	**1,488**		**60.3%**	**9.65%**

My concern deepens when considering data from the most recent VA VBA Annual Benefits Report (FY 2022). This report indicated that the total population of Veterans with a military service–connected disability rating between 60% and 100% was 3.1 million, which comprised 57.2% of all disabled Veterans (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2023) (Table 95). The 57.2% is nearly double the 30.9% that I calculated in this dissertation. The same report also indicated that 834,460 Veterans received education benefits that same year (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2023). These official data suggest that the FY2022 annual population of Veterans with a military service–connected disability rating between 60% and 100% who attended college or graduate school was approximately 477,095 (Table 95).

Table 95: Student–Veterans With Disability Severity Ratings Between 60% – 100%.

FY2022	
Veteran Service-Connected Disability Severity Rating	**Veterans Benefits Administration Annual Benefits Report**
0%	6,959
10%	893,638
20%	400,002
30%	359,613
40%	364,950
50%	294,724
60%	440,756
70%	513,459
80%	529,283
90%	506,188
100%	1,107,440
TOTALS	**5,417,012**
Total Veterans Rated 60%-100%	**3,097,126**
Percentage of Veterans Rated 60%-100%	**57.2%**
Number of Veterans who participated in VA education programs	**834,460**
Estimated number of Veterans who participated in VA education programs with 60%-100% disability rating	**477,095**
Source: FY2022 Veterans Benefits Administration Annual Benefits Report	

Importantly, the 477,095 number does not take into account Student–Veterans with military service–connected disability ratings between 60% and 100% who attended college or graduate school without utilizing their GI Bill benefit. Factoring in this population, I conservatively estimate that the Student–Veteran population with a military service–connected disability rating between 60% and 100% is more than 500,000. The question is how much higher than 500,000. Additional research is needed to ascertain a more accurate estimate of this population, but it is this particularly vulnerable population of Student–Veterans that I aim to support with my dissertation findings and subsequent research. Thus, my PhD journey has evolved into a greater purpose of spearheading a new body of research supporting the higher educational achievement of U.S. armed

forces Student–Veterans with more severe military service–connected disabilities. Several key findings of this dissertation hold significant promise to realize this goal (Table 96).

Table 96: Several key findings of this dissertation hold significant promise.

	KEY FINDINGS
1	**Disclosure of military service–connected disability positively affects graduation status**
2	**Nearly half of Student–Veterans did not disclose their military service–connected disability to their college or university**
3	**84% of Student–Veterans with military service–connected disabilities did not receive reasonable accommodations support from their college or university**
4	**12 of 14 reasonable accommodations typically provided by colleges and universities had no statistical impact on Student–Veteran higher educational achievement**
5	**One reasonable accommodation typically provided by colleges and universities (extended–time–on–exams) did positively impact Student–Veteran higher educational achievement (graduation) (60%-100% disability rating)**
6	**One reasonable accommodation typically provided by colleges and universities (audiobooks) negatively impacted Student–Veteran higher educational achievement (graduation)**
7	**Student–Veterans with military service–connected disabilities who received reasonable accommodations were statistically more satisfied with their college-university experience than Student–Veterans with military service–connected disabilities who did not receive reasonable accommodations**

Combined, these findings indicate that there is a significant opportunity to increase the graduation rate of Student–Veterans with military service–connected disabilities.

The primary hypothesis of this dissertation was that higher educational achievement (graduation status and GPA) of Student–Veterans with military service–connected disabilities is improved when colleges/universities provide reasonable learning

accommodations. Supporting this hypothesis, I found that the mean graduation status of Student–Veterans with military service–connected disabilities who received reasonable accommodations (68.1%) was higher than the mean graduation status of Student–Veterans who did not receive reasonable accommodations (65.9%) (Table 78). In contrast, however, I found that the mean GPA of Student–Veterans with military service–connected disabilities who received reasonable accommodations (3.51) was slightly less than the mean GPA of Student–Veterans who did not receive reasonable accommodations (3.52) (Table 87). I was somewhat perplexed by this finding, because I had anticipated that graduation and GPA would be highly correlated; however, the data in this dissertation indicated a positive, but very weak correlation (0.19). While graduation status and GPA are both measures of academic achievement, the differences in how they were impacted by reasonable accommodations in this study might be explained by this very weak correlation.

Research into college graduation status and GPA as predictors of future success is also somewhat divergent. Regarding graduation, men with bachelor's degrees earn approximately $900,000 more in median lifetime earnings than high school graduates; women with bachelor's degrees earn $630,000 more (U.S. Social Security Administration, 2015). Further, men with graduate degrees earn $1.5 million more in median lifetime earnings than high school graduates; women with graduate degrees earn $1.1 million more (U.S. Social Security Administration, 2015). Regarding GPA, research indicates that it could be critical when applying for a first job after graduating from college; however, beyond entry–level positions, GPA seems to matter less and track record becomes more important to employers (Indeed.com, 2023). Additionally, whether

GPA matters or not after college depends on the career path a student decides to pursue (Indeed.com, 2023). “Students with no interest in pursuing further education or joining the corporate world might find that it's less important to have a high GPA” (Indeed.com, 2023, para. 7). “Further, many notable companies, such as Google, have already announced that they will no longer consider a job candidate's college GPA in the recruitment process; companies like this care more about level of education (degree) or experience than GPA” (Indeed.com, 2023, para. 13). Beyond financial measures, research also indicates that “highly educated adults in the U.S. have lower yearly mortality rates than less–educated people in every age, gender, and racial/ethnic subgroup of the population” (Hummer & Hernandez, 2013, para. 6). This statistic should capture the undivided attention of VA, which has a responsibility to provide health care to Veterans.

Based on the growing evidence that graduation status, i.e., degree, particularly at the masters level and higher (Indeed.com, 2023), is a more significant indicator of student success over a lifetime than GPA, I believe that my findings in this dissertation bode well for Student–Veterans with military service–connected disabilities, particularly those with more severe disability ratings between 60% and 100%.

5.2 Implications

5.2.1 Reasonable Accommodations

The literature review of this dissertation revealed that minimal research has been conducted examining the impact of reasonable accommodations on higher educational student achievement (graduation and GPA): (a) of the 100 studies identified, only 19 pertained to higher education; (b) these 19 higher education studies addressed only four of the 14 reasonable accommodations typically provided by colleges and universities:

extended–time–on–exams , recording–of–classes/lectures, and audiobooks; (c) none of the 19 higher education studies measured impact in terms of graduation status and (d) *the literature review of this dissertation revealed that, to date, it appears that no research has been conducted specifically examining the impact of reasonable accommodations on disabled Student–Veteran higher educational achievement* (Table 97). Beyond the Student–Veteran population identified in this dissertation, there is clearly a great need to conduct more research on the use of reasonable accommodations to support students of all types with disabilities in higher education.

Table 97: Absence of Research Examining Impact of Reasonable Accommodations on Graduation

HIGHER EDUCATION STUDIES MEASURING IMPACT OF REASONABLE ACCOMMODATIONS ON STUDENT EDUCATIONAL ACHIEVEMENT				
	REASONABLE ACCOMMODATION	**RESEARCHERS**	**MEASUREMENT**	**IMPACT**
1	**Extended time on exams**	Kim & Lee, 2016	GPA	Positive
2		Baker, 2006	GPA	Positive
3		Ofiesh, 2000	Processing Speed	Positive
4		Jarvis, 1997	Course Assessments	Positive
5		Miller et al., 2013	Reading Comprehension	Mixed
6		Lewandowski et al., 2012	Reading Comprehension	Mixed
7		Wadley & Liljequist, 2013	Math Tests	None
8	**Audiobooks**	Kartal & Simsek, 2017	English as a Foreign Language	Positive
9		Daniel & Woody, 2010	Course Assessments	Negative
10	**Recording-of-classes/lectures**	Spittaels & Vanacker, 2019	Course Assessments	Positive
11		Bruxvoort, 2012	Course Assessments	Positive
12		Morris, 2010	Course Assessments	Positive
13		McKinney et al., 2009	Course Assessments	Positive
14		Murphy & Stewart, 2015	Course Assessments	Mixed
15		Leadbeater et al., 2013	Final Examinations	None
16		Franklin et al., 2011	Course Assessments	None
17		Baillie et al., 2022	Course Assessments	Negative
18		Edwards & Clinton, 2018	Course Assessments	Negative
NOTE 1: Zero studies examined the impact of reasonable accommodations on Student-Veteran educational achievement.				
NOTE 2: Zero studies examined the impact of reasonable accommodations on graduation status.				

5.2.2 Reasonable Accommodations – Extended–Time–on–Exams

Of the 100 studies identified within the literature review of this dissertation, seven examined the impact of the extended–time–on–exams reasonable accommodation on

higher educational student achievement (Table 52). Of these seven studies, four found a positive impact, two found mixed results, and one found no impact on higher educational achievement (Table 52). Of the four studies that found a positive impact, two measured GPA (Kim & Lee, 2016; Baker, 2006) and two measured classroom tests (Ofiesh, 2000; Jarvis, 1997). Both studies that found mixed results measured impact on reading comprehension (Miller et al., 2013; Lewandowski et al., 2012). The single study that found no impact measured math tests (Wadley & Liljequist, 2013). Importantly, none of the identified studies within the literature review of this dissertation measured graduation status.

Therefore, at a more granular level, my findings are not directly consistent with any of the seven extended–time–on–exams studies identified within my literature review, because none of these studies measured impact on graduation. Regarding the two studies that found a positive impact of extended–time–on–exams on GPA (Kim & Lee, 2016 and Baker, 2006), the findings in this dissertation do not agree with those results. I found that the extended–time–on–exams reasonable accommodation had no significant statistical impact on GPA (Table 87).

5.2.3 Reasonable Accommodations – Audiobooks

Only two of the 100 studies identified within the literature review of this dissertation examined the impact of the audiobooks reasonable accommodation on higher educational achievement (Table 41). Of the two studies, one found a positive impact and one found a negative impact (Table 41). The study that found a positive effect included 66 undergraduate English–as–a–Foreign Language (EFL) students and measured a positive impact on listening comprehension and pronunciation (Kartal & Simsek, 2017).

The study that found a negative effect involved the use of a podcast as a primary source of content rather than a textbook and measured assessments within a course (Daniel & Woody, 2010). As with the extended time on exams reasonable accommodation, at a more granular level, my findings are not directly consistent with either of the audiobooks studies identified within my literature review, because neither of these studies measured impact on graduation.

5.2.4 Reasonable Accommodations – Recording–of–Classes/Lectures

With nine studies identified, the recording–of–classes/lectures reasonable accommodation represented the highest number identified within the literature review of this dissertation examining impact on higher educational student achievement (Table 42). Of these nine studies, four found a positive impact, one found mixed results, two found no impact, and two found a negative impact (Table 42). All four of the studies that found a positive impact measured exam results (Spittaels & Vanacker, 2019; Bruxvoort, 2012; Morris, 2010; McKinney et al., 2009). The single study that found mixed results measured overall student achievement within a course (Murphy & Stewart, 2015). On the surface, the results of this dissertation are consistent with the two studies that found no impact (Leadbeater et al., 2013; Franklin et al., 2011). Once again, however, it should be noted that the Leadbeater and Franklin studies measured exam scores, while this dissertation measured graduation and GPA. The two studies that found negative impact measured academic performance within courses (Baillie et al., 2022; Edwards & Clinton, 2018). Consistent with the studies involving the extended–time–on–exams and audiobooks reasonable accommodations, none of the recording–of–classes/lectures

studies identified within the literature review of this dissertation measured impact on graduation.

5.3 Limitations

The most significant limitation that I encountered during the performance of this dissertation involved the calculation of Student–Veteran disability severity ratings. VBA assigns a disability rating based on the severity of the Veteran's service–connected condition (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2022). If a Veteran has multiple disability ratings, VBA uses them to calculate the Veteran's combined VA disability rating (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2022). Importantly, calculating a Veteran's combined disability rating involves more than adding up individual ratings, which is why a combined disability rating may be different from the sum of the individual ratings (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2022). VA has a combined disability rating calculator on its website, which allows Veterans to input each of their disability ratings in order to calculate overall disability rating.

I tested this combined disability rating calculator using a fabricated Veteran with a mental (post–traumatic stress disorder–PTSD) disability rating of 30% and a musculoskeletal disability rating of 20%. The VA combined disability rating calculator indicated that the combined rating of this fabricated Veteran is 40%, not 50% as one might expect. The VA calculator followed–up this rating with several explanatory notes including: (a) the actual combined value of the Veteran's disability ratings was 44%; (b) VBA rounded this value to the nearest 10% to get the Veteran's VA disability rating; (c) if the Veteran has two or more disabilities that affect both sides of their body, this may

increase the VA disability rating and compensation payment; and (d) please refer the Veteran to their VA disability compensation award letter for their official rating. (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2022).

Given the complexity of the VA's combined disability rating formula and the high number of Student–Veterans with multiple disabilities included in this dissertation (2,810 Student–Veterans/ 44.2% of total population), I decided that it would be practicable to create my own combined disability rating calculator, which I believe is a reasonable facsimile of the VA calculator (Table 98). Of the 6,359 Student–Veterans included in this dissertation, 3,549 of them (or 55.8%) were rated with one military service–connected disability (Table 98). For these Student–Veterans, I assumed that their single disability rating equaled their overall disability rating, which I believe to be the policy of VBA.

Table 98: Student–Veterans with Disabilities.

STUDENT VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	NUMBER OF STUDENT-VETERANS	PERCENTAGE OF STUDENT-VETERANS
Student-Veterans with 1 disability	**3,549**	**55.8%**
Student-Veterans with multiple disabilities	**2,810**	**44.2%**
Total Student-Veterans with disabilities	**6,359**	**100.0%**

Of the remaining 2,810 Student–Veterans with multiple disabilities, 928 were rated with disabilities exceeding 100% (110% or higher) (Table 99). For these 928 Student–Veterans (14.6% of population), I assumed a 100% overall disability rating. For the remaining 1,882 Student–Veterans (29.6% of population) with multiple disabilities, I used the sum of their individual disability ratings as their overall rating. It is within this 1,882 Student–Veteran subgroup that my assumed overall ratings may be slightly higher

than those of VA. In future research, I recommend accessing and using each Student–Veteran's official rating that is reported on their VA disability compensation award letter. These award letters were not accessible through the VA Informatics and Computing Infrastructure (VINCI) used for this dissertation. These letters are most likely housed within VBA, which is the organization responsible for generating them.

Table 99: Student–Veterans with Multiple Disabilities.

STUDENT VETERANS WITH MILITARY SERVICE-CONNECTED DISABILITIES	NUMBER OF STUDENT-VETERANS	PERCENTAGE OF STUDENT-VETERANS
Student-Veterans with multiple disabilities totalling more than 100%	**928**	**14.6%**
Student-Veterans with multiple disabilities 100% or less	**1,882**	**29.6%**
Total Student-Veterans with multiple disabilities	**2,810**	**44.2%**

Another important limitation I encountered during the performance of this dissertation pertained to graduation status. Question 5 in the dissertation survey asked for graduation status. One of the four answer options was *on–track to graduate*. Importantly, I did not include the 1,052 Student–Veterans who selected this answer as having graduated in my results. Undoubtedly, a percentage of these Student–Veterans went on to graduate, or will go on to graduate. Had I included the 1,052 Student–Veterans who indicated that they were *on–track to graduate*, the graduation status data would have been impacted. The exact nature of this impact could certainly be ascertained in future research efforts.

