2025 Generation Related Differences in the Job Satisfaction and Work Engagement of Civilian Department of Defense Scientists and Engineers

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DEDICATION

To my Dad, who always dreamed I would be a palomino horse doctor – I can't believe we made it! I can feel you cheering me on from Heaven. To my Mom, for her love and encouragement. To my husband, Fitzgerald, Giles, Margaux and Lula, I absolutely love you. You are my dream come true.

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ABSTRACT

The United States Department of Defense (DOD) is facing ongoing workforce challenges as the Baby Boomer population (age 65-81) retire and younger generational cohorts are left to step into critical leadership roles. Building on Gilliam's 2010 findings, this research studies job satisfaction, work engagement and work factor importance among the Department of Defense civilian scientists and engineers from 2010 to present time.

In addition to Baby Boomers, Generation X, and Millennials, this study also includes Generation Z, who were excluded from the 2010 study due to age.

This quantitative, comparative study uses three validated instruments to close multiple important research gaps: the Job Satisfaction Survey (JSS), Utrecht Work Engagement Scale (UWES) and Work Factor Importance Questionnaire. Surveys from 240 Department of Defense civilian scientists and engineers were analyzed using analysis of variance (ANOVA) and Tukey HSD post-hoc tests to detect statistically significant differences among the 2025 workforce generations and between the 2010 and 2025 datasets.

The analysis uncovered statistically significant differences in job satisfaction, work engagement and job factor importance. Generation Z emerged as the most distinct generational cohort, diverting sharply from older cohorts and indicating higher emphasis on work/life balance, reporting difficulties detaching from work and lower satisfaction with compensation and their relationship with supervisors. Generation Y datasets revealed an overall decline in job satisfaction and work engagement since 2010.

Generation X remained stable with a small increase in mental resilience responses. Baby boomers showed minimal changes from 2010 to the present, as they are phasing out of their roles and nearing retirement.

Overall, findings show that the DOD civilian scientist and engineering workforce has moved towards desiring more flexibility, fairness, strong supervisory relationship and fairness over traditional workforce recognition.

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CHAPTER I INTRODUCTION

A. Introduction

This dissertation is a continuation of Jason Gilliam's 2010 research entitled "Age and Generation Related Differences in The Job Satisfaction and work engagement of Civilian Department of Defense Scientists and Engineers." Gilliam identified that little research has been conducted on federal government employees' job satisfaction and work engagement. The following research examines the relationship between the generational cohorts within the United States Department of Defense (DOD) civilian workforce and their corresponding job satisfaction, work engagement and work importance factors. It also reveals in responses from DOD civilian employees from the present date and fifteen years ago when Gilliam originally conducted his study in 2010. Additionally, the research expands upon Gilliam's original work by including the Generation Z workforce, who were not a part of the workforce at the time of the original study because they were too young to be employed. This research revisits Gilliam's original focus, updates the analysis with current data, and expands the scope of research to include additional generations.

Recent changes in the federal workforce, including generational turnover and reduction in the civilian workforce under the Trump Administration, have made it increasingly clear and urgent that the differences amongst generational cohorts with respect to job satisfaction and work engagement need to be researched and better understood, especially in mission critical work environments such as the United States Department of Defense. Government agencies face "retirement tsunami" waves from the

Baby Boomer population as they phase out of the workforce and into retirement, which means the Department of Defense must also simultaneously recruit, manage and retain younger talent. The younger generations may have work values, expectations and behaviors that differ from their predecessors. The workforce shift described above brings both opportunities and challenges to Department of Defense leadership as they prepare to fill key leadership and technical roles.

The researcher expects that Baby Boomers, Generation X & Generation Y's views on job satisfaction, work engagement and work factor importance have remained stable over the last fifteen years. However, with Generation Z entering the workforce, the researcher anticipates that there may be a noticeable difference in how Generation Z views the same issues.

B. Generational Representation in the Workforce

As the workforce becomes increasingly diverse, the topic of generational differences has been heavily studied as managers attempt to understand the best way to manage a team comprised of multiple generations (Berge & Berge 2019). Baby Boomers, Generation X, Generation Y and Generation Z are respectively grouped into age categories based on their birth year, each group with an average of 15.75 years from the youngest to oldest members. The thought behind the generational differences are that the population that comprises each band are similarly aged and were alive at the same time to experience momentous life events at critical times in their development. Currently, generational differences are a heavily studied topic due to a highly publicized theory the

incoming Generation Z workforce is going to shake up the workplace (Berge & Berge, 2019).

C. Problem Statement

The federal government has historically hired in waves due to frequent hiring freezes. The result of their hiring practices is an uneven age distribution across the Department of Defense workforce, with Baby Boomers holding a large percentage of the positions. The Baby Boomer population is currently between 65 and 81 years old, making almost the entire generation eligible for retirement. An estimated 29.7% of Department of Defense employees were eligible for retirement in 2023 (Katz, 2018). The tsunami retirement wave must be addressed head on to ensure there is not a huge knowledge gap left behind as the roles are filled by a younger generation of skilled workers. The research outlined in this paper will advise DOD management on how to correctly manage, motivate and retain their civilian scientists and engineers.

1. Department of Defense (DOD) Upcoming Retirements

The federal government has historically hired in waves. This is in part due to several hiring freezes, which resulted in large age gaps within the DOD workforce. An important portion of the current DOD workforce is comprised of Baby Boomers, whose youngest members are 65 years old. There are two retirement systems for Department of Defense employees, Civilian Service Retirement System (CSRS) and Federal Employees Retirement System (FERS), both of which retirement can be taken at age 60 with 20 years of service or age 65 with 5 years of service. Retirements are steadily on the rise.

From March - May of 2021 alone, there were 26,762 more retirements than March - May of the previous year (Causey, 2021). As of 2018, 13.4% of the DOD workforce was eligible for retirement. In the year 2023, 29.7% of DOD employees were eligible for retirement (Katz 2018). The factors above have created an upcoming "retirement tsunami" (Causey, 2021). The upcoming retirement tsunami has the potential to leave the DOD in a vulnerable position with knowledge gaps and important positions to be filled by younger generations of knowledge workers.

Loss of knowledge, especially technical knowledge, is a threat to all Department of Defense enterprises facing the upcoming retirement boom. The DOD needs to ensure that the experience and knowledge of senior workers is not lost as they retire. It is imperative that the remaining group of workers are trained under the upcoming retirees to retain as much knowledge as possible. Unfortunately, the transfer of knowledge is a very difficult process (Burmeister & Deller 2016). The two most important types of knowledge to be passed down are explicit and tacit knowledge. Explicit knowledge is teachable and less complex to pass on to another person. Tacit knowledge is multifaceted, difficult to teach, and often relies on context to understand. By successfully managing and retaining knowledge, such as subject matter expertise, despite the upcoming retirement wave, the DOD will be able to maintain its overall institutional knowledge. The successful transfer of knowledge is going to require a concerted effort by the DOD to develop knowledge retention programs to pass on vital knowledge from the exiting generation to the next.

2. Contradictory Literature

There is extensive literature available on the subject of generational differences, but with vastly different conclusions. The subject has been an ongoing debate in academic research and managerial studies regarding how generational differences in the workplace are measured and interpreted. One portion of the research shows that generational stereotypes are rampant in the workplace. Other literature, however, claims that there are no significant differences between the different generations in the workplace. The proposed research will provide a clear result on any age-related differences in the Department of Defense workforce and will compare any findings with traditional generational generalizations.

D. Research Purpose

The purpose of this study is to examine age and generation-related differences within the Civilian DOD workforce. Specifically, by using the results of this research, Department of Defense managers will be more aptly prepared to manage the youngest generations of knowledge workers that will soon be hired into the government or promoted in order to replace freshly retired employees.