5.4 Recommendations

5.4.1 Disclosure of Disability

The results of this dissertation indicate that disclosure of disability had a statistically significant impact on Student–Veteran graduation status. I found that Student–Veteran disclosure of disability to their college or university correlated positively with academic success, that the odds of a Student–Veteran graduating are increased by 46% when disabilities are disclosed to the college or university (Table 74). Based on the survey results of this dissertation indicating that 58% of Student–Veterans with military service–connected disabilities reported their disability to their college or university (Table 70), there is an opportunity to help the remaining 42% improve their odds of graduating. As with many data points that I have highlighted in this dissertation, disclosure of military service–connected disability to colleges and universities is very important and requires further research. I point to the difference between this study's estimate of the percentage of Veterans with a military service–connected disability rating between 60% and 100% and that of VA. The survey results of this dissertation indicated a percentage of 30.9%, while the VA reported a considerably higher percentage of 57.2%. Additional research is necessary to verify the percentage of Student–Veterans who disclose/do not disclose their disability to their college or university.

Given the high percentage of Student–Veterans with a more severe disability rating, I encourage the Department of Veterans Affairs to conduct a media campaign informing Student–Veterans with military service–connected disabilities about the importance of disclosing their disability to their college or university. The Veterans Benefits Administration is well-positioned to inform every Student-Veteran receiving

education benefits about the importance of self-disclosure through a variety of communication vehicles (direct mail, email, website, student forums, etc.). Colleges and universities are also well-positioned to inform Student-Veterans about the importance of self-disclosure. Because GI Bill funding is sent directly to the bursar's office, every college and university can identify Student-Veterans within their student population and contact them directly using the aforementioned communication vehicles. Additionally, colleges and universities have other available communication vehicles such as student forums and ROTC programs.

In addition to direct communications with Veterans, VA should conduct a communications campaign with the Department of Defense including all branches of the U.S. armed forces, because many Student–Veterans are actively serving while attending college or graduate school. For these Student-Veterans still serving, VA could provide information materials through military education offices, which are a standard component of most military installations. Commanders's calls could also be a powerful mechanism for motivating Student-Veterns to self-disclose.

Beyond U.S. federal government institutions, this same message should be communicated on every college and university campus that is receiving GI Bill funds. There should at least be a discussion about ensuring compliance with this communication requirement. I suggest that VA consider requiring higher educational institutions to communicate this message in order to qualify for GI bill funds, which are substantial. In 2019, $11.9 billion was paid by the VBA in education benefits for 909,320 beneficiaries (U.S. Department of Veterans Affairs, 2021). The list of colleges and universities receiving these GI Bill funds span every state and territory within the U.S. as well as 81

foreign nations across the globe (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2019).

5.4.2 Reasonable Accommodations

The results of this dissertation indicated that a paltry 16% of Student–Veterans with military service–connected disabilities received reasonable accommodations support from their college or university. Even for the Student–Veterans who did disclose their disability, the percentage who received reasonable accommodations support increased to only 28%. *These data indicate that the vast majority of Student–Veterans with military service–connected disabilities received no reasonable accommodations support from their college or university.* This state of affairs is simply not acceptable.

5.4.3 Reasonable Accommodations – Extended–time–on–exams

As previously discussed, the extended–time–on–exams reasonable accommodation was statistically significant (Table 84) with an odds ratio of 1.55, indicating that *the odds of a Student–Veteran with a disability rating between 60%–100% graduating are increased by 55% when receiving this reasonable accommodation (Table 84).*

My recommendations are twofold regarding the extended–time–on–exams reasonable accommodation. One, as with disclosure of disability, I recommend that VA include this information in the aforementioned media campaign to Student–Veterans, to the Department of Defense/ U.S. armed forces, and to all colleges and universities receiving GI Bill funds. My other recommendation is that VA use the findings of this dissertation to take a leadership role in developing Veteran–centered educational research studies by leveraging its immense research operations. In FY2022, the total congressional

appropriation for VA research was $2.26 billion (U.S. Department of Veterans Affairs, 2022). In that same year, VA funded $8.7 billion in education programs for Veterans (U.S. Department of Veterans Affairs, Veterans Benefits Administration, 2023). These VA investments in Veteran research and education are substantial., but the two enterprises are not connected to each other; they operate in separate silos within VA. I am advocating that the results of this dissertation be used to establish a link between the VA Veterans Health Administration–Office of Research and Development and the VA Veterans Benefits Administration–Education and Training.

5.4.4 Reasonable Accommodations – Audiobooks

As previously discussed, the audiobooks reasonable accommodation was also statistically significant with an odds ratio of 0.47, indicating *that the odds of a Student–Veteran with a disability rating between 60%–100% graduating are decreased (53%) when receiving this reasonable accommodation (Table 84).* While the research about the impact of the audiobooks reasonable accommodation on higher educational achievement in general is very thin, the negative results in this dissertation do agree with those of Daniel & Woody, 2010. In a study involving 48 undergraduates, Daniel & Woody substituted a podcast for a traditional textbook and found that the podcast group performed more poorly than did students who read the text. Because five of the 10 studies identified within the literature review of this dissertation found a positive impact on student achievement, future research is needed to examine the impact of audiobooks on Student–Veteran higher educational achievement.

5.5 Conclusions/ Future Research

There exists a compelling opportunity to improve the education and health of Student–Veterans with more severe military service–connected disability ratings, which is supported by extensive existing research linking education positively with health. For example, the Centers for Disease Control and Prevention (CDC) indicated that individuals with less education are more likely to experience a number of health risks, such as obesity, substance abuse, and intentional and unintentional injury, compared with individuals with more education (Centers for Disease Control, 2023). The CDC further stated that higher levels of education are associated with a longer life and an increased likelihood of obtaining or understanding basic health information and services needed to make appropriate health decisions (Centers for Disease Control, 2023). I argue that, given the substantial existing investment by VA into Veteran health and education, coupled with equally substantial research positively correlating education with health, there is more than sufficient justification for VA to invest some of its formidable resources into the education of Veterans with more severe military service–connected disabilities.

I believe that VA should take a leadership role in developing Veteran–centered educational research. From my position as an associate center director within VA/ Office of Research and Development (ORD)/ Cooperative Studies Program (CSP), I am well–positioned to advocate for this incremental shift in research. Although not directly involved in educational research, VA has conducted research that is directly related to educational outcomes, e.g., employment. Consequently, it would be a logical progression if VA were to conduct educational research. In fact, this progression has already happened ipso facto with the completion of this dissertation under the West Haven

Connecticut Veterans Affairs Medical Center (WH–VAMC) Research and Development (R&D) Committee. In short, the opportunity to conduct educational research leveraging the existing, extensive research infrastructure of VA ORD is promising.

Regarding past research conducted by VA related to educational outcomes, in a study entitled Effect of Evidence–Based Supported Employment vs Transitional Work on Achieving Steady Work Among Veterans With Posttraumatic Stress Disorder, A Randomized Clinical Trial., VA examined the impact of supported employment on functioning in work or school, social., and interpersonal areas as specifically related to the symptoms of Post–Traumatic Stress Disorder (PTSD) (Mueller et. al., 2018). This study found that, compared to the usual–care VA vocational services for veterans with PTSD, Individual Placement and Support (IPS) was associated with greater improvement in overall PTSD–related functioning, including occupational., interpersonal., and lifestyle domains (Mueller et. al., 2018). Again, it would be a logical progression for VA to build upon this existing research focused on educational outcomes by conducting direct educational research.

I would propose that VA consider a more robust version of this dissertation. I envision a multi–site, randomized clinical trial including approximately 500–1,000 Student–Veterans and perhaps 10–20 collaborative partner universities. I would leverage VA's extensive relationships with academic affiliates. VA maintains affiliation agreements with over 1,800 educational institutions, including 97% of the nation's medical schools (U.S. Department of Veterans Affairs, 2023). While these affiliations are concentrated on clinical training, these existing relationships also represent an opportunity to develop affiliations with the colleges/schools of education within these

partner universities. For example, the West Haven VA Medical Center and the VA Cooperative Studies Program (CSP) have an academic affiliation with nearby Yale University. Beyond these existing relationships, I would reach out to prospective academic affiliates and invite them to participate. I would certainly use my relationship as a student within the University of Massachusetts Amherst (UMASS) to invite the UMASS College of Education to participate in this prospective study (Figure 6). Additionally, I would leverage VA CSP's Network of Dedicated Enrollment Sites (NODES). NODES is is a consortium of 23 VA medical centers that have teams, nodes, in place dedicated to conducting CSP studies to enhance the overall performance, compliance, and management of CSP multi-site research (U.S. Department of Veterans Affairs, 2023).

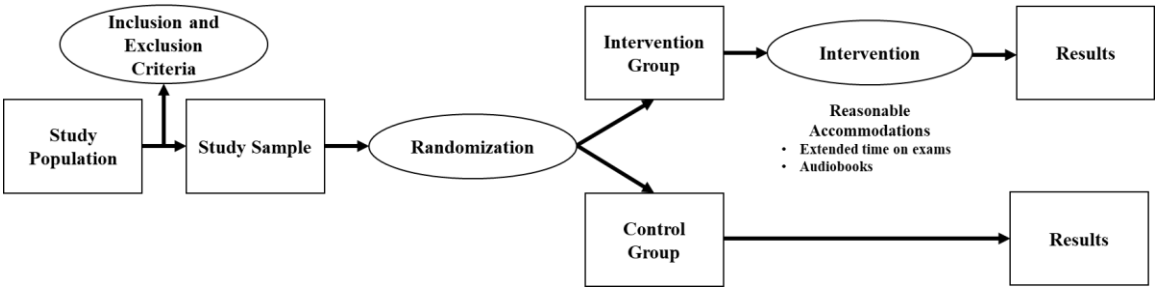


Figure 6: Proposed randomized controlled trial.

Unlike this dissertation, which I conducted without funding, this proposed randomized controlled trial would require funding. Within VA, I would pursue funding through the Cooperative Studies Scientific Evaluation Committee (CSSEC) by submitting a Letter of Intent (LOI) or Planning Request to CSP Central Office. There are seven steps outlined in the VA CSP study proposal process (U.S. Department of Veterans Affairs Office of Research & Development, 2020). The likelihood of successfully navigating through this process and being selected for funding depends on many factors,

some controllable and some not controllable. For example, the precarious nature of the political process within the beltway of Washington, D.C. regarding the Federal Government budget is not controllable. Consequently, in parallel with my efforts within VA, I would pursue education grant funding opportunities outside of VA where it makes sense on a case by case basis.

Of course, the size and scope of this prospective follow–on study will depend on the level of funding acquired, but the fundamentals of the research will consistently center on the impact of reasonable accommodations on the higher educational achievement of Student–Veterans with military service–connected disabilities. I would hope that the findings within this dissertation will inform whatever shape this research takes and that extended time on exams and audiobooks would be among the reasonable accommodations selected for study.

APPENDIX A

10 MOST PREVALENT MILITARY SERVICE–CONNECTED DISABILITIES BY PERIOD OF SERVICE

World War II

MOST PREVALENT MILITARY SERVICE-CONNECTED DISABILITY BY PERIOD OF SERVICE			
Period of service (POS)	**Disability**	**Total number**	**% of all POS disabilities**
World War II	Hearing loss	13,084	23.5%
	Tinnitus	9,405	16.9%
	Residuals of cold injury	2,538	4.6%
	Post-traumatic stress disorder	2,415	4.3%
	Scars, general	1,727	3.1%
	Scars, superficial (tender)	1,014	1.8%
	Generalized anxiety disorder	741	1.3%
	Paralysis of the sciatic nerve	714	1.3%
	Scars, head, face or neck	669	1.2%
	Traumatic arthritis	616	1.1%
	Total most prevalent World War II disabilities	32,923	59.3%
	All World War II disabilities	55,565	
UNIQUE VETERANS		22,965	
Source: FY2021 Veterans Benefits Administration Annual Benefits Report			

Korean Conflict

MOST PREVALENT MILITARY SERVICE-CONNECTED DISABILITY BY PERIOD OF SERVICE			
Period of service (POS)	**Disability**	**Total number**	**% of all POS disabilities**
Korean Conflict	Hearing loss	51,158	26.2%
	Tinnitus	42,806	21.9%
	Residuals of cold injury	8,946	4.6%
	Post-traumatic stress disorder	6,516	3.3%
	Scars, general	5,660	2.9%
	Paralysis of the sciatic nerve	3,269	1.7%
	Scars, superficial (tender)	2,840	1.5%
	Scars, head, face or neck	2,136	1.1%
	Lumbosacral or Cervical Strain	1,979	1.0%
	Limitation of flexion, knee	1,867	1.0%
	Total most prevalent Korean Conflict disabilities	127,177	65.1%
	All Korean Conflict disabilities	195,455	
UNIQUE VETERANS		78,648	
Source: FY2021 Veterans Benefits Administration Annual Benefits Report			

Vietnam Era

MOST PREVALENT MILITARY SERVICE-CONNECTED DISABILITY BY PERIOD OF SERVICE			
Period of service (POS)	**Disability**	**Total number**	**% of all POS disabilities**
Vietnam Era	**Tinnitus**	**639,032**	**11.3%**
	Hearing loss	**580,781**	**10.3%**
	Post-traumatic stress disorder	**393,639**	**7.0%**
	Diabetes mellitus	**355,793**	**6.3%**
	Paralysis of the sciatic nerve	**346,073**	**6.1%**
	Scars, general	**213,731**	**3.8%**
	Arteriosclerotic heart disease (Coronary artery disease)	**186,789**	**3.3%**
	Penile deformity (loss of erectile power)	**164,809**	**2.9%**
	Malignant growths of genitourinary system	**129,451**	**2.3%**
	Scars, superficial (tender)	**82,665**	**1.5%**
	Total most prevalent Vietnam Era disabilities	**3,092,763**	**54.8%**
	All Vietnam Era disabilities	**5,645,702**	
UNIQUE VETERANS		**1,397,362**	

APPENDIX B

DISABILITY SEVERITY RATINGS OF VETERANS ACROSS THE 15 BODY SYSTEMS

Musculoskeletal–Auditory–Neurological–Skin

NUMBER OF MILITARY SERVICE-CONNECTED DISABILITIES AND PREVALENCE BY BODY SYSTEM								
Severity Rating	Musculoskeletal		Auditory		Neurological		Skin	
0%	2,725,004	23.2%	1,143,301	28.1%	560,225	14.9%	2,584,295	76.8%
10%	6,137,892	52.4%	2,682,149	66.0%	1,463,253	38.8%	594,188	17.7%
20%	1,844,909	15.7%	61,890	1.5%	963,990	25.6%	42,868	1.3%
30%	451,810	3.9%	66,239	1.6%	392,008	10.4%	104,840	3.1%
40%	355,107	3.0%	35,349	0.9%	189,520	5.0%	3,328	0.1%
50%	118,362	1.0%	24,275	0.6%	153,112	4.1%	5,618	0.2%
60%	54,821	0.5%	12,171	0.3%	16,634	0.4%	27,397	0.8%
70%	5,308	0.0%	7,856	0.2%	15,341	0.4%	11	0.0%
80%	1,223	0.0%	7,653	0.2%	5,886	0.2%	1,226	0.0%
90%	1,012	0.0%	3,045	0.1%	492	0.0%	3	0.0%
100%	28,917	0.2%	20,472	0.5%	9,659	0.3%	566	0.0%
TOTALS	11,724,365	100.0%	4,064,400	100.0%	3,770,120	100.0%	3,364,340	100.0%
Source: FY2021 Veterans Benefits Administration Annual Benefits Report								