For management to be able to hire and retain DOD knowledge workers, the manager must understand the job characteristics their employees deem important. The manager is then tasked with a difficult job of trying to figure out which job factors are important to their employees. Are the factors the same for all generations or do they vary from one to another? They need to understand what work factors are important to their team, as well as how to keep their workers engaged. This understanding is crucial for

both improving job satisfaction and maintaining productivity, decreasing turnover rates and developing strategies to motivate a multi-generational workforce. By clearly identifying the motivational factors for each generational cohort in motivation, satisfaction and work engagement, supervisors can use this information to tailor their management and communication styles and incentives to create a better, more committed Department of Defense workforce.

Once the sample population reports which job traits are important to their generational cohort, job satisfaction will be explored. Which job traits are most important to the older generations (Baby Boomers, Generation X)? Are they the same as the younger generation (Generation Y, Generation Z)? If the job traits vary, how does a manager utilize the knowledge of generational job preferences to ensure that their entire workforce is satisfied?

Generational cohort stereotypes will be researched. Are there differences in the four generations making up the workforce? How do the generations' characteristics vary from one to another? Do the DOD scientists and engineers display the stereotypical characteristics of their respective generations? The core of the generational stereotype research aims to understand if differences are due to generational cohort, or stage of life, maturity, age and/or life experience.

Generational stereotypes will be explored throughout this research. The following questions will be answered: Does the DOD workforce exhibit traits that align with their generational stereotype? What are the main differences between the generations? Are the (if any) differences found in the various groups (Baby Boomers, Generation X,

Generation Y, Generation Z) due to their generational grouping or can they be attributed to their age, life/career experience and maturity?

This research will create a model detailing the relationship between measured job factors of work engagement and job satisfaction. The final model will reveal the DOD workforce's job factor preferences to optimize work engagement and job satisfaction. Management will be able to use the research to better understand the desires of their workforce for more engaged, satisfied knowledge workers.

The sample population is the workforce of the United States Army Combat Capabilities Development Command (CCDC) Aviation and Missile Center (AvMC) in Huntsville, Alabama. The sample population is contained within the McMorrow laboratories building on Redstone Arsenal. This DOD center consists primarily of scientists and engineers with very minimal non-technical support staff. The population will receive a survey via email and the data results will be statistically analyzed using structural equation modeling. The final work engagement and job satisfaction and work importance factor model will be created using the statistical results as well as the results from the literature review (Gilliam, 2010).

E. Significance of Study

The significance of this study is to provide information on age and generation-related differences within the Civilian DOD workforce, which will soon face a retirement boom. The government human resources office estimates that 30% of the federal employee workforce was eligible for retirement in 2023. The number of eligible retirees is even higher for organizations like NASA, which reported 44% retirement eligibility

rate in 2023 (Katz, 2018). A mass retirement wave will leave the DOD with holes in its workforce that will be filled by younger generations. The research outlined in this dissertation will provide managers important information on job satisfaction and work engagement that can be directly applied to younger workers filling retirees' positions. The four-generation workforce will not be a short-term scenario; the future of the workforce is set to become even more diversified (Bennett et al., 2012).

CHAPTER II

LITERATURE REVIEW

The purpose of the study is to measure and analyze age/generational differences in work engagement and job satisfaction for federal employees. Given the upcoming increase in DOD workforce retirement, research was performed to help managers in the federal government understand what job traits are preferable to the younger, upcoming generations that will fill the retirees' slots. The research will also help managers retain the employees they currently have.

Numerous studies measuring the qualities that make a workplace desirable exist. Compensation, reward/bonus systems, company culture, workplace environment, work engagement and job satisfaction are some of the most used factors to survey workplace desirability. This dissertation research examines job satisfaction, work engagement and job factor importance to the DOD workforce.

In advance of the collection and analysis of data, an exhaustive literature review was performed in areas including: generational cohorts, job satisfaction, Department of Defense workforce, work engagement, DOD workforce retirement, generations in the workplace, generational leadership styles and job factors. The researcher used numerous sources to perform the literature review, primarily via The University of Tennessee's online library. Specifically, the following databases were used: EBSCO Information Services, Google Scholar and ResearchGate.

A. Job Satisfaction and Motivational Theories

B. 1. Maslow's Hierarchy

Maslow's A Theory of Human Motivation (1942) is one of the most widely cited references on human needs. Although it was written in 1942 and the writing style is dated, the content is still fully applicable to present time. Maslow's theory is simple, there is a vertical hierarchy of needs. The levels from bottom to top are: physiological, safety, love, esteem, and self-actualization. Once a human satisfies a lower rung need, they begin to hunger to satisfy the need the next level up.

Maslow explains that the common thread among all humans (lowest rung) is the desire to have all their physiological needs met in order to be in homeostasis. The National Cancer Institute describes homeostasis in the body to be "A state of balance among all the body systems needed for the body to survive and function correctly. In homeostasis, body levels of acid, blood pressure, blood sugar, electrolytes, energy, hormones, oxygen, proteins, and temperature are constantly adjusted to respond to changes inside and outside the body, to keep them at a normal level." The physiological need is met with food, water, sexual activity, shelter and exercise (Maslow, 1942). In the working world, the physiological rung would equate to working environment. An employer providing a clean, safe building with adequate lighting, HVAC and health standards would satisfy this need.

After physiological requirements are met, the urge to satisfy safety needs emerges. Physical safety is often what comes to mind, but Maslow explains that a person's preference for routine and predictability fall into this category as well. In the workplace,

the safety need would include physical safety, a routine workday, predictability of assignments, and job security.

Next on the hierarchy is love, which also includes membership. This need is essentially humankind's desire for belonging- not sex, which is covered in physiological needs. The love and membership category would correlate with feeling accepted by and having positive relationships with co-workers. There are two main types of respect that a worker wishes to receive from co-workers and leaders: recognition and appraisal respect (Van Quaquebeke et. Al). Recognition respect is shown by co-workers treating each other as they want to be treated and everyone having equal rights. Appraisal respect is about the feeling a worker gets when a skill is mastered or one makes a big accomplishment which results in positive feedback from a supervisor or a pay raise. Receiving recognition and appraisal respect increases one's level of workplace happiness.

After love and membership needs are met, esteem is the next goal to be reached. The esteem category is the need for one to have self-esteem. The desire is to both have a high opinion of yourself and to have self-respect. Maslow divides this category into two sections: Desire for strength and achievement and desire for a positive reputation and/or prestige. In the workplace, this would translate to recognition, having a positive reputation and being seen as a competent worker.

As shown in Figure 1, the top rung is self-actualization. The self-actualization level is the need for the person to reach their potential in life, to express themselves, to be creative. In a work environment, this level would include being able to be one's true self

at work, to continue to work on self-development in their role, and to be able to use creativity in their tasks (Maslow, 1942).

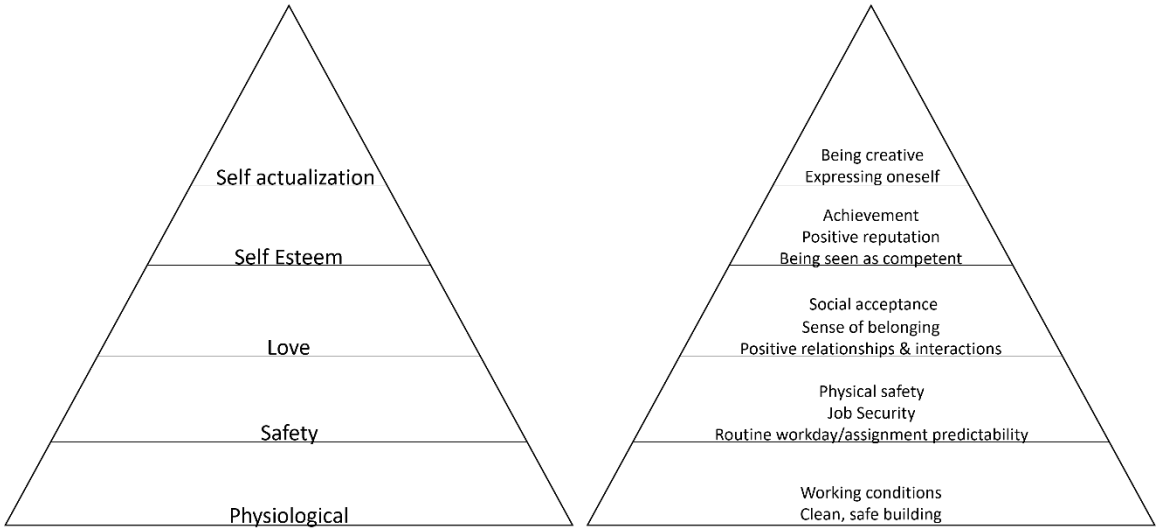


Figure 1. Maslow's Hierarchy Translated to Work Scenarios

2. McClelland Achievement Motivation Theory

In the 1950's, David McClelland collaborated with others at Wesleyan University to form the Achievement Motivation Theory (Miner, 2015). As the name suggests, the need for achievement is the main pillar of the theory. The theory additionally includes power, affiliation and the fear of failure. McClelland concluded that all human motives are learned and as they are formed, they begin to arrange in a hierarchy in oneself that influences their behavior and varies from person to person. As a person grows, they learn to attach positive and negative feelings to the things that are happening to and around them. For a person with achievement at the top of their hierarchy, they are motivated and energized by a difficult task.

There are three features of situations that are preferred by achievement-goal oriented workers. First, people categorized as having a strong need for achievement tend to accomplish success by themselves and through their hard work/merits as opposed to by chance. When the positive result is due to the work they put in, the person gets to take sole responsibility for the task and gets all the credit. These individuals feel very satisfied by receiving the credit for the success of their hard work.

Second, achievement-goal oriented individuals want to set themselves up for success when choosing tasks. They gravitate towards moderate levels of risk and difficulty. If the task is too simple, anyone could do it, and the personal credit received is not as high. If the task is too tough, there is a higher chance of failure and the probability of the motive for satisfaction is low. Achievement-motivated people want to be slightly challenged but choose tasks that are certainly able to be accomplished.

Lastly, a situation is preferred to have very clear instructions and a clear desired outcome. There must be direct, unambiguous feedback from the tasking party. If the individual cannot clearly tell success from failure, there is little to no achievement satisfaction when the solution is found (Miner, 2015).

3. Adam's Equity Theory

J. Stacy Adams introduced the equity theory in the 1960's after studying the results of a colleague's research, which showed that the top reported cause of dissatisfaction in the workplace was due to feeling of unfairness (Miner, 2015). The theory is based upon an interaction where one person gives something and then gets something in return.

There are three main components of Adams equity theory. First, the input/investment is what the individual gives in the relationship. The inputs must be recognized by the giver and be considered important to the relationship. Examples of inputs include: investment of time and effort, experience and education, skills, and hard work. In a workplace example, an employee working extra hours to make a tight deadline would be the employee's input.

Second, outcomes are the other end of the exchange relationship. Similar to inputs, the outputs must be considered relevant to receiving party and recognized upon receipt. Examples of outcomes include: salary, promotions, extra job perks, and intrinsic rewards. In the above workplace example, the employee that worked the extra hours could receive a pay bonus as the outcome of the transaction.

The third type of theoretic variable is comparison. A reference person is used to help the employee evaluate the equity of the exchange. In our above example, the reference person could be a co-worker in a similar role and pay structure. The employee getting the pay bonus could confer with their co-worker to get an understanding of how fair this bonus was. They would check to see if the reference person's bonus higher or lower when they received it to judge the fairness of their amount of bonus pay.

Inequity exists when one's outcomes from their inputs do not equal or exceed the outcomes from others' inputs. The imbalance leaves the party feeling they are inadequately being rewarded for the job they have done in respect to their peers. To reference the example above, inequity would exist if the bonus they received was far less than their reference person's bonus for an equal effort. The inequity would result in the

input employees feeling discouraged and disappointed in their workplace. Equity exists when the scales are even and the outcome versus inputs equals other outcomes versus input ratios. Most exchanges involve multiple inputs and outcomes; therefore, they must be summed across all the relevant factors to result in the correct outcome. There are multiple scenarios of outcomes, as shown in Figure 2, that are possible (Miner, 2015).

The Amount of Inequity Experienced Under Various Input and Outcome Conditions

Perception of oneself	Perception of the reference source			
	Inputs low—outcomes high	Inputs high—outcomes low	Inputs low—outcomes low	Inputs high—outcomes high
Inputs low—outcomes high	No inequity	Much inequity	Some inequity	Some inequity
Inputs high—outcomes low	Much inequity	No inequity	Some inequity	Some inequity
Inputs low—outcomes low	Some inequity	Some inequity	No inequity	No inequity
Inputs high—outcomes high	Some inequity	Some inequity	No inequity	No inequity

Figure 2. Inputs Vs. Outcomes Equity Chart

The result of inequity is either guilt (feeling overrewarded for low effort), or dissatisfaction (being underrewarded for a high level of effort). Tension is created due to the inequity, which motivates forces to move towards reducing the inequity. Altering the inputs is one-way to reduce the inequity. In our above workplace example, a dissatisfied employee who felt they worked extra hard to receive less than their peer would lower the amount of work that was done or lower the quality of their work to match their outcome. Altering outcomes is another approach to reducing inequality. An example would be requesting a larger bonus or promotion. Another approach is to mentally alter inputs and outputs. A person can work to cognitively lessen or increase a factor to make themselves

feel better about the situation and mentally shift so there is perceived equality. However, the ideal scenario, especially for workplace interactions, is simply for both parties to work and make sure the inputs of the employee are matched to the outcomes.

4. Goal Setting Theory

Goal setting theory (GST) began in the 1970's on the premise that action is affected by conscious goals. Locke and Latham (2002) describe a goal as "the object or aim of an action, for example, to attain a specific standard of proficiency, usually within a specified time limit."

The degree of goal difficulty plays a huge role in GST. A linear and positive relationship was found when studying effort levels versus difficult goals; difficult goals proved to increase the level of effort exerted up to a certain point. To receive the highest level of effort from an individual, the goal must be moderately difficult. There is a decrease in the level of effort as the task becomes extremely difficult. The lowest level of effort occurs when the task is extremely easy or difficult. The researchers found that setting a specific goal(s) was the key to a successful outcome, as opposed to telling someone to do their best. The problem with being told to do one's best is that there is a large scale of outcomes that could all be deemed as acceptable. When a goal outcome is specified, however, it reduces the ambiguity of the outcome and allows for a clear plan to be made in order to complete the task.

Self-efficacy is as confidence in a specific task and is calculated by taking efficacy ratings over the entire range of potential performance outcomes as opposed to a single outcome. Self-efficacy is important to GST in multiple ways. When one sets their own

goals, those with high self-efficacy set farther reaching goals than those with lower self-efficacy. In addition to setting higher goals, the high self-efficacy population is more committed to their goals and use negative feedback to better themselves. In order to increase self-efficacy and thereby increase goal commitment, a leader can increase the self-efficacy of their team by:

1. providing training, which gives the trainee experiences in mastering a subject and provides successful experiences
2. providing successful role models, and
3. Using language to communicate one's confidence that the trainee will be successful.