Mental–Respiratory–Digestive–Cardiovascular

NUMBER OF MILITARY SERVICE-CONNECTED DISABILITIES AND PREVALENCE BY BODY SYSTEM								
Severity Rating	Mental		Respiratory		Digestive		Cardiovascular	
0%	39,783	1.8%	556,750	39.0%	629,113	51.2%	334,819	31.8%
10%	113,939	5.3%	238,156	16.7%	375,337	30.6%	332,276	31.6%
20%	564	0.0%	2,758	0.2%	43,070	3.5%	52,801	5.0%
30%	453,764	21.0%	144,166	10.1%	142,058	11.6%	130,643	12.4%
40%	574	0.0%	311	0.0%	6,109	0.5%	22,306	2.1%
50%	562,510	26.0%	438,707	30.7%	2,049	0.2%	386	0.0%
60%	458	0.0%	23,376	1.6%	17,986	1.5%	102,383	9.7%
70%	703,955	32.5%	23	0.0%	333	0.0%	52	0.0%
80%	8	0.0%	13	0.0%	592	0.0%	17	0.0%
90%	36	0.0%	5	0.0%	3	0.0%	22	0.0%
100%	287,606	13.3%	22,901	1.6%	11,474	0.9%	76,844	7.3%
TOTALS	2,163,197	100.0%	1,427,166	100.0%	1,228,124	100.0%	1,052,549	100.0%
Source: FY2021 Veterans Benefits Administration Annual Benefits Report								

Genitourinary–Endocrine–The Eye–Gynecological

NUMBER OF MILITARY SERVICE-CONNECTED DISABILITIES AND PREVALENCE BY BODY SYSTEM								
Severity Rating	Genitourinary		Endocrine		The Eye		Gynecological	
0%	616,407	62.3%	28,670	5.6%	196,049	56.8%	90,617	54.0%
10%	53,667	5.4%	77,878	15.2%	78,272	22.7%	16,973	10.1%
20%	81,838	8.3%	370,942	72.2%	23,302	6.8%	259	0.2%
30%	31,988	3.2%	7,259	1.4%	28,206	8.2%	35,710	21.3%
40%	67,982	6.9%	18,013	3.5%	6,264	1.8%	804	0.5%
50%	28	0.0%	18	0.0%	3,012	0.9%	22,255	13.3%
60%	78,735	8.0%	7,145	1.4%	2,751	0.8%	349	0.2%
70%	13	0.0%	3	0.0%	2,158	0.6%	2	0.0%
80%	7,652	0.8%	1	0.0%	815	0.2%	257	0.2%
90%	0	0.0%	1	0.0%	888	0.3%	0	0.0%
100%	51,645	5.2%	3,853	0.7%	3,363	1.0%	687	0.4%
TOTALS	989,955	100.0%	513,783	100.0%	345,080	100.0%	167,913	100.0%
Source: FY2021 Veterans Benefits Administration Annual Benefits Report								

Dental/Oral–Hemic/Lymphatic–Infection/Immune/Nutrition

NUMBER OF MILITARY SERVICE-CONNECTED DISABILITIES AND PREVALENCE BY BODY SYSTEM								
Severity Rating	Dental/Oral		Hemic/Lymphatic		Infection/ Immune/Nutrition		Total all body systems	
0%	46,857	30.4%	36,191	45.8%	33,880	58.2%	9,621,961	30.9%
10%	67,586	43.9%	10,654	13.5%	5,904	10.1%	12,248,124	39.4%
20%	20,046	13.0%	3,000	3.8%	1,984	3.4%	3,514,221	11.3%
30%	12,056	7.8%	6,390	8.1%	1,779	3.1%	2,008,916	6.5%
40%	6,716	4.4%	363	0.5%	3,233	5.6%	715,979	2.3%
50%	761	0.5%	7	0.0%	18	0.0%	1,331,118	4.3%
60%	5	0.0%	530	0.7%	7,884	13.6%	352,625	1.1%
70%	23	0.0%	604	0.8%	5	0.0%	735,687	2.4%
80%	2	0.0%	2	0.0%	33	0.1%	25,380	0.1%
90%	1	0.0%	0	0.0%	2	0.0%	5,510	0.0%
100%	59	0.0%	21,243	26.9%	3,460	5.9%	542,749	1.7%
TOTALS	154,112	100.0%	78,984	100.0%	58,182	100.0%	31,102,270	100.0%
Source: FY2021 Veterans Benefits Administration Annual Benefits Report								

APPENDIX C

VA CT R&D COMMITTEE STUDY APPROVAL LETTER

NOTE: VA policy does not permit PhD students to serve as Principle Investigator for approved VA studies. Therefore, Dr. Tassos C. Kyriakides is serving as the official PI of this study for VA purposes. However, Mr. Buoniconti is the official PI of this study for the purpose of this dissertation.

Date:	**April 1, 2022**
From:	ACOS/R&D and R&D Committee
TO:	**Tassos Kyriakides, PhD**
Protocol Title:	**[1657744-1] Impact of Learning Accommodations on Disabled Student-Veteran Higher Educational Achievement (EXEMPT)**
Submission Type:	**New Project**
Review Type:	**Full Committee Review**
Action:	**APPROVED**
Effective Date:	**March 30, 2022**
Subject:	Combined Associate Chief of Staff for Research and Development (ACOS/R&D) and R&D Committee Study Approval Notice

1. This research project was reviewed and found to be aligned with the mission of the VHA, scientifically valid, and reviewed by all appropriate subcommittees to ensure the safety of the study subjects and VHA staff. Approval was granted by **CONVENED BOARD REVIEW** of the VA Connecticut Healthcare System Research and Development Committee on **March 30, 2022**.
2. This research project has obtained the following additional approvals:
   a. **February 22, 2022**: Subcommittee on Research Safety (SRS) Exemption granted
   b. **March 25, 2022**: The Information Systems and Security Officer (ISSO) reviewed this research project and found that it complies with information systems and security requirements for VA
   c. **March 28, 2022**: A waiver of HIPAA Authorization was approved by a member of the HSS
   d. **March 28, 2022**: This study was determined to be EXEMPT from HSS review under category #2
   e. **April 1, 2022**: The Privacy Officer (PO) reviewed this project and found that the proposed research complies with VA Privacy Requirements

3. The R&D Committee is the sole oversight committee for this research project and as such, the following requirements apply:

    a. The continuing review approval period for this research project is **12 months** with an expiration date of **March 29, 2023**. It is the Investigator's responsibility to submit the continuing review documents to the R&D Committee in sufficient time to maintain approval of the research study.
    b. All modifications to approved research must be submitted to the R&D Committee for approval prior to initiation except in the circumstance where harm could come to a research subject. Immediate reporting to the R&DC is then required.
    c. Reportable events involving risks to subjects and others, noncompliance, suspensions and terminations, or other incidents requiring reporting must be reported to the R&D Committee in accordance with VHA Directive 1058.01, Research Compliance Reporting Requirements.

4. If any of your personal or financial situations change that may reasonably put you in conflict with this study, you must submit a revised OGE 450 Alt to your local conflict of interest administrator.
5. Acknowledgment of the VA's contribution is required in any publications and presentations that may result from this research.
6. If at some point in the study the PI needs to expand the study population to include non-Veterans, the PI must inform the R&D Committee.
7. All regulatory criteria needed for approval have been met and all applicable Subcommittee approvals are in place. You may now begin your research project.

Protocol Title: **[1657744-1] Impact of Learning Accommodations on Disabled Student-Veteran Higher Educational Achievement (EXEMPT)**

Mehmet Sofuoglu 177719

Digitally signed by Mehmet Sofuoglu 177719
Date: 2022.04.01 12:48:18 -04'00'

Mehmet Sofuoglu, M.D., Ph.D. (Acting Associate Chief of Staff for Research)

APPENDIX D

TYPES OF COLLEGE ACCOMMODATIONS AND SERVICES

(SCANLAN STEFANAKOS, 2022)

Commonly available accommodations

- Extended–time–on–exams (not the same as “untimed” tests, which are not typically available)
- Use of laptops for tests and exams
- Use of calculators for tests and exams
- Permission to make audio recordings of classes (some schools may loan out smart pens for this purpose)
- Reduced course load — but financial aid may be reduced as a result
- Priority registration for courses
- Copies of notes from a classmate
- Access to audiobooks
- Access to voice recognition software
- Access to text–to–speech programs

Accommodations that may be more difficult to get

- Extended time on papers and projects (typically not given on an ongoing basis but rather as situations arise — such as for students with acute medical or psychological episodes)

- Course waivers and substitutions (colleges may choose to give these but are not required to)
- Alternative exam formats, such as oral rather than written exams (colleges typically do not grant this)

Other services that may be available

- Training in adaptive technology
- Help with study skills and time management
- Learning specialists (may cost extra)
- Mentoring programs
- Student support groups

APPENDIX E

INFORMED CONSENT

INTRODUCTION

Dear Fellow Veteran:

My name is Michael Buoniconti. I am retired military with 30 years of service. The reason for this email is to ask you to complete a brief survey to help other Veterans with military service–connected disabilities while attending college or graduate school. This brief survey is design to be completed in 10 minutes or less. Please read the informed consent information detailed below before deciding whether to participate in this survey.

The results will be used to inform the Department of Veterans Affairs as to whether Veterans report their military service–connected disabilities while attending college or graduate school. The results will also be used to inform colleges/universities as to which learning accommodations have been helpful to Veterans with military service–connected disabilities while attending college or graduate school.

Thank you for your continued service,

Michael A. Buoniconti

U.S. Air Force / U.S. Air Force Reserve

Colonel, Retired

INFORMED CONSENT

You are invited to take part in a research study because you are a Veteran with a military service–connected disability or disabilities who attended college. This study is being

conducted by Veterans Affairs Cooperative Studies Program Coordinating Center located in West Haven, Connecticut. Before you decide to take part, it is important for you to know why the research is being done and what it will involve. This initial summary is intended to give you key information to help you decide whether to participate. Detailed information follows this brief summary. Please feel free to ask the research team questions. Taking part in this study is completely voluntary.

WHAT IS THIS STUDY ABOUT AND HOW LONG WILL IT LAST?

The purpose of this study is to establish a baseline of research to inform best practices for supporting disabled Student–Veteran higher educational achievement. The study includes a 10–question survey designed to gather important information from Veterans with military service–connected disabilities who attended college. Your participation in this study is limited to the completion of this survey, which should take approximately five minutes.

YOU MIGHT CHOOSE TO VOLUNTEER FOR THIS STUDY

The knowledge gained from this study will be used to help Veterans with military service–connected disabilities achieve at higher levels in college and graduate school.

DO YOU HAVE TO TAKE PART IN THIS STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any services, benefits, or rights you would normally have if you choose not to volunteer.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to establish a baseline of research to inform best practices for supporting disabled Student–Veteran higher educational achievement. The results of the study will be published and made available to educators across the U.S. By conducting this research study, we hope to learn (a) whether Veterans with military service–connected disabilities are self–reporting their service–connected disability to their college or university; (b) whether the Student–Veterans who do self–report are receiving the learning accommodations that they need; and (c) the impact of such accommodations on Student–Veteran higher educational achievement.

HOW LONG WILL YOU BE IN THIS STUDY?

This research study is expected to take place over an 8–month period. Your individual participation in the project will take approximately five minutes. Participation is limited to completion of the survey. The final report is expected to be published during 2023.

WHAT WILL HAPPEN IF YOU TAKE PART IN THIS STUDY?

If you take part in the study, your completed survey will be stored on a secure VA server and maintained according to Federal records management policy. Your survey results will be combined with those of approximately 1,200 Veterans, and no personal information of any Veteran will be included in the final report. Importantly, participating Veterans are free to skip any questions that you would prefer not to answer.

WHAT IS EXPECTED OF YOU IF YOU TAKE PART IN THIS STUDY?

If you take part in this study, your responsibility is to complete the electronic survey as accurately as possible and return it to the study team.

WHAT ARE THE POSSIBLE BENEFITS OF THIS STUDY?

This study presents potential educational benefits to Student–Veterans with military service–connected disabilities who are attending college and graduate school. For example, if the study finds that a significant percentage of Student–Veterans do not report their military service–connected disability to their college or university, then VA might conduct a communications campaign to inform Veterans of their rights. By law, if a Veteran informs their college or university of their military service–connected disability, the institution is required to provide reasonable learning accommodations support. Another example– if the study finds that specific learning accommodations have proven helpful to Student–Veterans with military service–connected disabilities, VA might conduct a communications campaign to inform educators in U.S. colleges and universities. These educators will then be able to provide their Student–Veterans with research–informed learning accommodations support. While there may be no direct personal benefits to you from your taking part in this research study, the information that we learn from this study might help other Veterans with your condition(s) attending college and graduate school.

HOW WILL YOUR PRIVATE INFORMATION BE PROTECTED?

Taking part in this study will involve collecting private information about you. This information will be protected. Electronic copies of your private information will be stored

on secure VA servers. If any paper copies of your private information are printed, the documentation will be stored in a locked filing cabinet, within a locked office, within a locked building on the West Haven, CT, VA Medical Center campus. Paper copies of your private information will be subject to inspection by a VA Records Management Officer. There are times when we might have to show your records to other people. For example, our local Research and Development Committee, VA officials, and other study monitors who may look at or copy portions of records that identify you.

STORAGE AND FUTURE USE OF DATA

Your name might be removed from your survey and anonymized. After that removal., the information could be used for future research studies or distributed to another investigator for future research studies without additional informed consent from you or your legally authorized representative.

IS THERE A PAYMENT TO YOU IF YOU TAKE PART IN THIS STUDY?

No.

WHO ELSE MAY YOU CONTACT IF YOU HAVE QUESTIONS?

If you have questions about your rights as a study subject, or you want to make sure this is a valid VA study, you may contact the Chairman of the Human Studies Subcommittee at 203–932–5711 x3350. If you have questions, complaints, or concerns about the study or if you would like to obtain information or offer input you may call the Principal Investigator at 203–932–5711 x4187.

DO YOU HAVE TO TAKE PART IN THIS STUDY?

Participation in this study is voluntary. Refusal to take part in the study, or withdrawing from the study, will involve no penalty or loss of benefits to which you are otherwise entitled. If you are a VA employee or student, refusal to take part in this study will in no way influence your employment, ratings, subsequent recommendations, or academic progress as applicable. You may discontinue taking part at any time without any penalty or loss of benefits.