C. Work Engagement Theory

The topic of employee work engagement has been widely discussed since the 1990's when it first started appearing in text (Schaufeli, 2012). In a worldwide questionnaire among CEOs, it was shown that the engagement of employees was listed in the top five important challenges for their companies. Due to the need in the marketplace to understand work engagement, companies began to develop surveys to gauge engagement. The outcome of the large, international databases was that 60% of workers are moderately engaged, 20% are highly engaged and 20% are actively disengaged.

The 20/60 figures above are reminiscent of the Pareto Principle. Italian economist Vilfredo Pareto (1848-1923) observed an unequal distribution of wealth. In his 1906 paper, he described that 20% of the Italian population was in possession of 80% of the country's wealth. Pareto's 80/20 rule was expanded upon in the 1930's when Dr. Joseph

Juran concluded that 20% of work is usually responsible for 80% of the results (Abyad, Abdulrazak, 2021).

Work engagement is the opposite of burnout. Connected, engaged employees feel an energized connection to their work and look at demanding situations as a challenge instead of a stressor. Engagement constitutes one being involved, energized and having high self-efficacy. On the contrary, burnout involves exhaustion, cynicism and lack of accomplishment (Schaufeli, W.B., Salanova, M., Gonzalex-Roma, V. & Bakker, A.B, 2002).

1. Vroom's Theory of Work and Motivation

Victor Vroom's theory of work and motivation originated from his 1960 dissertation from the University of Michigan. The theory does not explain what motivates people, but it explains why motivation works in some instances and fails in others. Vroom's theory begins with the concept that people's preference of goals and outcomes widely vary. When their preferred outcome is obtained, they feel satisfied and happy. When the preferred outcome is achieved, the term valence is applied to the feeling about the outcome. With positive valence, the outcome is preferred as opposed to not having the outcome. Having no outcome is preferred if there is negative valence. Outcomes obtain valence independently, or because there is anticipation the outcome will lead to another situation that will result positively or negatively. An example would be a salary leading to satisfaction on its own, or to another person as the means to purchase a home (Miner, 2015). Vroom describes the estimation of a valence for an outcome in his 1964 book:

"The valence of an outcome to a person is a monotonically increasing function of the algebraic sum of the products of the valences of all other outcomes and his conceptions of its instrumentality for the attainment of these other outcomes." (Vroom 1964, 17)

Thus, the magnitude of the valence of an outcome of a scenario is dependent to the degree it is regarded as a means to future outcomes and the valence of those future outcomes. Due to the multiplication factor of Vroom's formula, an outcome with no valence or no future outcome valence takes on the value of zero, which adds nothing to the total sum. An outcome with a large valence would likely be one linked to multiple future outcomes with high valences. Vroom applied his estimation of valence described above to job choice (calculation of the valence of a job role), job satisfaction (valence of a current job), and job performance (valence of the performance of a current job).

A fundamental variable in Vroom's theory is expectancy. Expectancies combined with total valence result in a person's motivation or potential for a specific course of action. Vroom describes the combination of expectancy and valence as force (Miner, 2015). Vroom describes force as:

"The force on a person to perform an act is a monotonically increasing function of the algebraic sum of the products of all the valences of all outcomes and the strength of his expectancies that the act will be followed by the attainment of these outcomes." (Vroom, 1964)

Thus, the force on an individual to apply a specific amount of energy in the performance of their job is described below by Vroom in his 1964 book as "a monotonically increasing function of the algebraic sum of the products of the valences of

different levels of performance and his expectancies that this amount of effort will be followed by their attainment." (Vroom, 1964)

2. Porter and Lawler's Expectancy Theory

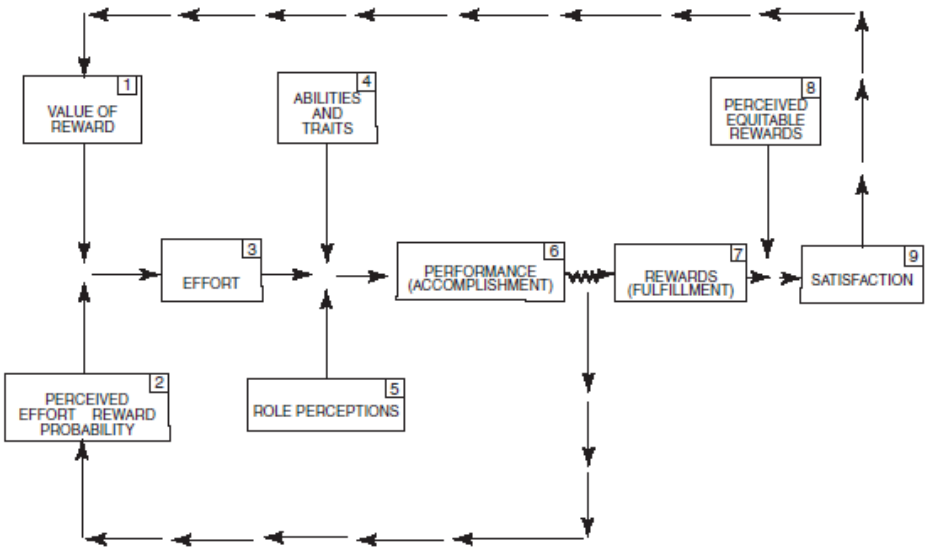
Porter and Lawler created a model that is derived from Victor Vroom's theory but goes beyond Vroom's to include performance as a whole (Miner, 2015). The formula is:

Performance = f (Ability * Motivation)

The Variables include:

1. Reward value- how desirable the outcome is (valence)
2. Effort-reward probability- perception of the differential rewards versus the differential effort. This flows down into expectancy and instrumentality components.
3. Effort- the amount of energy one expends on a task (force)
4. Traits and Abilities- a person's characteristics
5. Role Perceptions- the level of effort a person deems necessary to effectively perform job
6. Performance- an individual's accomplishments on tasks required by job role
7. Rewards- desirable outcomes received from oneself or others actions (intrinsic vs extrinsic)
8. Perceived equitable rewards- the amount of rewards a person deems just
9. Satisfaction- the degree to which rewards received the receiver's expectations

Figure 7.1 **The Original Porter-Lawler Model**



Source: Porter and Lawler (1968, 17). Copyright © 1968 McGraw-Hill. Reprinted with permission.

Figure 3. The Original Porter-Lawler Model (Minor, 2015)

Porter and Lawler's model contains feedback loops that make their theory more dynamic than Vroom's predecessor model. Porter and Lawler's model is based on the theory that a worker's perception of their future reward increases their effort. There are two types of rewards in this model: intrinsic and extrinsic. The Latin root word for intrinsic is intrinsecus, which means "inwardly, on the inside." Intrinsic rewards are feelings of accomplishment, feelings of self-worth, etc. workers find within themselves. Extrinsic rewards are external items such as salary increases, bonuses and gifts. Porter and Lawler's studies concluded that intrinsic rewards resulted in higher satisfaction than extrinsic.

3. Job Satisfaction and Work Engagement Connection

The above theories connect job satisfaction and work engagement/work effort, but it must be noted that the relationship between the two variables is not consistent throughout. Porter and Lawler (1968) built upon Vroom's expectancy theory (1964). Both researchers concluded performing well led to rewards. Porter and Lawler took the conclusion a step further and concluded that the rewards caused satisfaction and thus, the performance was the root cause of the satisfaction. Herzberg (1968), however, disagreed with Vroom, Porter and Lawler. Herzberg claimed that performance was the result of satisfaction of the worker. These statements directly contradict each other yet are all widely accepted theories in the field. This leaves us with the question of what determines one's job satisfaction?

D. Generational Differences

1. Baby Boomers

Baby Boomers are the oldest generation in the current workforce, born between 1944 and 1960 (Gilliam, 2010). Baby Boomers lived through a time of social reform and political instability. The Civil Rights Movement, Cuban Missile Crisis, Vietnam War, and assassination of Martin Luther King Jr. are a few of the events that shaped this generation (Chaney, 2012). Baby Boomers are patient in earning promotions and are very committed to their work organization. (Chaney, 2012). Baby Boomers have a notoriously strong work ethic, which comes with difficulty balancing work with family life. The focus on company loyalty and hard work leads the group to desire status and rewards for

loyalty and commitment. The group also ranks being able to learn new skills, personal improvement, and the ability to be creative at work as important (Cennamo & Gardner 2008).

2. Generation X (Gen X)

Generation X, also known as Gen X, were born 1961 to 1980 (Gilliam, 2010). Generation X was shaped by events such as the Fall of the Berlin Wall, Watergate Scandal, Energy Crisis, AIDS epidemic and Cold War. They grew up in a time where divorce was becoming increasingly more common. Work-life balance is deeply desired by this group. This generation has the reputation of being entitled because they feel as though they deserve immediate recognition through title, promotion, and pay. (Chaney, 2012). The media has painted a picture of Generation X as being "selfish," but they could also be looked at as independent and enjoying autonomy. They are more interested in their personal career than in their company and prefer organizations with value developing their personal skillset and being productive over status or tenure. (Cennamo & Gardner, 2008).

3. Generation Y (Millennials)

Generation Y, also known as Generation Me, GenMe, Millennials, nGen and igen were born between 1981 and 2000 (Gilliam, 2010). As this generation entered adulthood, they were met with a difficult economic situation. The financial crisis and the housing market collapse shaped this generation (Chaney, 2012). By the year 2030, Millennials will account for 75% of the workforce. Millennials are positive, collaborative people who

enjoy working in a team-based environment (Calk & Patrick, 2017). They have gotten the title of "job hoppers", meaning they jump from one job to another. Unlike older generations, they are unafraid to leave companies in order to find better or higher paying roles elsewhere (Berger, 2020). Job stability with a steady salary and benefits are not attractive to Millennials. It is important that they have satisfying work that feels meaningful (Calk & Patrick, 2017). Generation Y tend to value work life balance, their lifestyle and overseas travel more than previous generations (Cennamo & Gardner, 2008).

4. Generation Z (Gen Z)

Generation Z is the youngest cohort in the workplace, with the youngest members of the group born in 2012. In 2019, Gen Z became the largest generation with 2.47 billion people (32% of the global population). Their generation was shaped by events including war and terrorism, the election of the first Black President, social media and smart phones. They are a highly technological group that has been exposed to technology for the entirety of their life. They feel deeply connected to technology and value using it in everyday life (Berge & Berge, 2019). Gen Z has been described as technologically dependent, with their cell phones feeling like an extension of themselves. Since this generation grew up with cell phones, they are used to being connected virtually to their peers and family at all times with a touch of a button. They crave connection with others, which bleeds into their work life as well. Gen Z prefers steady communication with their peers, including co-workers. According to Forbes, 90% of this generation desires a human connection in their workplace. Surprisingly, Generation Z does not only want to

exist virtually. For most, a hybrid on-site and remote work scenario is the ideal working environment. They desire a clear understanding of the parameters and expectations of their job and desire consistent communication with their supervisors and appreciate transparency. Frequent check-ins provide a feedback loop that Gen Z highly values. (Western Governors University, 2021). With almost half (48%) of Gen Z identifying as ethnic minorities, members of this cohort value diversity in the workplace (Spitznagel, 2020). They are much more accepting of different races, cultures and genders (Western Governors University, 2021).

E. Motivating and Retaining Younger Generations

Generation X workers desire flexibility as to when, how and where they work. Many Gen X employees are in a position of working while also being responsible for taking care of elderly parents and young children. By providing Gen X employees with the option of remote/hybrid work, it appeases the worker's desire for flexibility and helps their work/life balance. It is important to this cohort to work in an environment with integrity. Providing strong, ethical leadership and fair treatment ensures the worker will feel their federal service is purposeful. It is also important for leadership to ensure that Generation X workers feel they have a seat at the table. This cohort often feels overlooked because they are not the "young, hip" group, but also not the most senior and seasoned group. Two-way communication with leadership and this group ensures they feel heard (Hyman, Mikayla, et al., 2022).

Millennials have been unfairly criticized in the media for being lazy and job hoppers. However, at their core, millennials want to connect with their work and do a great job. The "lazy" stereotype came from the fact that his cohort does not want to work additional hours beyond their set duties because they value work/life balance so highly. The group is energized by making positive changes in the world, which is hard to see when one is bogged down by day-to-day tasking. By simply outlining the impact and purpose of the job the millennial is doing, it can motivate the employee to see the big picture of their role and promotes staying in their role. In order to combat the willingness of a millennial to job hop, leaders should make them feel connected to the mission and team. Providing a consistent feedback loop and working with the employee to create a development plan that aligns the leadership's needs and their skills and work desires ensures the individual will be engaged and productive (Berger, 2020).

Generation Z initially experienced remote/hybrid work because they entered the workforce around the time of the COVID-19 pandemic. They now expect flexibility in their work schedule. If employees are required to be in the office for work, Gen Z needs clear communication on why staff needs to be on-site and their time in the office needs to have meaningful connections with bosses and coworkers. In 2021, members of Generation Z carried an average of $18,000 in student debt. The group is very concerned about their financial stability and is motivated by financially secure roles and bonuses. Generation Z has made it clear that they are socially conscious and want to contribute to the greater good. If this cohort connects with the agency's mission, they are much more likely to remain in their roles. Placing these young workers in roles that align with their

morals and ethics is a key part in retaining them. Human Resources (HR) leadership must work to create an inclusive culture (Hyman, Mikayla, et al 2022).

F. Department of Defense Civilian Workforce Population

The Federal Employee Viewpoint Survey (FEVS) is distributed annually among the 2.2 million civilians to receive feedback on their views about work environment, workplace policies, management policies, as well as demographic questions. In the 2022 FEVS, more Civilian employees identified as members of minority groups than ever before. The Office of Personnel Management (OPM) reports that in September 2022, the civilian workforce identified as 60.5% White; 18.2% Black; 9.8% Hispanic; 6.7% Asian/Pacific Islander; 1.6% Native American/Native Alaskan; and 2.1% more than one race. Men account for 55.6% of employees, women 45%. The Federal workforce has an average age of 47 years old; 29% (625,828) are older than 55; 8.3% (180,933) are younger than 30 (United States Government, 2023).

1. Strengthening The Federal Workforce

In 2023, President Biden's Administration published a report entitled "Strengthening The Federal Workplace", outlining their plans to rebuild the civilian Federal workplace as the model employer. The Biden Administration created the President's Management Agenda (PMA) to lay out the rebuilding plan. The PMA aims to bolster the Federal workforce, prioritizing strategies to increase Federal organizational performance through the advancement of service and delivery results for the civilian workforce. The PMA's goal is to increase the civilian workforce's trust in the United States Government. The

PMA laid out four key strategies (listed below) to empower and invigorate the Federal workforce.

Strategy 1: Appeal to and hire the most accomplished employees, who display the diversity of the USA in the correct roles across the civilian workforce

The Administration is driving hiring reforms, focusing on hiring and maintaining a resilient, diverse and inclusive workforce. There have been investments in programs to allow agencies to easily and efficiently hire and recruit talent. Community outreach across the Nation is required to reach those who have never considered Civilian service and those starting a career or who are very early in career stages. Reviving the Federal Internship program is the main plan to reach early-career workers. Currently, the internship/apprenticeship programs are underutilized. The 2023 budget accounted for the hiring of 35,000 interns across the workforce, which is on track to be successfully completed. The Diversity, Equity, Inclusion and Accessibility (DEIA) Council formed plans to be embedded in Federal work culture via actions and practices. The Council will monitor agency implementation of the plans through milestones achieved.