APPENDIX F

SURVEY INSTRUMENT

1. What degree did you pursue or are pursuing? (Check all that apply)

    Associates

    Bachelors

    Masters

    Doctorate

2. What was/is your field of study? (Check all that apply)

    Agriculture & Natural Resources Conservation

    Architecture

    Area, Ethnic, & Multidisciplinary Studies

    Arts: Visual & Performing

    Business

    Communications

    Community, Family, & Personal Services

    Computer Science & Mathematics

    Education

    Engineering

    Engineering Technology & Drafting

    English & Foreign Languages

    Health Administration & Assisting

    Health Sciences & Technologies

    Philosophy, Religion, & Theology

- Sciences: Biological & Physical
- Social Sciences & Law
- Other

3. Approximately how many credits have you completed thus far in your current degree?

   Type number

4. Approximately what was/is your GPA? (4.0 Scale)

   Type number between 0 and 4.0

5. What is your graduation status?

   - Graduated
   - On–track to graduate
   - Unsure
   - Will not graduate (decided not to complete degree)

6. Did you disclose your military service–connected disability to your college or university?

   - **Yes**
   - No

7. What was your level of comfort in doing so?

   - Very comfortable
   - Somewhat comfortable
   - Neither comfortable nor uncomfortable

- Somewhat uncomfortable
- Very uncomfortable

8. Colleges and universities typically provide the following types of reasonable accommodation supports. Which types did you receive? (check all that apply)
   - Audiobooks
   - Extended–time–on–exams
   - Manipulatives
   - Noise reduction
   - Note–taker or scribe
   - Preferential seating
   - recording–of–classes/lectures
   - Small group and individual administration
   - Speech–to–text (voice recognition)
   - Test breaks
   - Testing over multiple days
   - Text–to–speech (digital)
   - Text–to–speech (human)
   - Use of calculators for tests and exams
   - None. Did not receive accommodations

9. How helpful were the provided reasonable accommodations to your learning?
   - Very helpful
   - Somewhat helpful

- Neither helpful nor unhelpful
- Somewhat helpful
- Very unhelpful
- Not applicable. Did not receive accommodations

10. How satisfied are you with your college experience?
    - Very satisfied
    - Somewhat satisfied
    - Neither satisfied nor dissatisfied
    - Somewhat dissatisfied
    - Very dissatisfied

11. Additional feedback. Is there anything that you would like to clarify or share about your college experience, particularly pertaining to your military service–connected disability and your learning? Open text response

VERSION – IF VETERAN DID <u>NOT</u> DISCLOSE DISABILTY

1. What degree did you pursue or are pursuing? (Check all that apply)
    - Associates
    - Bachelors
    - Masters
    - Doctorate

2. What was/is your field of study? (Check all that apply)
    - Agriculture & Natural Resources Conservation

- Architecture
- Area, Ethnic, & Multidisciplinary Studies
- Arts: Visual & Performing
- Business
- Communications
- Community, Family, & Personal Services
- Computer Science & Mathematics
- Education
- Engineering
- Engineering Technology & Drafting
- English & Foreign Languages
- Health Administration & Assisting
- Health Sciences & Technologies
- Philosophy, Religion, & Theology
- Sciences: Biological & Physical
- Social Sciences & Law
- Other

3. Approximately how many credits have you completed thus far in your current degree?

   Type number

4. Approximately what was/is your GPA? (4.0 Scale)

   Type number between 0 and 4.0

5. What is your graduation status?

    Graduated

    On–track to graduate

    Unsure

    Will not graduate (decided not to complete degree)

6. Did you disclose your military service–connected disability to your college or university?

    Yes

    No

7. What influenced your decision not to disclose your military service–connected disability? (check all that apply)

    Perceived anti–Veteran bias on campus

    Perceived anti–Veteran bias by peers

    Perceived anti–Veteran bias by faculty

    Perceived stigma of revealing weakness

    Perceived stigma of disability(ies)

    Other

8. How satisfied are you with your college experience?

    Very satisfied

    Somewhat satisfied

    Neither satisfied nor dissatisfied

    Somewhat dissatisfied

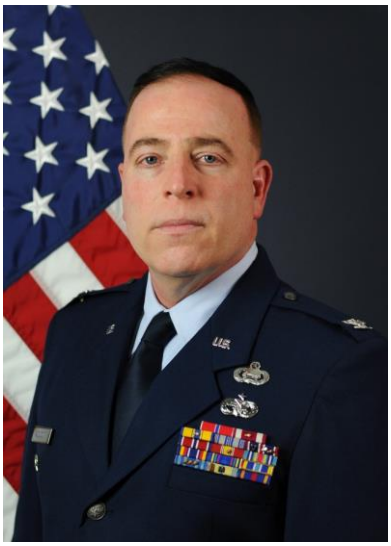
- Very dissatisfied

9. Additional feedback. Is there anything that you would like to clarify or share about your college experience, particularly pertaining to your military service–connected disability and your learning? Open text response

APPENDIX G

PRINCIPLE INVESTIGATOR MILITARY BIOGRAPHY

COLONEL MICHAEL A. BUONICONTI, RETIRED



Colonel Michael A. Buoniconti ended his Air Force career on December 1, 2019, as the 1AF (AFNORTH) National Security Emergency Preparedness (NSEP) directorate Emergency Preparedness Liaison Officer (EPLO) to the state of Massachusetts. In this position, Col Buoniconti served as principal AF liaison to the MA Adjutant General on AF Defense Support of Civil Authorities (DSCA)/ Civil Support/ Homeland Security (HLS) plans/ policies/ procedures with the Regional Defense Coordination Office/ Element. He facilitated 1 AF NSEP support required during Presidentially-declared natural/ man-made disasters or emergencies. Col Buoniconti served as AF representative to the State Area Command Emergency Operations Center and engaged in state/ federal HLS planning, training exercises, and National Special Security Events.

Col Buoniconti was commissioned through the Air Force Officer Training School in 1989 after earning a Bachelor of Arts degree in economics and political science from Yale University. Before entering logistics in 2008, Col Buoniconti served as a career intelligence officer. During Operation Iraqi Freedom, he spearheaded bare-base set-up of intelligence operations at Baghdad International Airport and was awarded a bronze star. A Citizen Airman, Col Buoniconti served as a superintendent of schools in Massachusetts from 2005 through his Air Force retirement. In this role, he was responsible for the education of 1,100 students, the supervision of 300 employees, and the execution of a $20+ million annual budget.

EDUCATION

1988 Bachelor of Arts in Economics and Political Science, Yale University, New Haven, Connecticut
1994 Master of Business Administration, Rensselaer Polytechnic Institute, Troy, New York
2002 Squadron Officer School (in-residence)
2005 Air Command and Staff College (correspondence)
2012 Air War College (correspondence)
2017 Doctor of Education Program, University of Massachusetts, Amherst, Massachusetts (Dissertation Proposal Stage)

ASSIGNMENTS

1. Jun 1990 – Feb 1992, Assistant Chief of Combat Intelligence, Combat Intelligence Branch, 379th Operations Support Squadron, Wurtsmith Air Force Base, Michigan
2. Feb 1991 – Jun 1992, Assistant Chief of Target Intelligence, Target Intelligence Branch, 379th Operations Support Squadron, Wurtsmith Air Force Base, Michigan
3. Jun 1992 – Jun 1993, Signals Intelligence Systems Development Engineer, Rome Laboratory, Griffiss Air Force Base, New York
4. Jun 1993 – Jun 1995, Intelligence Technology Development Manager, Rome Laboratory, Griffiss Air Force Base, New York
5. Jun 1995 – Sep 1996, Foreign Disclosure Officer, Electronic Systems Center, Hanscom Air Force Base, Massachusetts
6. Sep 1996 – Sep 1997, Command & Control Systems Threat Analyst, Electronic Systems Center, Hanscom Air Force Base, Massachusetts
7. Sep 2001 - Jul 2005, Intelligence Officer, 439th Operations Support Squadron, Westover Air Reserve Base, Massachusetts
8. Jul 2005 – Mar 2009, Chief Intelligence Officer, 439th Operations Support Squadron, Westover Air Reserve Base, Massachusetts
9. Mar 2009 – Apr 2013, Commander, 439th Logistics Readiness Squadron, Westover Air Reserve Base, Massachusetts
10. Apr 2013 – Jun 2015, Emergency Preparedness Liaison Officer to Rhode Island, 1AF (AFNORTH) National Security Emergency Preparedness (NSEP) directorate, Tyndall Air Force Base, Florida
11. Jun 2015 – Dec 2019, Emergency Preparedness Liaison Officer to Massachusetts, 1AF (AFNORTH) National Security Emergency Preparedness (NSEP) directorate, Tyndall Air Force Base, Florida

MAJOR AWARDS AND DECORATIONS

Legion of Merit
Bronze Star
Meritorious Service Medal with Oak Leaf Cluster
Air Force Commendation Medal with Oak Leaf Cluster
Air Force Achievement Medal
National Defense Service Medal with one star
Global War on Terrorism Expeditionary Medal & Service Medal
Air Force Expeditionary Service Ribbon with Gold Border
Armed Forces Reserve Medal with M device

EFFECTIVE DATES OF PROMOTION

Second Lieutenant November 7, 1989
First Lieutenant November 7, 1991
Captain November 7, 1993
Major March 25, 2003
Lieutenant Colonel August 14, 2008
Colonel May 31, 2013

BIBLIOGRAPHY

Abedi, J., & Ewers , E. (2013). Accommodations for English Language Learners and Students with Disabilities: A Research–Based Decision Algorithm . *Smarter Balanced Assessment Consortium*. Retrieved from https://portal.smarterbalanced.org/library/en/accommodations–for–english–language–learners–and–students–with–disabilities–a–research–based–decision–algorithm.pdf.

Abedi, J., Kao, J. C., Leon, S., Sullivan, L., Herman, J. L., Pope, R., Nambiar, V., & Mastergeorge, A. M. (2008). Exploring Factors that Affect the Accessibility of Reading Comprehension Assessments for Students with Disabilities: A Study of Segmented Text. CRESST Report 746. ().National Center for Research on Evaluation. Retrieved from ERIC http://silk.library.umass.edu/login

American Diabetes Association. (n.d.). Section 504 Plan. Section 504 of the Rehabilitation Act of 1973. Retrieved May 1, 2022, from https://www.diabetes.org/tools–support/know–your–rights/safe–at–school–state–laws/written–care–plans/section–504–plan

American Psychological Association. (2012). Reasonable Accommodations Explained. https://www.apa.org/pi/disability/dart/toolkit–three.

Antalek, E. E. (2005). The relationships between specific learning disability attributes and written language: A study of the performance of learning–disabled high school subjects completing the TOWL–3. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 65(11). Retrieved from http://search.proquest.com/docview/305006698/abstract

Audible Inc. (n.d.). What is the difference between abridged and unabridged audiobooks? Retrieved August 18, 2022, from https://help.audible.com/s/article/what–is–the–difference–between–abridged–and–unabridged–audiobooks?language=en_US

Baillie, L. D., Banow, R., & Botterill, J. J. (2022). The impact of lecture capture availability on academic performance in a large biomedical science course. Education and Information Technologies, 27(5), 7183–7203. https://doi.org/10.1007/s10639–022–10903–1

Bailey, E. (2020, June 13). How Colleges Can Accommodate Students with Anxiety Disorders. Retrieved May 4, 2022, from https://www.healthcentral.com/slideshow/11–college–accommodations–for–students–with–anxiety–disorders

Baker, J. S. (2006). Effect of extended time testing accommodations on grade point averages of college students with learning disabilities (Order No. 3205714). Available from ProQuest Dissertations & Theses Global. (304908732). http://silk.library.umass.edu/login?url=https://www.proquest.com/dissertations–theses/effect–extended–time–testing–accommodations–on/docview/304908732/se–2

Bandukwala, N. Q. (2021, September 9). Depression and Erectile Dysfunction (ED). Retrieved May 1, 2022, from https://www.webmd.com/erectile–dysfunction/coping–ed

Barton, K. E. W. (2001). Stability of constructs across groups of students with different disabilities on a reading assessment under standard and accommodated administrations (Publication No. 3036177) [Doctoral Dissertation, University of South Carolina]. ProQuest Dissertations and Theses Global.

Bassette, L., Bouck, E., Shurr, J., Park, J., & Cremeans, M. K. (2019). Comparison of Concrete and App–Based Manipulatives toTeach Subtraction Skills to Elementary Students with Autism. Education and Training in Autism and Developmental Disabilities, 54(4), 391–405. Retrieved August 1, 2022, from https://www.researchgate.net/publication/344545176_Comparison_of_Concrete_and_App–Based_Manipulatives_to_Teach_Subtraction_Skills_to_Elementary_Students_with_Autism.

Batho, L. P., Martinussen, R., & Wiener, J. (2015). The effects of different types of environmental noise on academic performance and perceived task difficulty in adolescents with ADHD. Journal of Attention Disorders, 24(8), 1181–1191. https://doi.org/10.1177/1087054715594421

Bolt, S. E. (2004). Examining empirical evidence for several commonly held beliefs and disputes about testing accommodations (Order No. 3134567). . (305157951). https://www.proquest.com/dissertations–theses/examining–empirical–evidence–several–commonly/docview/305157951/se–

Bolt, S. E., & Thurlow, M. L. (2004). Five of the most frequently allowed testing accommodations in state policy. Remedial and Special Education, 25(3), 141–152. https://doi.org/10.1177/07419325040250030201

Bolt, S. E., & Ysseldyke, J. (2008). Accommodating students with disabilities in large-scale testing: A comparison of differential item functioning (DIF) identified across disability types. Journal of Psychoeducational Assessment, 26(2), 121–138. https://doi.org/10.1177/0734282907307703

Bone, Erin Kae, and Emily C. Bouck. "Evaluating Calculators as Accommodations for Secondary Students with Disabilities." Learning Disabilities: A Multidisciplinary Journal 23.1 (2018): 35–49. ProQuest. Web. 11 Aug. 2022.

Bouck, E. C. (2008). Calculating the value of graphing calculators for Seventh–grade students with and without disabilities. Remedial and Special Education, 30(4), 207–215. https://doi.org/10.1177/0741932508321010

Bouck, E. C., & Bouck, M. K. (2008). Does it add up? Calculators as accommodations for sixth grade students with disabilities. Journal of Special Education Technology, 23(2), 17–32. https://doi.org/10.1177/016264340802300202

Bouck, E. C., Satsangi, R., Doughty, T. T., & Courtney, W. T. (2013). Virtual and concrete manipulatives: A comparison of approaches for solving mathematics problems for students with autism spectrum disorder. Journal of Autism and Developmental Disorders, 44(1), 180–193. https://doi.org/10.1007/s10803–013–1863–2

Bouck, E. C., Shurr, J., Bassette, L., Park, J., & Whorley, A. (2018). Adding it up. Journal of Special Education Technology, 33(3), 194–206. https://doi.org/10.1177/0162643418759341

Bridgeman, B., Trapani, C., & Curley, E. (2004). Impact of Fewer Questions per Section on SAT I Scores. Journal of Educational Measurement, 41(4), 291–310. http://www.jstor.org/stable/20461764

Brown, T. E., Reichel, P. C., & Quinlan, D. M. (2011). Extended time improves reading comprehension test scores for adolescents with ADHD. Open Journal of Psychiatry, 1(3), 79–87. https://doi.org/10.4236/jsemat.2011.13012

Bruins, S. K. (2005). Investigating how students with learning disabilities receiving special education services affect the school's ability to meet adequate yearly progress. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 66(08). Retrieved from http://search.proquest.com/docview/305011908/abstract

Bruxvoort, D. S. (2012). Lecture Capture Technology: Does It Make a Difference on College Student Achievement? Retrieved August 22, 2022, from https://scholarworks.uni.edu/cgi/viewcontent.cgi?article=1145&context=grp.

Buehler, K. L. (2001). Standardized group achievement tests and the accommodation of additional time. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 63(04), 1312. Retrieved from http://search.proquest.com/docview/304700547/abstract

Bush, J. B. (2021). Software-based intervention with digital manipulatives to support student conceptual understandings of fractions. British Journal of Educational Technology, 52(6), 2299–2318. https://doi.org/10.1111/bjet.13139

Byrnes, M. A. (2008). Educators' interpretations of ambiguous accommodations. Remedial and Special Education, 29(5), 306–315. https://doi.org/10.1177/0741932507313017

Calhoon, M. B., Fuchs, L. S., & Hamlett, C. L. (2000). Effects of computer–based test accommodations on mathematics performance assessments for secondary students with learning disabilities. Learning Disability Quarterly, 23(4), 271–282. https://doi.org/10.2307/1511349

Camara, W. J., Copeland, T., & Rothschild, B. (1998). (rep.). Effects of Extended Time on the SAT I Reasoning Test Score Growth for Students with Learning Disabilities (7th ed., Vol. 1998). New York, NY: College Entrance Examination Board.

Camara, W. J., & Schneider, D. (2000). Testing With Extended Time on the SAT I: Effects for Students With Learning Disabilities. The College Board Office of Research and Development Research Notes, 08.

Cawthon, S. W. (2008). Accommodations use for statewide standardized assessments: Prevalence and recommendations for students who are deaf or hard of hearing. Journal of Deaf Studies and Deaf Education, 13(1), 55–96. https://doi.org/10.1093/deafed/enm029

Cawthon, S. W., & Cole, E. V. (2010). Postsecondary Students who have a Learning Disability: Student Perspectives on Accommodations Access and Obstacles. Journal of Postsecondary Education and Disability, 23(2), 112–128.