"Strategy 2: Make every Federal job a good job, where all employees are engaged, supported, heard, and empowered, with opportunities to learn, grow, join a union and have an effective voice in their workplace through their union, and thrive throughout their careers"

Federal employees are to be empowered as stakeholders in their future and their agency's future. This can be achieved by providing clear work expectations, giving people the correct tools to complete their jobs, providing opportunity for career

development and encouraging coworker engagement. In order to compete with private company age growth, the FY24 US Budget reflects a 5.2% increase for civilians. Between 2009 and 2021, private sector pay increased 39.9%, while Federal civilian pay increased 26.9% The 13% pay difference has caused risk for attrition within current civilian workforce and has reduced the competitiveness of civilian jobs. The 2024 civilian pay adjustment is an effort to close the civilian versus private sector pay gap. The Biden Administration issued Executive Order 14025 to ensure agencies are ensuring union organizing rights.

"Strategy 3: Reimagine and build a roadmap to the future of Federal work informed by lessons from the pandemic and nationwide workforce and workplace trends"

The COVID-19 pandemic forced the Federal government, along with the rest of the world, to reimagine their workplace approaches and requirements. The U.S. Government has shifted from being primarily on-site to offering more flexible options including telework, off-site/remote work, hybrid work schedules, alternative work schedule and online teamwork. In the future, the agencies will be prepared for changing work environments, which will enhance technological tools used and collaborations amongst teams.

"Strategy 4: Build the personnel system and support required to sustain the Federal Government as a model employer able to effectively deliver on a broad range of agency missions"

Increased Human Resources (HR) personnel is required for the Federal Government to rebuild the civilian workforce to desired capacity. An Administration's top priority is

decreasing skill gaps within the HR workforce. Agencies are working with the Office of Personnel Management (OPM) to build transformational skills required in today's environment for HR professionals. They are also increasing HR recruitment of early-career candidates and those with transferrable skills.

2. DOD Hiring Freezes

The U.S. Federal government hires in waves and downsizes using a technique called "hiring freezes". The DOD uses full and partial freezes to decrease the size of their workforce quickly and efficiently. Partial freezes allow agencies to replace workers in particular roles, but place a cap on the number of existing slots that can be replaced over the year. The U.S. Federal government typically hires in waves and downsizes using a technique called "hiring freezes" (U.S. Government Accountability Office, 1982).

The DOD uses full and partial freezes to decrease the size of their workforce quickly and efficiently. Partial freezes allow agencies to replace workers in particular roles, but place a cap on the number of existing slots that can be replaced over the year. Full freezes forbid any hiring or replacing within the organization during the freeze and are firm with very few exceptions. A 2-year partial hiring freeze from 1990 to 1992 reduced the DOD by 111,000 (3%-4% each year). The most recent freeze, enacted by President Trump, lasted from 23 January 2017 until 12 April 2017 (Trump, D.J., 2017).

Although hiring freezes are effective at reducing the workforce, there are many negative implications as well. There is a risk of losing vital skill sets, education levels, and experience when employees retire or leave the DOD workforce. The main issue, however, is when employees leave or retire during a freeze, the workload remains the

same. Thus, other employees must pick up additional work outside of their job scope. Additional consequences of a full hiring freeze include: increased turnover, lower morale and productivity across the workforce, and higher stress among workers, all of which can also spill over into their personal lives (U.S. Government Accountability Office, 1982). When a hiring freeze brings down the culture in the work environment due to these issues and morale is low, the most competent and skilled workers will find new jobs at other agencies or the private sector. Lower/poor performing employees will stay in their positions longer. The combination of high value employees leaving and low value employees remaining lessens the organization's value.

G. Need For Further Research

As the federal government prepares for the "retirement tsunami" of baby boomer leadership and civilians, the federal government has the potential to be left in a vulnerable spot if their positions are not filled correctly (Causey 2021). Generation X and Millennial workers will be promoted to leadership positions vacated by baby boomers. It is vital for organizations to understand how to engage and motivate the younger generations of knowledge workers.

Research on work engagement and job satisfaction in younger generations has primarily been focused on non-civilian, Millennial workers (Calk & Patrick, 2017; Berger, 2020; Cennamo & Gardner, 2008). Articles regarding the lack of young knowledge workers and the gaps that will be left in the federal workforce after the retirement tsunami have also been written (Causey, 2021; Katz 2018). Unfortunately, there has been no recent research conducted tying research of job satisfaction and all the

working generational cohorts to inform federal government managers how to best lead their multi-generational teams. The largest gap is research oriented to federal employees regarding the topics above- the overwhelming majority is conducted with private company employees as their focus.

It is imperative for federal managers to understand how to best lead their multi-generational teams. Managers who understand how to properly lead, motivate and stimulate their knowledge workers will lead the future of the federal government.

H. Research Gap

In Chapter VI of Gilliam's 2010 dissertation, he noted "In order to truly analyze age and generational-related differences in the workforce, the same respondents should be studied over a period of time as they grow older and progress through their career." The 2025 research both directly answers his call and extends upon it. By replicating Gilliam's 2010 study and adding in Generation Z, the 2025 research increases the validity of the initial findings and addresses crucial gaps in research, outlined below:

1. Job satisfaction and work engagement of Generation Z DOD scientists and engineers
    a. At the time of this paper (2025), there are no known scholarly articles specifically addressing the job satisfaction and work engagement of Generation Z DOD scientists and engineers
2. Management of DOD Generation Z scientists and engineers
    a. Currently, there are no known scholarly articles focused on the management of civilian DOD Generation Z scientists and engineers

3. Extending the study conducted fifteen years ago and analyzing current versus previous datasets
    a. Extending a study conducted in 2010 and directly comparing the results to current data is critically important to understanding the full picture of generational cohorts. Using Gilliam's 2010 study as a snapshot in time, we have rare insight on if the views expressed by the same population fifteen years ago were truly generational or shaped by the time period's workplace culture and the climate of the world.

CHAPTER III MATERIALS AND METHODS

I. Research Approach

The study used a quantitative research approach to extend and build upon the work of Gilliam (2010). The goal of the research was to take a close look at how various generational cohorts of Department of Defense workers (Baby Boomers, Generation X, Generation Y and Generation Z) view their work positions. The research focused on work factors, job satisfaction and work engagement. The quantitative approach was chosen because it offers a structured way to measure attitudes across a large group of workers and then utilizes statistics to test the differences between the groups and determine if the differences are statistically significant.

It was very important to the researcher to keep this study as consistent with Gilliam's 2010 research design as possible. Since the 2010 research and the 2025 extension used the same sample population, DOD scientists and engineers from the same Redstone Arsenal facility, using the exact surveys ensured that the results could be compared directly. By keeping as many components of the 2025 research the same as 2010, the differences found between the two are more likely to be caused by generational differences as opposed to differing data collection approaches.

The design of this research has three main components: comparison of survey answers over time from 2010 to 2025, generational comparisons of the four cohorts and a view into the mindset of Generation Z as a whole and against their coworkers. By replicating Gilliam's 2010 study and adding Generation Z, this study strengthens the validity of the 2010 outcomes and helps address three main gaps in available literature.

Generation Z had not entered the workforce in 2010, so they were left unstudied. By comparing data collected in 2010 and fifteen years later in 2025, we are provided with a rare opportunity to examine whether the responses are truly generational or shaped more by workplace culture and the state of the world at the time of the survey.

The method of using a survey was chosen for three main reasons:

1. Consistency across the 2010 and 2025 surveys. Using the same survey for all sample populations ensures the comparisons will be direct
2. Accessibility provided by an online study. An emailed survey link provided an easy to complete survey for the sample population.
3. Analytical benefit. The structured format of the survey allows for direct application of statistical analysis (ANOVA, MANOVA, t-tests) to clearly see how generations differ.