Cawthon, S. W., Kaye, A. D., Lockhart, L. L., & Beretvas, S. N. (2012). Effects of linguistic complexity and accommodations on estimates of ability for students with learning disabilities. Journal of School Psychology, 50(3), 293–316. https://doi.org/10.1016/j.jsp.2012.01.002

Center for Disease Control and Prevention. (2021, October 12). The Arthritis–Mental Health Connection. Retrieved March 23, 2022, from https://www.cdc.gov/arthritis/communications/features/arthritis–mental–health.htm#:~:text=About% 201% 20in% 205% 20US,or% 20otherwise% 20unable% 20to% 20work.

Centers for Disease Control and Prevention . (2023, May 26). Health Disparities. https://www.cdc.gov/healthyyouth/disparities/index.htm#:~:text=The%20Education%E2%80%93Health%20Disparities%20Link&text=Overall%2C%20individuals%20with%20less%20education,with%20individuals%20with%20more%20education.

Center for Psychiatric Rehabilitation, Boston University. (2020, April 29). How do mental health and psychiatric conditions interfere with performance in educational settings? Retrieved April 20, 2022, from https://cpr.bu.edu/resources–and–information/reasonable–accommodations/how–do–mental–health–and–psychiatric–conditions–interfere–with–performance–in–educational–settings/

Centers for Disease Control and Prevention. (2022, March 22). Malaria. Malaria Frequently Asked Questions (FAQs). Retrieved May 6, 2022, from https://www.cdc.gov/malaria/about/faqs.html

Chiu, Y.–C. J., Chang, H.–Y. V., Johnston, A., Nascimento, M., Herbert, J. T., & Niu, X. M. (2019). Impact of Disability Services on Academic Achievement Among College Students with learning disabilities. *Journal of Postsecondary Education and Disability*, *32*(3), 227–245.

Cho, H.–J., Lee, J., & Kingston, N. (2012). Examining the effectiveness of test accommodation using DIF and a mixture IRT model. Applied Measurement in Education, 25(4), 281–304. https://doi.org/10.1080/08957347.2012.714682

Chu, L., Fuentes, L. R., Marshall, O. M., & Mirin, A. A. (2020). Accommodating University Students with Myalgic Encephalomyelitis / Chronic Fatigue Syndrome (ME/CFS) A Guide for Colleges and Universities. Retrieved May 6, 2022, from https://www.meaction.net/wp–content/uploads/2020/11/University_Accommodations_103020.pdf

Cohen, A. S., Gregg, N., & Deng, M. (2005). The role of extended time and item content on a high–stakes mathematics test. Learning Disabilities Research & Practice, 20(4), 225–233. https://doi.org/10.1111/j.1540–5826.2005.00138.x

Cosgrove, D. J., Gordon, Z., Bernie, J. E., Hami, S., Montoya, D., Stein, M. B., & Monga, M. (2002). Sexual dysfunction in combat Veterans with post–traumatic stress disorder. Urology, 60(5), 881–884. https://doi.org/10.1016/s0090–4295(02)01899–x

Crawford, L., Helwig, R., & Tindal., G. (2004). Writing performance assessments: How important is extended time? Journal of Learning Disabilities, 37(2), 132–142. https://doi.org/10.1177/00222194040370020401

Daniel, D. B., & Woody, W. D. (2010). They hear, but do not listen: Retention for podcasted material in a classroom context. Teaching of Psychology, 37(3), 199–203. https://doi.org/10.1080/00986283.2010.488542

Davis, J. E. (2011). Secondary education teachers' perceptions related to their knowledge and effectiveness of accommodations for students with mild disabilities. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 72(10). http://search.proquest.com/docview/884226584/abstract

De Leeuw, R., Bertoli, E., Schmidt, J. E., & Carlson, C. R. (2005). Prevalence of traumatic stressors in patients with temporomandibular disorders. Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons, 63(1), 42–50. https://doi.org/10.1016/j.joms.2004.04.027

De Hert, M., Detraux, J., & Vancampfort, D. (2018). The intriguing relationship between coronary heart disease and mental disorders. Dialogues in Clinical Neuroscience, 20(1), 31–40. https://doi.org/10.31887/dcns.2018.20.1/mdehert

Dixon, R. A., Simon, E. W., Nowak, C. A., Hultsch, D. F. (1982). Text recall in adulthood as a function of level of information, input modality, and delay interval. Journal of Gerontology, 37(3), 358–364. https://doi.org/10.1093/geronj/37.3.358

DO–IT (Disabilities, Opportunities, Internetworking, and Technology) . (2012, April 3). Academic Accommodations for Students with Psychiatric Disabilities. Retrieved April 20, 2022, from https://www.washington.edu/doit/academic–accommodations–students–psychiatric–disabilities

Dyrnarski, M., & Kainz, K. (2015, November 20). Why federal spending on disadvantaged students (Title I) doesn't work. Retrieved July 21, 2022, from https://www.brookings.edu/research/why–federal–spending–on–disadvantaged–students–title–i–doesnt–work/

Education Data Initiative. (2021, February 21). College Enrollment & Student Demographic Statistics. Retrieved March 14, 2022, from https://educationdata.org/college–enrollment–statistics#:~:text=78.5% 25% 20of% 20undergraduates% 20attend% 20public,time% 20equivalent% 20(FTE)% 20students.

Edwards, M. R., Clinton, M. E. (2018). A study exploring the impact of lecture capture availability and lecture capture usage on student attendance and attainment. Higher educational., 77(3), 403–421. https://doi.org/10.1007/s10734–018–0275–9

Elliott, J., Bielinski, J., Thurlow, M., DeVito, P., & Hedlund, E. (1999). Accommodations and the performance of all students on Rhode Island's performance assessment (Rhode Island Assessment Report 1). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.

Elliott, S. N., Kratochwill, T. R., McKevitt, B. C., & Malecki, C. K. (2009). The effects and perceived consequences of testing accommodations on math and science performance assessments. School Psychology Quarterly, 24(4), 224–239. https://doi.org/10.1037/a0018000

Elliott, S. N., & Marquart, A. M. (2004). Extended time as a testing accommodation: Its effects and perceived consequences. Exceptional Children, 70(3), 349–367. https://doi.org/10.1177/001440290407000306

Engelhard, G., Jr., Fincher, M., & Domaleski, C. S. (2011). Mathematics performance of students with and without disabilities under accommodated conditions using resource guides and calculators on high stakes tests. Applied Measurement in Education, 24(1), 22–38. https://doi.org/10.1080/08957347.2010.485975

Esteves, K. J., Whitten, E. (2011). Assisted Reading with Digital Audiobooks for Students with Reading Disabilities. Reading Horizons: A Journal of Literacy and Language Arts, 51(1/4). Retrieved August 18, 2022, from https://scholarworks.wmich.edu/cgi/viewcontent.cgi?article=1021&context=reading_horizons.

Eustace, C., & Chandrasekaran, MD, MPH, A. C. (2021, February 23). An Overview of Degenerative Arthritis. Retrieved March 22, 2022, from https://www.verywellhealth.com/what–is–degenerative–arthritis–189342

Ferreira, D. M., Vaz, C. C., Stuginski–Barbosa, J., & Conti, P. C. (2018). Post–traumatic stress disorder and temporomandibular dysfunction: A review and clinical implications. Brazilian Journal Of Pain, 1(1). https://doi.org/10.5935/2595–0118.20180012

Fincher, M. L. (2013). Investigating the effects of a read–aloud alteration on the third–grade Reading Criterion–Referenced Competency Test (CRCT) for students with disabilities (Publication No. 3571373) [Doctoral dissertation, Georgia State University]. ProQuest Dissertations and Theses Global.

Fleming, K., Ressa, V. A., Lazarus, S. S., Rogers, C., & Hinkle, A. (2022). Small group and individual administration: Research (NCEO Accommodations Toolkit #23a). National Center on Educational Outcomes.

Fletcher, J. M., Francis, D. J., Boudousquie, A., Copeland, K., Young, V., Kalinowski, S., & Vaughn, S. (2006). Effects of accommodations on high–stakes testing for students with reading disabilities. Exceptional Children, 72(2), 136–150. https://doi.org/10.1177/001440290607200201

Fletcher, J. M., Francis, D. J., O'Malley, K., Copeland, K., Mehta, P., Caldwell, C. J., & Vaughn, S. (2009). Effects of a bundled accommodations package on high–stakes testing for middle school students with reading disabilities. Exceptional Children, 75(4), 447–463. https://doi.org/10.1177/001440290907500404

Fox, S. (2023, October 22). How to Determine Survey Sample Size: a Guide. https://survicate.com/blog/survey–sample–size/#:~:text=The%20same%20source%20states%20that,get%20you%20statistically%20significant%20results.

Franklin, D. S., Gibson, J. W., Samuel, J. C., Teeter, W. A., Clarkson, C. W. (2011). Use of lecture recordings in Medical Education. Medical Science Educator, 21(1), 21–28. https://doi.org/10.1007/bf03341590

Fuchs, Lynn S., Fuchs, D., & Capizzi, A. M. (2017). Identifying appropriate test accommodations for students with learning disabilities. Focus on Exceptional Children, 37(6). https://doi.org/10.17161/foec.v37i6.6812

Fuchs, Lynn S., Fuchs, D., Eaton, S. B., Hamlett, C., Binkley, E., & Crouch, R. (2000). Using objective data sources to enhance teacher judgments about test accommodations. Exceptional Children, 67(1), 67–81. https://doi.org/10.1177/001440290006700105

Fuchs, L. S., Fuchs, D., Eaton, S. B., Hamlett, C. L., & Karns, K. M. (2000). Supplementing teacher judgments of mathematics test accommodations with objective data sources. School Psychology Review, 29(1), 65–85. https://doi.org/10.1080/02796015.2000.12085998

Ganguly, R. (2010). Testing accommodations for students with emotional or behavioral disorders: A national survey of special education teachers. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 71(12). Retrieved from http://search.proquest.com/docview/787893086/abstract

Garrett, J. T. (2007). Using Speech Recognition Software to Increase Writing Fluency for Individuals with Physical Disabilities . https://doi.org/10.57709/1061131

Garrett, J. T., Heller, K. W., Fowler, L. P., Alberto, P. A., Fredrick, L. D., & O'Rourke, C. M. (2011). Using speech recognition software to increase writing fluency for individuals with physical disabilities. Journal of Special Education Technology, 26(1), 25–41. https://doi.org/10.1177/016264341102600104

Gardiner, J. (2021, February 22). Overcoming Adult Learning Anxiety. Retrieved March 23, 2022, from https://www.ool.co.uk/blog/overcoming–adult–learning–anxiety/#:~:text=Anxiety% 20can% 20affect% 20our% 20cognitive,to% 20a% 20catch% 20twenty% 2Dtwo

Goldstone, L., Ressa, V., Lazarus, S. S., Hinkle, A. R., & Rogers, C. (2021). Calculator Use: Research (NCEO Accommodation Toolkit #13a. National Center on Educational Outcomes. https://publications.ici.umn.edu/nceo/accommodations-toolkit/calculator-research#:~:text=Calculator%20use%20may%20be%20beneficial.,Yakubova%20%26%20Bouck%2C%202014). Accessed 14 Dec. 2023.

Green, R. (1981). Remembering ideas from text: The effect of modality of presentation. British Journal of Educational Psychology, 51(1), 83–89. https://doi.org/10.1111/j.2044–8279.1981.tb02458.x

Gregg, N., & Nelson, J. M. (2010). Meta–analysis on the effectiveness of extra time as a test accommodation for transitioning adolescents with learning disabilities. Journal of Learning Disabilities, 45(2), 128–138. https://doi.org/10.1177/0022219409355484

Ha, O., & Fang, N. (2017). Interactive virtual and physical manipulatives for improving students' spatial skills. Journal of Educational Computing Research, 55(8), 1088–1110. https://doi.org/10.1177/0735633117697730

Hadley, W. M. (2011). College students with learning disabilities: A student development perspective. New Directions for Higher educational., 154(154), 77–81.

Hall, S. E. H. (2002). The impact of test accommodations on the performance of students with disabilities. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 63(03). http://search.proquest.com/docview/305575304/abstract

Hamblet, E. C. (2022, April 13). College Accommodations Aren't Like High School Accommodations. Retrieved August 8, 2022, from https://www.additudemag.com/slideshows/accommodations–for–adhd–in–college–legal–overview/

Harris, L. W. S. (2008). Comparison of student performance between teacher read and CD –ROM delivered modes of test administration of english language arts tests (Order No. 3321402). Available from ProQuest Dissertations & Theses Global: Social Sciences. (304458812). http://silk.library.umass.edu/login

Herbert, J., & Hong, B. (2014). Persistence and Graduation of College Students Seeking Disability Support Services. Journal of Rehabilitation, 80(1), 22–32.

House Committee on Appropriations, 117th Congress, United States of America. (2021, June 24). Appropriations Committee Releases Fiscal Year 2022 Military Construction, Veterans Affairs, and Related Agencies Funding Bill. Retrieved October 1, 2022, from https://appropriations.house.gov/news/press–releases/appropriations–committee–releases–fiscal–year–2022–military–construction

Hummer, R. A., & Hernandez, E. M. (2013). The Effect of Educational Attainment on Adult Mortality in the United States. Population bulletin, 68(1), 1–16.

Indeed.com. (2023, February 16). Does GPA Matter in College? (FAQ) (Indeed Editorial Team, Ed.). https://www.indeed.com/career–advice/career–development/does–gpa–matter–in–college#:~:text=GPA%20could%20make%20all%20the,record%20than%20your%20college%20grades.

Izzo, M. V., Yurick, A., McArrell, B. (2009). Supported etext: Effects of text–to–speech on access and achievement for high school students with disabilities. Journal of Special Education Technology, 24(3), 9–20. https://doi.org/10.1177/016264340902400302

Huynh, H., Meyer, J. P., & Gallant, D. J. (2004). Comparability of student performance between regular and oral administrations for a high–stakes mathematics test. Applied Measurement in Education, 17(1), 39–57. http://silk.library.umass.edu/login

Institute of Educational Sciences. "ERIC FAQ - General." ERIC, Ed.gov, https://eric.ed.gov/?faq. Accessed 14 Dec. 2023.

Izzo, M. V., Yurick, A., & McArrell, B. (2009). Supported etext: Effects of text–to–speech on access and achievement for high school students with disabilities. Journal of Special Education Technology, 24(3), 9–20. https://doi.org/10.1177/016264340902400302

Jarvis, K. (1997). Leveling the Playing Field: A Comparison of Scores of College Students with and without Learning Disabilities on Classroom Tests. Dissertation Abstracts International., 57(111). Retrieved August 22, 2022, from https://eric.ed.gov/?id=ED415261.

Joakim, S. E. (2015). Help me fail: A study on testing accommodations for students with disabilities in writing assessments (Order No. 3730563). Available from ProQuest Dissertations & Theses Global: Social Sciences. (1735801010). http://silk.library.umass.edu/login

Johns Hopkins Medicine. (2022). Hiatal Hernia. Retrieved April 20, 2022, from https://www.hopkinsmedicine.org/health/conditions–and–diseases/hernias/hiatal–hernia

Kappel, A. T. (2002). The effects of testing accommodations on subtypes of students with learning disabilities (Publication No. 3054293) [Doctoral dissertation, University of Pittsburgh]. ProQuest Dissertations and Theses Global.

Karp, M. (2020, January 10). How tinnitus impacts daily life. Verywell Health. Retrieved May 4, 2022, from https://www.verywellhealth.com/how–tinnitus–impacts–daily–life–1048324

Kartal , G., & Simsek, H. (2017). The Effects of Audiobooks on EFL Students' Listening Comprehension . The Reading Matrix: An International Online Journal., 17(1). Retrieved August 19, 2022, from https://readingmatrix.com/files/16–7w4b733r.pdf.

Kern, L., Hetrick, A. A., Custer, B. A., & Commisso, C. E. (2019). An evaluation of IEP accommodations for secondary students with emotional and behavioral problems. Journal of Emotional and Behavioral Disorders, 27(3), 178–192. https://doi.org/10.1177/1063426618763108

Kim, W. H., & Lee, J. (2016). The effect of accommodation on academic performance of college students with learning disabilities. Rehabilitation Counseling Bulletin, 60(1), 40–50. https://doi.org/10.1177/0034355215605259

Kofoed, M. S. (2020). Where have all the GI Bill dollars gone? Veteran usage and expenditure of the Post–9/11 GI Bill. Economic Studies at Brookings. Retrieved October 11, 2022, from https://www.brookings.edu/wp–content/uploads/2020/10/ES–10.13.20–Kofoed–2.pdf.

Kulawiak, P. R. (2021). Academic benefits of wearing noise–cancelling headphones during class for typically developing students and students with special needs: A scoping review. Cogent Education, 8(1). https://doi.org/10.1080/2331186x.2021.1957530

Kuti, L. M. (2011). Accommodations for English language learners with disabilities in federally–mandated statewide English language proficiency assessment. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 72(11). Retrieved from http://search.proquest.com/docview/888048530

Laughlin–Tommaso, S. K., Satish, A., Khan, Z., Smith, C. Y., Rocca, W. A., & Stewart, E. A. (2020). Long–term risk of de novo mental health conditions after hysterectomy with ovarian conservation: a cohort study. The Journal of The North American Menopause Society, 27(1), 33–42. https://doi.org/https://journals.lww.com/menopausejournal/Fulltext/2020/01000/Long_term_risk_of_de_novo_mental_health_conditions.7.aspx

Leadbeater, W., Shuttleworth, T., Couperthwaite, J., & Nightingale, K. P. (2013). Evaluating the use and impact of lecture recording in undergraduates: Evidence for distinct approaches by different groups of students. Computers & Education, 61, 185–192. https://doi.org/10.1016/j.compedu.2012.09.011

Learning Disabilities Association of America. (2012, September 22). What Are Learning Disabilities? – Learning Disabilities Association of America. Retrieved November 27, 2023, from https://ldaamerica.org/advocacy/lda–position–papers/what–are–learning–disabilities/

Learning Point Associates. (2004). A Closer Look at the Five Essential Components of Effective Reading Instruction: A Review of Scientifically Based Reading Research for Teachers. https://files.eric.ed.gov/fulltext/ED512569.pdf

Lee, I. X. C. (2011). The application of speech recognition technology for remediating the writing difficulties of students with learning disabilities (Publication No. 3501541) [Doctoral dissertation, University of Washington]. ProQuest Dissertations and Theses Global. https://www.proquest.com/docview/937166217?pq–origsite=gscholar&fromopenview=true

Lewandowski, L., Cohen, J., & Lovett, B. J. (2012). Effects of extended time allotments on reading comprehension performance of college students with and without learning disabilities. Journal of Psychoeducational Assessment, 31(3), 326–336. https://doi.org/10.1177/0734282912462693

Lewandowski, L. J., Lovett, B. J., Parolin, R., Gordon, M., & Codding, R. S. (2007). Extended time accommodations and the mathematics performance of students with and without ADHD. Journal of Psychoeducational Assessment, 25(1), 17–28. https://doi.org/10.1177/0734282906291961

Lindsay, S. (2022, October 15). What's the Average College GPA? By Major? https://blog.prepscholar.com/average–college–gpa–by–major#:~:text=The% 20average% 20GPA% 20for% 20students,3.15% 2C% 20or% 20a% 20B% 20average.

Liu, K. K., Thurlow, M. L., Press, A. M., & Dosedel, M. J. (2019). A Review of the Literature on Computerized Speech–to–Text Accommodations, 414. Retrieved August 1, 2022, from https://files.eric.ed.gov/fulltext/ED600670.pdf.

Long, H., Bouck, E., & Domka, A. (2020). Manipulating algebra: Comparing concrete and virtual algebra tiles for students with intellectual and developmental disabilities. Exceptionality, 1–18. https://doi.org/10.1080/09362835.2020.1850454

Lovett, B. J. (2010). Extended Time Testing Accommodations for Students with learning disabilities: Answers to Five Fundamental Questions. Review of Educational Research, 80(4), 611–638. https://doi.org/10.3102/0034654310364063Mamboleo, G., Dong, S., & Fais, C. (2020). Factors Associated With Disability Self–Disclosure to Their Professors Among College Students with learning disabilities. Career Development and Transition for Exceptional Individuals, 43(2), 78–88. https://doi.org/10.1177/2165143419893360

MacArthur, C. A., & Cavalier, A. R. (2004). Dictation and speech recognition technology as test accommodations. Exceptional Children, 71(1), 43–58. https://doi.org/10.1177/001440290407100103

Mandinach, E. B., Bridgeman, B., Cahalan–Laitusis, C., & Trapani, C. (2005). (rep.). The Impact of Extended Time on SAT Test Performance (8th ed., Vol. 2005). New Yord, NY: CollegeBoard.

MayoClinic. (2018, July 6). Post–traumatic stress disorder (PTSD). Retrieved April 15, 2022, from https://www.mayoclinic.org/diseases–conditions/post–traumatic–stress–disorder/symptoms–causes/syc–20355967#:~:text=Post% 2Dtraumatic% 20stress% 20disorder% 20(PTSD)% 20is% 20a% 20mental% 20health,uncontrollable% 20thoughts% 20about% 20the% 20eventMayo Clinic. (2018, February 3). Depression (major depressive disorder). Retrieved April 20, 2022, from https://www.mayoclinic.org/diseases–conditions/depression/symptoms–causes/syc–20356007

Mayo Clinic. (2018, December 28). TMJ Disorders. Retrieved May 2, 2022, from https://www.mayoclinic.org/diseases–conditions/tmj/symptoms–causes/syc–20350941

Mayo Clinic. (2020, June 6). Diabetes management: How lifestyle, daily routine affect blood sugar Print. Retrieved May 1, 2022, from https://www.mayoclinic.org/diseases–conditions/diabetes/in–depth/diabetes–management/art–20047963

Mayo Clinic. (2020, August 1). Sciatica. Retrieved April 6, 2022, from https://www.mayoclinic.org/diseases–conditions/sciatica/symptoms–causes/syc–20377435?utm_source=Google&utm_medium=abstract&utm_content=Sciatica&utm_campaign=Knowledge–panel

Mayo Clinic. (2020, September 24). Chronic fatigue syndrome (CFS). Retrieved May 6, 2022, from https://www.mayoclinic.org/diseases–conditions/chronic–fatigue–syndrome/symptoms–causes/syc–20360490#:~:text=Chronic% 20fatigue% 20syndrome% 20(CFS)% 20is,doesn't% 20improve% 20with% 20rest.

Mayo Clinic. (2020, October 30). Diabetes. Retrieved May 1, 2022, from https://www.mayoclinic.org/diseases–conditions/diabetes/symptoms–causes/syc–20371444Mayo Clinic. (2021, March 16). Arteriosclerosis / atherosclerosis. Retrieved April 28, 2022, from https://www.mayoclinic.org/diseases–conditions/arteriosclerosis–atherosclerosis/symptoms–causes/syc–20350569

Mayo Clinic. (2021, January 13). Leukemia. Retrieved May 6, 2022, from https://www.mayoclinic.org/diseases–conditions/leukemia/symptoms–causes/syc–20374373

Mayo Clinic. (2021, February 4). Tinnitus. Retrieved March 25, 2022, from https://www.mayoclinic.org/diseases–conditions/tinnitus/symptoms–causes/syc–20350156

Mayo clinic. (2021, May 4). Non–Hodgkin's lymphoma. Retrieved May 5, 2022, from https://www.mayoclinic.org/diseases–conditions/non–hodgkins–lymphoma/symptoms–causes/syc–20375680

Mayo Clinic. (2021, July 1). High Blood Pressure (Hypertension). Retrieved April 28, 2022, from https://www.mayoclinic.org/diseases–conditions/high–blood–pressure/symptoms–causes/syc–20373410

Mayo Clinic. (2021, July 2). Migraine. Retrieved April 6, 2022, from https://www.mayoclinic.org/diseases–conditions/migraine–headache/symptoms–causes/syc–20360201

Mayo Clinic. (2021, July 27). Obstructive sleep apnea. Retrieved March 30, 2022, from https://www.mayoclinic.org/diseases–conditions/obstructive–sleep–apnea/symptoms–causes/syc–20352090

Mayo Clinic. (2021, October 12). Malaria. Retrieved May 6, 2022, from https://www.mayoclinic.org/diseases–conditions/malaria/symptoms–causes/syc–20351184

Mayo Clinic. (2022, February 11). Anemia. Retrieved May 5, 2022, from https://www.mayoclinic.org/diseases–conditions/anemia/symptoms–causes/syc–20351360

MacArthur, C. A., & Cavalier, A. R. (2004). Dictation and speech recognition technology as test accommodations. Exceptional Children, 71(1), 43–58. https://doi.org/10.1177/001440290407100103

McCollum, D., Nation, S., & Gunn, S. (2014). The effects of a speech–to–text software application on written expression for students with various disabilities. National Forum of Special Education Journal., 25(1), 1–13. http://www.nationalforum.com/Journals/NFSEJ/NFSEJ.ht

McKinney, D., Dyck, J. L., & Luber, E. S. (2009). ITunes University and the classroom: Can podcasts replace professors? Computers & Education, 52(3), 617–623. https://doi.org/10.1016/j.compedu.2008.11.004

Medical News Today. (2018, January 26). Hysterectomy side effects and recovery. Retrieved May 2, 2022, from https://www.medicalnewstoday.com/articles/hysterectomy–side–effects

Meloy, L. L., Deville, C., & Frisbie, D. (2002). The effect of a read aloud accommodation on test scores of students with and without a learning disability in reading. Remedial and Special Education, 23(4), 248–255. https://doi.org/10.1177/07419325020230040801

Mental Health America. (2022). Chronic Pain And Mental Health. Retrieved April 6, 2022, from https://www.mhanational.org/chronic–pain–and–mental–health#THREE

Merriam–Webster.com. (n.d.). audiobook. Retrieved August 18, 2022, from https://www.merriam–webster.com/dictionary/audiobook

Meyer, N. K., & Bouck, E. C. (2017). Read–aloud accommodations, expository text, and adolescents with learning disabilities. Learning Disabilities: A Multidisciplinary Journal., 22(1). https://doi.org/10.18666/ldmj–2017–v22–i1–7932

Meyer, N. K., & Bouck, E. C. (2014). The impact of text–to–speech on expository reading for adolescents with LD. Journal of Special Education Technology, 29(1), 21–33. https://doi.org/10.1177/016264341402900102

Milani, A. A. (1996). Disabled students in higher educational: administrative and judicial enforcement of disability law. Journal of College and University Law, 22(4), 989–1044.

Miller, L. A., Lewandowski, L. J., Antshel, K. M. (2013). Effects of extended time for college students with and without ADHD. Journal of Attention Disorders, 19(8), 678–686. https://doi.org/10.1177/1087054713483308

Mitchell K. (2016). Understanding Academic Reasonable Accommodations for Post–9/11 Veterans with Psychiatric Diagnoses, Part 1: The Foundation. Federal practitioner: for the health care professionals of the VA, DoD, and PHS, 33(4), 33–39.

Moore, J., & Cahill, M. (2016). Audiobooks: Legitimate "Reading" Material for Adolescents? School Library Research, 19. Retrieved August 18, 2022, from https://files.eric.ed.gov/fulltext/EJ1120838.pdf.

Morris, N. P. (2010). Podcasts and mobile assessment enhance student learning experience and academic performance. Bioscience Education, 16(1), 1–7. https://doi.org/10.3108/beej.16.1

Mottaghi, A., & Zamani, E. (2014). Temporomandibular joint health status in war Veterans with post–traumatic stress disorder. Journal of Education and Health Promotion, 3(60), 53–58. https://doi.org/https://www.jehp.net/temp/JEduHealthPromot3160–617776_170937.pdf

Mueller, L., Wolfe, W. R., Neylan, T. C., McCaslin, S. E., Yehuda, R., Flory, J. D., Kyriakides, T. C., Toscano, R., & Davis, L. L. (2019). Positive impact of IPS supported employment on PTSD–related occupational–psychosocial functional outcomes: Results from a VA randomized–controlled trial. Psychiatric rehabilitation journal., 42(3), 246–256. https://doi.org/10.1037/prj0000345

Murphy, C. A., & Stewart, J. C. (2015). The impact of online or F2F lecture choice on student achievement and engagement in a large lecture–based science course: Closing the gap. Online Learning, 19(3), 91–110. http://silk.library.umass.edu/login?url=https://www.proquest.com/scholarly–journals/impact–online–f2f–lecture–choice–on–student/docview/1720057887/se–2

Narcolepsy.Sleep–Disorders.net. (2020, May 24). School and Narcolepsy: Tips for Students. Retrieved April 20, 2022, from https://narcolepsy.sleep–disorders.net/living/tips–students

National Archives and Records Administration. (2022, February 8). Servicemen's Readjustment Act (1944). Retrieved March 14, 2022, from https://www.archives.gov/milestone–documents/servicemens–readjustment–act

National Archives and Records Administration Code of Federal Regulations. (2022, March 22). Title 38 Chapter I Part 4 Subpart B 38 CFR Part 4 Subpart B - Neurological Conditions and Convulsive Disorders. Retrieved December 13, 2023, from https://www.ecfr.gov/current/title-38/chapter-I/part-4/subpart-B/subject-group-ECFRab3ca55f4548afe

National Archives and Records Administration Code of Federal Regulations. (2022, March 22). Title 38 Chapter I Part 4 Subpart B 38 CFR Part 4 Subpart B – The Genitourinary System. Retrieved December 14, 2023, from https://www.ecfr.gov/current/title-38/chapter-I/part-4/subpart-B/subject-group-ECFR8198d98a7a48906

National Archives and Records Administration Code of Federal Regulations. (2022, March 22). Title 38 Chapter I Part 4 Subpart B The Musculoskeletal System . Retrieved March 24, 2022, from https://www.ecfr.gov/current/title–38/chapter–I/part–4/subpart–B/subject–group–ECFRd3005f7d828ea7b

National Archives and Records Administration Code of Federal Regulations. (2022, March 22). Title 38 Chapter I Part 4 Subpart B 38 CFR Part 4 Subpart B – The Skin. Retrieved December 13, 2023, from https://www.ecfr.gov/current/title-38/chapter-I/part-4/subpart-B/subject-group-ECFRf82e301cdb0c0e7

National Archives and Records Administration's Office of the Federal Register (OFR) and the Government Publishing Office. (2021, July 26). Electronic Code of Federal Regulations. https://www.ecfr.gov/cgi–bin/text–idx?SID=8ced5eadc10558122f663052a8249c7a&mc=true&tpl=/ecfrbrowse/Title38/38cfr4_main_02.tpl.

National Center for Learning Disabilities (NCLD). (2021). *Accommodations for Students with LD*. All about learning disabilities and ADHD. Retrieved September 13, 2021, from http://www.ldonline.org/article/8022/.