J. Survey Instruments

1. Selection of Job Satisfaction Survey (JSS)

The tool selected to measure job satisfaction in this study was Paul Spector's (1985) Job Satisfaction Survey (JSS). The Job Satisfaction Survey is a nine-facet scale written to assess employee feelings about their job and features of their work environment. There are four questions per facet, totaling 36 questions. The nine facets are "Pay, Promotion, Supervision, Fringe Benefits, Contingent Rewards (performance-based rewards), Operating Procedures (required rules and procedures), Coworkers, Nature of work, and Communication" (Spector, 1985). By collecting the results of those facets together, they provide a full assessment of how workers view their jobs. Responses are collected using a six-point Likert scale. The available answer choices are:

1. Disagree very much

2. Disagree moderately

3. Disagree slightly

4. Agree slightly

5. Agree moderately

6. Agree very much

In order to vary the response pattern, there is a mixture of positive and negatively-worded phrasing, which requires the researcher to either calculate score in reverse or interpret results in reverse for negatively worded items (Spector, 1985). Since the introduction of the JSS, it has been used in academic and research settings, as well as across various private industries. It has a long record of use and is well accepted and validated as a tool for studying job satisfaction (Spector, 1997).

Maintaining consistency with the 2010 survey Gilliam used was a top priority for this research. Because both of the 2010 and 2025 research used the same DOD scientists and engineering workforce as the sample population, the use of the Job Satisfaction Survey in 2025 ensured that the findings from both datasets would be able to be compared directly. By keeping the survey tool the same, there is a decrease in the risk of an error in interpretation if a new study were to be introduced.

The Job Satisfaction Survey has been documented over the last 40 years. In 1985, Spector used a large sample population of 3000 to find an internal consistency coefficient range of .6 to .82 across the facets. The total of the scale reached .91, which shows that the Job Satisfaction Survey provides consistent results across the different sections of the

survey. Spector confirmed his findings again in 1997 and showed that the JSS is a stable tool providing consistent, correct results. The overall facets of the Job Satisfaction Survey are shown in Table 1.

Table 1. Job Satisfaction Survey Examples

Facet	Description	Sample Item
Pay	Fairness in salary and wages	"I feel I am being paid a fair amount for the work I do."
Promotion	Promotion opportunities	"There is really too little chance for promotion on my job."
Supervision	Quality of immediate leadership	"My supervisor is quite competent in doing his/her job."
Fringe Benefits	Satisfaction with non-salary benefits	"The benefits we receive are as good as most other organizations offer."
Contingent Rewards	Performance recognition/appreciation	"When I do a good job, I receive the recognition for it that I should receive."
Operating Procedures	Operating policies and procedures	"Many of our rules and procedures make doing a good job difficult."
Coworkers	Relationships and interactions with colleagues	"I like the people I work with."

Table 1. Continued

Nature of Work	Enjoyment of the job tasks	"I like doing the things I do at work."
Communication	Communication within organization	"Communications seem good within this organization."

Note: Facets, descriptions and sample items adapted from Paul Spector (1985). Complete list of 36- item Job Satisfaction Survey is provided in Appendix A.

The Job Satisfaction Survey was selected for this research for multiple reasons:

1. Consistency with Gilliam's 2010 study
2. Directly applicable in the Department of Defense setting, where facets such as communication, supervisors, etc. are required in day-to-day operations
3. The JSS has 40 years of validation and is well-accepted in the academic and government sectors
4. It is a practical survey that is easy to understand and easily accessible to the sample population

Given the four reasons above, these qualities made the JSS the correct choice for measuring job satisfaction amongst DOD scientists and engineers. Its history and use in Gilliam's 2010 study ensured that the 2025 study could replicate the previous data as well as extend the findings.

2. Selection of Utrecht Work Engagement Scale (UWES)

The survey selected to measure work engagement for the 2025 research was the Utrecht Work Engagement Scale (UWES), which was developed in 2003 by Schaufeli

and Bakker. Similarly to the Job Satisfaction Survey, the Utrecht Work Engagement Scale has been frequently used in public and private sectors and academia over the last 22 years. The UWES covers the main three areas of work engagement: vigor, dedication, and absorption (Schaufeli & Bakker, 2003). There are two options for the UWES, a full 17 question version and a shortened 9 question version. Since the 2025 research was to be directly compared to the 2010 results, the researcher chose to use the same 17 item survey as Gilliam.

The UWES responses are collected using a seven-point Likert scale. The available answer choices are:

0. Never
1. Almost Never (a few times a year or less)
2. Rarely (once a month or less)
3. Sometimes (a few times a month)
4. Often (once a week)
5. Very Often (a few times a week)
6. Always (every day)

It should be noted that Gilliam (2010) added the answer clarification in parentheses above. To preserve comparability across the two datasets, the 2025 researcher added the notes as well. The frequency format of the questions records the regularity of the survey respondents' experiences.

The UWES has been proven to be a reliable survey. In various studies, the UWES Cronbach alpha coefficients range from .78 to .9 across the vigor, dedication, and

absorption categories, which shows this is a reliable survey (Schaufeli, Bakker, 2003; Schaufeli, Salanova, Gonzalez-Roma, Bakker, 2002). Table 2 provides a UWES overview and summarizes the three main areas of work engagement studied.

Table 2. Utrecht Work Engagement Scale Summary

Category	Description	Sample Items
Vigor	"refer to high levels of energy and resilience, the willingness to invest effort, not being easily fatigued, and persistence in the face of difficulties"	"At my job, I feel strong and vigorous."
		"When I get up in the morning, I feel like going to work."
Dedication	"refer to deriving a sense of significance from one's work, feeling enthusiastic and proud about one's job, and feeling inspired and challenged by it"	"I am enthusiastic about my job."
		"My job inspires me."

Table 2. Continued

Absorption	"refer to being totally and happily immersed in one's work and having difficulties detaching oneself from it so that time passes quickly and one forgets everything else that is around"	"I am immersed in my work."
		"I get carried away when I am working."

Note: Utrecht Work Engagement Scale Summary content sources from the *UWES – Utrecht Work Engagement Scale: Test manual (*Schaufeli, Bakker 2003).

3. Work Factor Importance Questionnaire

The Job Satisfaction Survey and Utrecht Work Engagement Scale are thorough surveys in their respective areas, but they do not cover importance of individual work factors. To understand which factors are least to most important, a questionnaire was added to the survey instrument to be calculated on a five-point Likert scale. The available answers are:

1.Least Important

2. Less Important

3. Neutral

4. More Important

5. Most Important

The eleven questions consisted of the satisfaction factors (pay, promotion opportunities, supervisor relationship, benefits, recognition, operating policies, relationships, nature of work, communication, trust of the organization and work/life balance). Table 3 summarizes the items.

Table 3. Work Factor Importance Summary

Work Factor	Description
Salary/Pay	Fairness and competitiveness of pay
Promotion Opportunities	Chances for advancement and career growth
Supervisor Feedback/Relationship	Quality of leadership and support provided by direct supervisors
Benefits	Value of non-salary compensation such as health care, retirement, leave, etc.
Workplace Recognition & Rewards	Receiving appreciation, awards, or acknowledgement
Operating Policies & Procedures	Clarity of rules and requirements of organization
Coworker Relationships	Importance of cooperative and positive environment

Table 3. Continued

Nature of the Work Itself	Content of the work being executed
Communication Within Organization	How well the organization communicates with employees
Trust Within Organization	Level of trust of leaders within organization
Work-Life Balance	Ability to manage personal life with work obligations

C. Pilot Study

After the survey instrument was compiled (Demographic questions, Job Satisfaction Survey, Utrecht Work Engagement Scale and work factor importance), it was then approved by The University of Tennessee Institutional Review Board (IRB) which ensured it was an ethically sound survey to send to the sample population. Prior to the survey instrument being sent to the entire sample population, a pilot study was conducted. The purpose of the pilot study was to test the survey instrument to examine clarity of questions, ensure the SurveyMonkey platform worked correctly and to provide general feedback on their experience including how long the test group took to finish. The actual results of the pilot group were discarded and not examined; the goal was to test the instrument only. The researcher spoke with each pilot group member prior to the link being sent out to explain the process and make sure they had time to participate that week. The pilot survey link was emailed to ten Department of Defense employees in various generational cohorts and job roles. Less than 24 hours later, all ten members of

the pilot group had completed the pilot survey and provided feedback. It took the pilot group approximately 7 minutes on average to finish the questionnaire. The pilot process revealed a spelling error that was corrected prior to the final survey being sent. No major problems were identified with any of the portions of the survey.