National Center on Educational Outcomes. (n.d.). Extended Time: Research. Retrieved July 21, 2022, from https://publications.ici.umn.edu/nceo/accommodations–toolkit/extended–time–research

National Center on Educational Outcomes. (n.d.). Multiple Days: Research. Retrieved July 30, 2022, from https://publications.ici.umn.edu/nceo/accommodations–toolkit/multiple–days–research

National Center on Educational Outcomes. (n.d.). Noise Reduction: Research. Retrieved July 30, 2022, from https://publications.ici.umn.edu/nceo/accommodations–toolkit/noise–reduction–research

National Center on Educational Outcomes. (n.d.). Scribe: Research. Retrieved July 30, 2022, from https://publications.ici.umn.edu/nceo/accommodations–toolkit/scribe–research

National Center on Educational Outcomes. (n.d.). Small Group and Individual Administration: Research. Retrieved July 31, 2022, from https://publications.ici.umn.edu/nceo/accommodations–toolkit/small–group–research

National Center on Educational Outcomes. (n.d.). Manipulatives: Research. Retrieved August 1, 2022, from https://publications.ici.umn.edu/nceo/accommodations–toolkit/manipulatives–research

National Deaf Center on Postsecondary Outcomes. (2019). Assistive Listening Systems: An Introduction. Austin, TX; National Deaf Center on Postsecondary Outcomes. Retrieved April 6, 2022, from https://www.nationaldeafcenter.org/sites/default/files/Assistive% 20Listening% 20Systems_% 20An% 20Introduction.pdf.

National Headache Foundation. (2020). Migraine University. Retrieved April 6, 2022, from https://headaches.org/resources/migraine–university/?print=print

National Health Service United Kingdom. (2020, October 23). Overview Scars. Retrieved April 15, 2022, from https://www.nhs.uk/conditions/scars/

National Institute of Dental and Craniofacial Research. (2022, January). TMD (Temporomandibular Disorders). Retrieved May 3, 2022, from https://www.nidcr.nih.gov/health–info/tmd

Noakes, M. A. (2017). Does speech-to-text assistive technology improve the written expression of students with traumatic brain injury? Dissertation Abstracts International: Section A. Humanities and Social Sciences, 79(01), E. http://search.proquest.com/docview/1954694875/abstract

Noakes, M. A., Schmitt, A. J., McCallum, E., & Schutte, K. (2019). Speech–to–text assistive technology for the written expression of students with traumatic brain injuries: A single case experimental study. School Psychology, 34(6), 656–664. https://doi.org/10.1037/spq0000316

Ofiesh, N. S. (2000). *Journal of Postsecondary Education and Disability*, *14*(1), 39–56. Retrieved August 22, 2022, from https://eric.ed.gov/?id=EJ649045.

Okeson, J. P. (2003). Diagnosis of temporomandibular disorders. Management of temporomandibular disorder and occlusion (5th ed.), Mosby, St Louis, 321–364

Oliver. (2022, February 5). Biden: US combat forces to leave Iraq by end of year 2022. Retrieved March 5, 2022, from https://www.nationofchange.org/2022/02/05/biden–us–combat–forces–to–leave–iraq–by–end–of–year–2022

One Feather, M. (2010). Test accommodations and standardized assessment for students with learning disabilities who are second language learners (Order No. 3423834). Available from ProQuest Dissertations & Theses Global; Publicly Available Content Database; Social Science Premium Collection. (761141872). http://silk.library.umass.edu/login?url=https://www.proquest.com/dissertations–theses/test–accommodations–standardized–assessment/docview/761141872/se–2

Packer, L. E. (2005). Tic–related school problems: Impact on functioning, accommodations, and interventions. Behavior Modification, 29(6). https://doi.org/10.1177/0145445505279383

Parks, M. Q. (2009). Possible effects of calculators on the problem solving abilities and mathematical anxiety of students with learning disabilities or attention deficit hyperactivity disorder. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 70(07). http://search.proquest.com/docview/305079627/abstract

Pomplun, M., & Omar, M. H. (2000). Score comparability of a state mathematics assessment across students with and without reading accommodations. Journal of Applied Psychology, 85(1), 21–29. https://doi.org/10.1037/0021–9010.85.1.21

Powers, K. (2022, September 1). Graduate Student Graduation and Completion Rates – Long Overdue. https://instituteforeffectiveness.org/graduate–student–graduation–and–completion–rates/

Press Office. (2021, March 18). EMPLOYMENT SITUATION OF VETERANS — 2020. Retrieved March 5, 2022, from https://www.bls.gov/news.release/pdf/vet.pdf

[Qualtrics Sample size calculator]. (2023, March 21). Sample Size Calculator. Retrieved November 8, 2023, from https://www.qualtrics.com/blog/calculating–sample–size/

Quinlan, T. (2004). Speech recognition technology and students with writing difficulties: Improving fluency. Journal of Educational Psychology, 96(2), 337–346. https://doi.org/10.1037/0022–0663.96.2.337

Rae–O'Donnell, E. (2015, January 20). How College Disability Services Differ from K–12 Special Education Services. Retrieved August 10, 2022, from https://cmda–law.com/how–college–disability–services–differ–from–k–12–special–education–services/

Randall, J., Cheong, Y. F., & Engelhard, G. (2011). Using explanatory item response theory modeling to investigate context effects of differential item functioning for students with disabilities. Educational and Psychological Measurement, 71(1), 129–147. https://doi.org/10.1177/0013164410391577

Randall, J., & Engelhard, G., Jr. (2010). Performance of students with and without disabilities under modified conditions: Using resource guides and read–aloud test modifications on a high–stakes reading test. The Journal of Special Education, 44(2), 79–93. https://doi.org/10.1177/0022466908331045

Rawe, J. (2021, May 3). What is decoding? Retrieved July 31, 2022, from https://www.understood.org/en/articles/decoding–what–it–is–and–how–it–works

Razavi, M. (2020). Chapter 1 – Challenges toward musculoskeletal injuries and diseases. In Nanoengineering in musculoskeletal regeneration (pp. 1–41). essay, Academic Press.

Reiter, S., Emodi–Perlman, A., Goldsmith, C., Friedman–Rubin, P., & Winocur, E. (2015). Comorbidity between depression and anxiety in patients with temporomandibular disorders according to the Research Diagnostic Criteria for temporomandibular disorders. Journal of Oral & Facial Pain and Headache, 29(2), 135–143. https://doi.org/10.11607/ofph.1297

Ricci, N. N. (2015). The effect of the read–aloud testing accommodation on the 2011 fourth–grade National Assessment of Educational Progress in Reading, for students with disabilities in the New York State metropolitan, tri–state area (Order No. 3664192). Available from Education Database; ProQuest Dissertations & Theses Global: Literature & Language; ProQuest Dissertations & Theses Global: Social Sciences. (1720330696). http://silk.library.umass.edu/login?url=https://www.proquest.com/dissertations–theses/effect–read–aloud–testing–accommodation–on–2011/docview/1720330696/se–2

Rogowsky, B. A., Calhoun, B. M., & Tallal., P. (2016). Does modality matter? the effects of reading, listening, and dual modality on comprehension. SAGE Open, 6(3), 215824401666955. https://doi.org/10.1177/2158244016669550

Rudzki, D. R. (2015). The extent of programs, services, and attendance for students with reading disabilities and performance on high–stakes reading assessments. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 77(09E). Retrieved from http://search.proquest.com/docview/1788597028/abstract

Russell, Roxana. "The Impact of using Calculators as an Accommodation on the Math Achievement of Students with Learning Disabilities." Order No. 3630205 Grand Canyon University, 2014. Ann Arbor: ProQuest. Web. 11 Aug. 2022.

Sandoval., W. (2020, October 27). Resource Guide for Students With Visual Impairments. Retrieved May 1, 2022, from https://www.bestcolleges.com/resources/college–planning–with–visual–impairments/#accommodations–available

Satsangi, R., Hammer, R., & Evmenova, A. S. (2018). Teaching multistep equations with virtual manipulatives to secondary students with learning disabilities. Learning Disabilities Research & Practice, 3(2), 99–111. https://onlinelibrary.wiley.com/journal/15405826

Sastangi, R., Hammer, R., & Hogan, C. D. (2018). Studying virtual manipulatives paired with explicit instruction to teach algebraic equations to students with learning disabilities. Learning Disabilities Quarterly, 41(4), 227–242. http://journals.sagepub.com/home/ldq

Schmitt, A. J., McCallum, E., Hennessey, J., Lovelace, T., & Hawkins, R. O. (2012). Use of reading pen assistive technology to accommodate post–secondary students with reading disabilities. Assistive Technology, 24(4), 229–239. https://doi.org/10.1080/10400435.2012.659956

Sheps, S. G. (2020, April 29). Isolated systolic hypertension: A health concern? Retrieved April 28, 2022, from https://www.mayoclinic.org/diseases–conditions/high–blood–pressure/expert–answers/hypertension/faq–20058527

Silió, M. C., & Barbetta, P. M. (2010). The effects of word prediction and text–to–speech technologies on the narrative writing skills of Hispanic students with specific learning disabilities. Journal of Special Education Technology, 25(4), 17–32. Retrieved from http://www.tamcec.org/jset

Sireci, S. G., & O'Riordan, M. (2020). Comparability issues in assessing individuals with disabilities. In A.I. Berman, E.H. Haertel, & J.W. Pellegrino (Eds.), Comparability Issues in Large–Scale Assessment: Issues and recommendations (p. 117–204). Washington, DC: National Academy of Education Press.

Sireci, S. G., Scarpati, S. E., & Li, S. (2005). Test Accommodations for Students with Disabilities: An Analysis of the Interaction Hypothesis. *Review of Educational Research*, *75*(4), 457–490. https://doi.org/10.3102/00346543075004457

Smith, G. W. (2010). The impact of a noise–reducing learning accommodation utilized by students with learning disabilities during an independent reading inventory (Order No. 3402556). Available from ProQuest Dissertations & Theses Global; Social Science Premium Collection. (304677061). http://silk.library.umass.edu/logi

Smith, G. W., & Riccomini, P. J. (2013). The effect of a noise reducing test accommodation on elementary students with learning disabilities. Learning Disabilities Research & Practice, 28(2), 89–95. https://doi.org/10.1111/ldrp.12010

Smith, L. (2019, August 30). Helping Students With Disabilities Understand Accommodations in College. Retrieved August 10, 2022, from https://www.edutopia.org/article/helping–students–disabilities–understand–accommodations–college

Smole, D. P., & Loane, S. S. (2008). (rep.). A Brief History of Veterans' Education Benefits and Their Value. Washington, D.C.: Congressional Research Service.

Spittaels, O., Vanacker, D. (2019). Use of Lecture Recordings on Attendance and Achievement. Retrieved from https://www.panopto.com/blog/to–capture–or–not–to–capture–your–lectures/.

Sreenivas, S. (2021, November 17). What Is Comorbidity? Retrieved April 6, 2022, from https://www.webmd.com/a–to–z–guides/what–is–comorbidity

St. Jude Children's Research Hospital. (2020, August). College Classroom Accommodations for Cancer Patients and Survivors. Together Teens & 20s. Retrieved August 27, 2022, from https://together.stjude.org/en–us/teensand20s/keep–up–with–school/college–classroom–accommodations.html#:~:text=They% 20can% 20include% 3A,Copies% 20of% 20lecture% 20notes

Stefanakos, V. S. (2021, July 27). Types of college accommodations and services. Retrieved August 8, 2022, from https://www.understood.org/en/articles/types–of–college–accommodations–and–services

Stetter, M. E., & Hughes, M. T. (2011). Computer Assisted Instruction to Promote Comprehension in Students with Learning Disabilities. International Journal of Special Education, 26(1), 88–100. http://silk.library.umass.edu/login?url=https://www.proquest.com/scholarly–journals/computer–assisted–instruction–promote/docview/870282859/se–2

Stodden, R. A., Roberts, K. D., Takahashi, K., Park, H. J., & Stodden, N. J. (2012). Use of text–to–speech software to improve reading skills of high school struggling readers. Procedia Computer Science, 14, 359–362. https://doi.org/10.1016/j.procs.2012.10.041

Szarko, J. E., Brown, A. J., & Watkins, M. W. (2013). Examiner familiarity effects for children with autism spectrum disorders. Journal of Applied School Psychology, 29(1), 37–51. https://doi.org/10.1080/15377903.2013.751475

Taylor, E. (2017). The influence of testing accommodations on academic performance and disciplinary rates Available from ERIC. (2101395189; ED582587). http://silk.library.umass.edu/login

The Journal of Headache and Pain. (2018, November 15). Cognitive dysfunction and migraine. Retrieved April 6, 2022, from https://thejournalofheadacheandpain.biomedcentral.com/articles/10.1186/s10194–018–0933–4

Thooft, N. A. (2011). The Effect of Audio Books on Reading Comprehension and Motivation. Retrieved August 18, 2022, from https://www.proquest.com/docview/936509135.

Tran, J. K., Dunckel, G., & Teng, E. J. (2015, February 9). Sexual dysfunction a common problem in Veterans with PTSD. Retrieved May 1, 2022, from https://www.research.va.gov/currents/spring2015/spring2015–3.cfm

Tsubak, M., & Maeda, Y. (2020). A research of analysing the effectiveness of speaking–pen on english learning in consideration of individual differences using a linear mixed–effect model. Education and Information Technologies, 25(2), 731–753. https://doi.org/10.1007/s10639–019–10085–3

Tusmagambet, B. (2020). Effects of audiobooks on EFL learners' reading development: Focus on fluency and motivation. English Teaching, 75(2), 41–67. https://doi.org/10.15858/engtea.75.2.202006.41

Uhač, I., Kovač, Z., Muhvić–Urek, M., Kovačević, D., Frančišković, T., & Šimunović–Šoškić, M. (2006). The prevalence of temporomandibular disorders in war Veterans with post–traumatic stress disorder. Military Medicine, 171(11), 1147–1149. https://doi.org/10.7205/milmed.171.11.1147

Understood.org. (2022, August 16). Assistive technology for reading. Retrieved August 18, 2022, from https://www.understood.org/en/articles/assistive–technology–for–reading

University of Notre Dame. (2022). *Office of Military & Veterans Affairs About*. Office of Military & Veterans Affairs. Retrieved March 5, 2022, from https://omva.nd.edu/about

U.S. Census Bureau. (2021, July 1). QuickFacts United States. Retrieved May 3, 2022, from https://www.census.gov/quickfacts/fact/table/US/PST045221

U.S. Department of Defense. (2019, January 9). 75 Years of the GI Bill: How Transformative It's Been. Retrieved March 16, 2022, from https://www.defense.gov/News/Feature–Stories/story/Article/1727086/75–years–of–the–gi–bill–how–transformative–its–been/

U.S. Department of Education. (2007, September 25). Disability Employment 101: Appendix IV. https://www2.ed.gov/about/offices/list/osers/products/employmentguide/appendix–4.html.

U.S. Department of Education. (2017, April 10). About IDEA. Retrieved July 21, 2022, from https://sites.ed.gov/idea/about–idea/

U.S. Department of Education. (2020, October 1). Protecting Students with learning disabilities. Retrieved March 14, 2022, from https://www2.ed.gov/about/offices/list/ocr/504faq.html

U.S. Department of Education. (2022, January 5). About IES: Connecting Research, Policy and Practice. Retrieved November 21, 2022, from https://ies.ed.gov/aboutus/

U.S. Department of Education. (n.d.). Education Resources Information Center (ERIC) FAQ. Retrieved November 21, 2022, from https://eric.ed.gov/?faq

U.S. Department of Education – National Center for Education Statistics. (2020). Title I. Retrieved July 21, 2022, from https://nces.ed.gov/fastfacts/display.asp?id=158

U.S. Department of Education – National Center for Education Statistics. (2021). Students with learning disabilities. Digest of Education Statistics. Retrieved March 16, 2022, from https://nces.ed.gov/fastfacts/display.asp?id=60#:~:text=How% 20many% 20students% 20in% 20postsecondary,20% 20% % 20for% 20female% 20students.

U.S. Department of Education – National Center for Education Statistics. (2022, April 26). A Majority of College Students with Disabilities Do Not Inform School, New NCES Data Show. Press release – A majority of college students with disabilities do not inform school, new NCES Data Show – April 26, 2022. https://nces.ed.gov/whatsnew/press_releases/4_26_2022.asp

U.S. Department of Education Office for Civil Rights. (2011, September). Students with Disabilities Preparing for Postsecondary Education: Know Your Rights and Responsibilities. https://www2.ed.gov/about/offices/list/ocr/transition.html

U.S. Department of Education Office for Civil Rights. (2020, April 21). Disability Discrimination Frequently Asked Questions. Retrieved March 15, 2022, from https://www2.ed.gov/about/offices/list/ocr/frontpage/faq/disability.html#:~:text=Section% 20504% 20is% 20a% 20federal.,discriminating% 20against% 20persons% 20with% 20disabilities.

U.S. Department of Labor, Bureau of Labor Statistics. (2021, March 18). Employment Situation of Veterans — 2020. https://www.bls.gov/news.release/pdf/vet.pdf.

U.S. Department of Labor, Bureau of Labor Statistics. (2021, April 21). Employment Situation of Veterans – 2021. Retrieved May 3, 2022, from https://www.bls.gov/news.release/pdf/vet.pdf.

U.S. Department of Justice Civil Rights Division. (2011, March 11). Americans with Disabilities Act ADA Title III Technical Assistance Manual Covering Public Accommodations and Commercial Facilities. Retrieved March 15, 2022, from https://www.ada.gov/taman3.html

U.S. Department of Justice Civil Rights Division. (2013, May 17). Introduction to the ADA. Retrieved July 21, 2022, from https://www.ada.gov/ada_intro.htm

U.S. Department of Justice Civil Rights Division. (2020, February 28). Guide to Disability Rights Laws. Www.ADA.gov. https://www.ada.gov/resources/disability-rights-guide/#Americans%20with%20Disabilities%20Act

U.S. Department of Justice Civil Rights Division Disability Rights Section. (2020, February 24). A Guide to Disability Rights Laws. Retrieved March 14, 2022, from https://www.ada.gov/cguide.htm#:~:text=Americans% 20with% 20Disabilities% 20Act% 20(ADA,to% 20the% 20United% 20States% 20Congress.

U.S. Department of Veterans Affairs. (2013, September). VIReC Research User Guide. VHA Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files, 2nd Edition. Retrieved October 1, 2022, from https://vaww.virec.research.va.gov/RUGs/ADUSH/RUG–ADUSH–EF–FY99–12–RA.pdf

U.S. Department of Veterans Affairs. (2016, June 27). VA Research Electronic Data Capture (REDCap). Retrieved October 10, 2022, from https://www.virec.research.va.gov/Resources/REDCap.asp

U.S. Department of Veterans Affairs. (2018, May 31). VA Cooperative Studies Program (CSP). Retrieved October 10, 2022, from https://www.research.va.gov/programs/csp/

U.S. Department of Veterans Affairs. (2018, September 13). VA Informatics and Computing Infrastructure Data Access Request Tracker (DART) (R. Simpson, Ed.) [Review of VA Informatics and Computing Infrastructure Data Access Request Tracker (DART)]. U.S. Department of Veterans Affairs. https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=2503

U.S. Department of Veterans Affairs. (2019, May 31). CSP Coordinating Center – West Haven, CT. Retrieved October 10, 2022, from https://www.research.va.gov/programs/csp/westhaven.cfm

U.S. Department of Veterans Affairs. (2019, June 21). 75th Anniversary of the GI Bill. Retrieved March 14, 2022, from https://www.benefits.va.gov/gibill/75th–anniversary.asp

U.S. Department. of Veterans Affairs. (2020, January 17). Forever GI Bill – Harry W. Colmery Veterans Educational Assistance Act. Retrieved March 16, 2022, from https://www.benefits.va.gov/GIBILL/FGIBSummaries.asp

U.S. Department of Veterans Affairs. (2020, December 10). About VA disability ratings. https://www.va.gov/disability/about–disability–ratings/.

U.S. Department of Veterans Affairs. (2021, September 15). ADUSH Enrollment Files. Retrieved October 2, 2022, from http://vaww.vhadataportal.med.va.gov/DataSources/ADUSHEnrollmentFile.aspx

U.S. Department of Veterans Affairs. (2021). (rep.). *VBA Annual Benefits Report Fiscal Year 2020*. Retrieved March 11, 2022, from https://www.benefits.va.gov/REPORTS/abr/docs/2020_ABR.pdf#.

U.S. Department of Veterans Affairs. (2022, January 13). Eligibility for VA disability benefits. Retrieved July 18, 2022, from https://www.va.gov/disability/eligibility/

U.S. Department of Veterans Affairs. (2022, March). VIReC Factbook Corporate Data Warehouse (CDW) Patient 3.1 Domain. VIReC Factbook. Retrieved October 1, 2022, from https://vaww.virec.research.va.gov/CDW/Factbook/FB–CDW–Patient–Domain.pdf

U.S. Department of Veterans Affairs. (2022, March 23). 38 CFR Book C, Schedule for Rating Disabilities. Retrieved July 18, 2022, from https://www.benefits.va.gov/WARMS/bookc.asp

U.S. Department of Veterans Affairs. (2022, March 31). PTSD: National Center for PTSD. Retrieved April 15, 2022, from https://www.ptsd.va.gov/

U.S. Department of Veterans Affairs. (2022, June 9). Corporate Data Warehouse (CDW). Retrieved October 1, 2022, from http://vaww.vhadataportal.med.va.gov/DataSources/CDW.aspx

U.S. Department of Veterans Affairs. (2022, July 6). Non–compensable disability. Retrieved July 18, 2022, from https://www.va.gov/resources/non–compensable–disability/#:~:text=If% 20you% 20receive% 20a% 200,eligible% 20for% 20other% 20VA% 20benefits.

U.S. Department of Veterans Affairs. (2022, August 2). The Researcher's Guide to VA Data VA Information Resource Center. Retrieved September 5, 2022, from https://www.virec.research.va.gov/Intro/About–VIReC.asp

U.S. Department of Veterans Affairs. (2022, August 9). DART Research Request Process. VHA Data Portal – DART Research Request Process. Retrieved October 1, 2022, from http://vaww.vhadataportal.med.va.gov/DataAccess/DARTRequestProcess.aspx

U.S. Department of Veterans Affairs. (2022, August 24). Research Electronic Data Capture (REDCap) . Retrieved October 10, 2022, from https://www.oit.va.gov/Services/TRM/ToolPage.aspx?tid=6453

U.S. Department of Veterans Affairs. (2022, September 6). United States Veterans Eligibility Trends and Statistics (USVETS). Retrieved October 2, 2022, from http://vaww.vhadataportal.med.va.gov/DataSources/USVETSData.aspx

U.S. Department of Veterans Affairs. (2022, November). VA Research by the Numbers. U.S. Department of Veterans Affairs. https://www.research.va.gov/pubs/infographs/VA–research–by–the–numbers–fy22.pdf

U.S. Department of Veterans Affairs. (2023, May 15). Office of Academic Affiliations. Retrieved November 17, 2023, from https://www.va.gov/oaa/affiliation–agreements.asp#:~:text=Affiliation%20Opportunities,Medical%20and%20Dental%20Education

U.S. Department of Veterans Affairs. (2023, August 15). Eligibility for VA disability benefits. Eligibility for VA Disability Benefits. Retrieved November 27, 2023, from https://www.va.gov/disability/eligibility/#:~:text=VA%20disability%20compensation%20provides%20tax,of%E2%80%94your%20active%20military%20service.

U.S. Department of Veterans Affairs. (2023, September 6). I CARE Overview [Review of I CARE Overview]. U.S. Department of Veterans Affairs I CARE; U.S. Department of Veterans Affairs. https://www.va.gov/icare/#:~:text=Our%20mission%2C%20as%20the%20Department,actions%20toward%20service%20to%20others.

U.S. Department of Veterans Affairs. (2023, November 6). Network of Dedicated Enrollment Sites (NODES). U.S. Department of Veterans Affairs Office of Research and Development; U.S. Department of Veterans Affairs. https://www.research.va.gov/programs/csp/nodes.cfm

U.S. Department of Veterans Affairs, Veterans Benefits Administration. (2020). *Veterans Benefits Administration Annual Benefits Report Fiscal Year 2019*. Veterans Benefits Administration Reports; U.S. Department of Veterans Affairs. https://www.benefits.va.gov/REPORTS/abr/docs/2019–abr–v2.pdf

U.S. Department of Veterans Affairs, Veterans Benefits Administration. (2021). *Veterans Benefits Administration Annual Benefits Report Fiscal Year 2020*. Veterans Benefits Administration Reports; U.S. Department of Veterans Affairs. https://www.benefits.va.gov/REPORTS/abr/docs/2020_ABR.pdf

U.S. Department of Veterans Affairs, Veterans Benefits Administration. (2022, October 20). About VA disability ratings. Veterans Affairs. Retrieved November 15, 2023, from https://www.va.gov/disability/about–disability–ratings/#:~:text=We%20use%20a%20method%20called,than%20100%25%20able%2Dbodied.

U.S. Department of Veterans Affairs, Veterans Benefits Administration. (2022). *Veterans Benefits Administration Annual Benefits Report Fiscal Year 2021*. Veterans Benefits Administration Reports; U.S. Department of Veterans Affairs. https://www.benefits.va.gov/REPORTS/abr/docs/2021–abr.pdf

U.S. Department of Veterans Affairs, Veterans Benefits Administration. (2023, February). *Veterans Benefits Administration Annual Benefits Report Fiscal Year 2022*. Veterans Benefits Administration Reports; U.S. Department of Veterans Affairs. https://www.benefits.va.gov/REPORTS/abr/

U.S. Department of Veterans Affairs National Center for Veterans Analysis and Statistics. (2021, April 14). Veteran Population. Retrieved March 25, 2022, from https://www.va.gov/vetdata/Veteran_population.asp

U.S. Department of Veterans Affairs Office of Public and Intergovernmental Affairs. (2015, 21). Federal Benefits for Veterans, Dependents and Survivors Chapter 2 Service–connected Disabilities. Retrieved March 25, 2022, from https://www.va.gov/opa/publications/benefits_book/benefits_chap02.asp

U.S. Department of Veterans Affairs Office of Public and Intergovernmental Affairs. (2021). VA and the Post 9/11 GI Bill. https://www.va.gov/opa/issues/post_911_gibill.asp.

U.S. Department of Veterans Affairs Office of Research & Development. (2020, June 15). Starting a VA Cooperative Study. https://www.research.va.gov/programs/csp/initiation.cfm

U.S. Department of Veterans Affairs Office of Research & Development. (2022, March 16). U.S. Department of Veterans Affairs Informatics and Computing Infrastructure (VINCI). Retrieved January 10, 2023, from https://www.research.va.gov/programs/vinci/default.cfm

U.S. Department of Veterans Affairs Office of Research and Development, Informed Consent for Human Subjects Research: A Primer (n.d.). U.S. Department of Veterans Affairs Office of Research and Development. Retrieved February 15, 2023, from https://www.research.va.gov/resources/pubs/docs/consent_primer_final.pdf.

U.S. Equal Employment Opportunity Commission. (n.d.). The Rehabilitation Act of 1973. Retrieved March 14, 2022, from https://www.eeoc.gov/statutes/rehabilitation–act–1973

U.S. Social Security Administration. (2015). Education and Lifetime Earnings [Review of Education and Lifetime Earnings]. U.S. Social Security Administration. Retrieved November 10, 2023, from https://www.ssa.gov/policy/docs/research–summaries/education–earnings.html#:~:text=Men%20with%20bachelor's%20degrees%20earn,earnings%20than%20high%20school%20graduates.

Vedder, R. (2018, April 9). There are really almost no truly private universities. Forbes. Retrieved March 15, 2022, from https://www.forbes.com/sites/richardvedder/2018/04/08/there–are–really–almost–no–truly–private–universities/

Veterans Benefits Administration, Annual Benefits Report (ABR) – Fiscal Year 2020 (2021). U.S. Department of Veterans Affairs . Retrieved March 24, 2022, from https://www.benefits.va.gov/REPORTS/abr/docs/2020_ABR.pdf.

Villa, S., Micheli, E., Villa, L., Pastore, V., Crippa, A., & Molteni, M. (2009). Further empirical data on the psychoeducational profile–revised (PEP–R): Reliability and validation with the Vineland Adaptive Behavior Scales. Journal of Autism and Developmental Disorders, 40(3), 334–341. https://doi.org/10.1007/s10803–009–0877–2

Wadley, M. N., Liljequist, L. (2013). The Effect of Extended Test Time for Students with Attention–Deficit Hyperactivity Disorder. Journal of Postsecondary Education and Disability, 26(3), 263–271. Retrieved August 22, 2022, from https://files.eric.ed.gov/fulltext/EJ1026889.pdf.

Wagar, C. (2016). The Impact of Audiobooks on Reading Comprehension and Enjoyment. Retrieved August 19, 2022, from https://www.researchgate.net/publication/304674071_The_Impact_of_Audiobooks_on_Reading_Comprehension_and_Enjoyment.

Walz, L., Albus, D., Thompson, S., & Thurlow, M. (2000). Effect of a multiple day test accommodation on the performance of special education students. Retrieved from University of Minnesota, National Center on Educational Outcomes website: http://www.cehd.umn.edu/NCEO/OnlinePubs/archive/AssessmentSeries/MnReport34.html

Wassmer, Sam. Malaria and the Brain – What Long-Term Impact Does Malaria Have on Brain Function? 15 Dec. 2021, www.lshtm.ac.uk/newsevents/expert-opinion/malaria-and-brain-what-long-term-impact-does-malaria-have-brain-function#:~:text=Malaria%20infection%20exerts%20a%20tremendous. Accessed 14 Dec. 2023.

Whittingham, J., Huffman, S., Christensen, R., McAllister, T. (2013). Use of Audiobooks in a School Library and Positive Effects of Struggling Readers' Participation in a Library–Sponsored Audiobook Club. School Library Research, 16. Retrieved August 18, 2022, from https://files.eric.ed.gov/fulltext/EJ1012831.pdf.

Willings, C. (2016, March 13). Teaching Students with Visual Impairments. Retrieved

May 1, 2022, from https://www.teachingvisuallyimpaired.com/accommodations—modifications.html

Yakubova, G., & Bouck, E. (2014). Not all created equally: Exploring calculator use by students with mild intellectual disability. Education and Training in Autism and Developmental Disabilities, 49(1), 111–126. http://www.daddcec.com/etadd.html

Young, M. C. (2017). The effects of text–to–speech on reading comprehension of students with learning disabilities. Dissertation Abstracts International: Section A. Humanities and Social Sciences, 78(11E). Retrieved from http://search.proquest.com/docview/1927469340/abstract

Young, M. C., Courtad, C. A., Douglas, K. H., & Chung, Y.–C. (2018). The effects of text–to–speech on reading outcomes for secondary students with learning disabilities. Journal of Special Education Technology, 34(2), 80–91. https://doi.org/10.1177/0162643418786047

Ysseldyke, J., Thurlow, M., Bielinski, J., House, A., Moody, M., & Haigh, J. (2001). The Relationship Between Instructional and Assessment Accommodations in an Inclusive State Accountability System. Journal of Learning Disabilities, 34(3), 212–220. https://doi.org/10.1177/002221940103400302