An additional noteworthy observation from the pilot study was that four participants (40%) of the pilot study members requested to review the study's results when the research commenced. This feedback highlighted how important and relevant the results of this dataset are to members of the Department of Defense Scientist and Engineering workforce.

D. Sample Population

A total of 268 responses were collected by the researcher from the Department of Defense Scientists and Engineers in 2025. The link was emailed to the workforce of the Army CCDC Aviation and Missile Center (AvMC), formerly known as AMRDEC. After initial review, there were 240 valid responses that were used to create the final dataset. Twenty-eight survey responses were discarded due to surveys left unfinished or surveys with skipped questions.

E. Survey Distribution

After The University of Tennessee Institutional Review Board (IRB) approval and completion of the pilot study, the finalized survey was emailed to the full sample population of the Department of Defense scientists and engineers at the CCDC Aviation and Missile Center (approximately 850 emails total). The message included the IRB-

approved message of consent found in Appendix A: Survey Consent, which described the study, explained confidentiality and assured the sample population they were free to abandon the survey at any time with no repercussions.

The survey link remained open for two weeks. During this period, one reminder email was sent out on day seven to encourage those who wanted to take it but had forgotten or were not able to when the initial email was sent. Responses were anonymously collected in SurveyMonkey. SurveyMonkey proved to be an excellent tool to distribute the survey. There were no known or reported issues using the platform and the link was easily emailed to the population, which allowed the workers to participate (or not) anonymously and at their convenience.

F. Summary

This research builds on Gilliam's (2010) work but goes much further in three important ways. First, it updates the dataset and analysis to include Generation Z, who were not old enough to be studied in the baseline research. Second, it allows the researcher to directly compare the data across the span of fifteen years, which allows the study of how workplace attitudes have shifted within the varying generational cohorts. Third, it specifically focuses on Generation Z versus the older generations, which provides a clear view of if the group truly has different views and preferences.

The research as a whole provides leadership a better understanding of how job satisfaction and work engagement are viewed in the Department of Defense civilian scientist and engineer civilian workforce. The results from the study will both help

leaders understand generational patterns (or the lack thereof) and help inform policies to better manage and motivate a diverse workforce spread among four generations.

CHAPTER IV RESEARCH METHODOLOGY

A. Analysis Approach

The objective of this research is to evaluate generational differences in job satisfaction, work engagement and the importance of work factors. The research also aims to capture changes from Gilliam's 2010 baseline study to the current dataset. A quantitative approach, using statistical analysis of survey data, was used to evaluate the study hypotheses.

The plan for analysis is based on the three major group sets of hypotheses. Each set focuses on a unique, but related question about the Department of Defense civilian workforce. The questions the sets aim to answer are outlined below:

1. Generational Differences in 2025 H_0 - H_3:

Do the Baby Boomer, Generation X, Generation Y and Generation Z differ in their reported work factors, job satisfaction and/or work engagement? When studying the current DOD civilian workforce, are there differences in how the four independent generations view their job and engage with work?

2. Changes Over Fifteen Years (2010-2025) H_4- H_7:

Over the last fifteen years, have the levels of job satisfaction, work engagement and work factors shifted significantly? This set of hypotheses directly answers Gilliam's 2010 call that "the same respondents should be studied over a period of time as they grow older and progress through their career."

3. Generation Z Versus Other Cohorts H_8 - H_{11}:

Does Generation Z differ from the Baby Boomer, Generation X and Generation Y population in their job satisfaction, work engagement and work factors? Due to the fact that Generation Z was too young to be a part of the 2010 baseline study, this extension of work will help DOD leaders better manage and retain Generation Z workers.

In order to answer the above questions, this research uses Analysis of Variance (ANOVA) as the primary statistical tool. One-way Analysis of Variance will be applied to each dependent variable (work factors / job satisfaction / work engagement) with the independent factors being one of the four generations (Baby Boomer, Generation X, Generation Y or Generation Z), or year (2010 or 2025), depending on which hypothesis is being examined. For hypotheses involving Generation Z, Tukey's Honestly Significant Difference (HSD) from the generational ANOVA results will be used to determine if there is significant difference between Generation Z and another generational cohort.

Matching each independent hypothesis to a specific statistical test allows the results to be interpreted clearly and compared directly to Gilliam's 2010 baseline results.

B. Hypotheses By Group H_0 - H_{11}

1. Generational Differences (2025 workforce)

There are three respective groups of hypotheses to be tested in this research. The first section of study investigates potential age-related differences in the importance of work factors, work engagement and job satisfaction in the DOD Scientist and Engineering civil servant workforce. This set of hypotheses is an extension of Gilliam's (2010) generational framework. There is no single-source of truth that determines exact age ranges for generational cohorts. For the purposes of this study, we will be using the same

generational cohort age ranges as Gilliam's 2010 research. By using the exact generational cohort age range, it allows the researcher to do direct comparisons of the 2010 versus 2025 workforces. The survey population is divided into generational cohorts as follows: Baby Boomers (1944-1960, aged 65-81), Generation X (1961-1980, aged 45-65), Generation Y (1981-2000, aged 25-44) and Generation Z (2001-2012, aged 13-24). Gilliam's original study only included Baby Boomers, Generation X and Generation Y. At the time of his study, Generation Z was too young to enter the workforce and therefore the group was excluded from the results of the analysis. The present research extends Gilliam's framework by including Generation Z, which is important since they are a large portion of the 2025 Department of Defense civilian workforce.

This section of the research aims to determine whether meaningful generational differences exist across the three generational cohorts. This provides insight into how workforce attitudes have evolved as new generations of employees have entered the Department of Defense civilian workforce. Identifying the differences will help leadership tailor their management strategies, retention plans and engagement initiatives to meet the multigenerational needs of the entire workforce. The differences will also help Department of Defense leadership tailor plans for retention, training and leadership development in order to strengthen the current workforce and recruit and retain the best possible future workforce. The H_0 - H_3 hypotheses are displayed in Table 4.

Table 4. Hypotheses H_0 - H_3 Generational Differences

Hypothesis	Type	Statement
H_0	Null	Baby Boomers, Generation X, Millennials, and Generation Z **will not differ** in job satisfaction, work engagement, or importance placed on work factors in 2025.
H_1	Alternative	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in importance placed on work factors in 2025.
H_2	Alternative	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in job satisfaction levels in 2025.
H_3	Alternative	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in work engagement levels in 2025.

2. Changes Over Fifteen Years (2010-2025)

The second group of hypotheses, shown in Table 5, examines how attitudes on the importance of work factors, job satisfaction and work engagement have shifted during the fifteen-year period between Gilliam's 2010 baseline study and the present 2025 research. Gilliam's study was performed at a time when Generation Z was a maximum of about nine years old and had not entered the workforce yet. In 2010, Department of Defense teleworking infrastructure was essentially non-existent, and major global events such as

the COVID-19 pandemic had not yet reshaped how knowledge workers thought about work. Gilliam's baseline data provides both a baseline for current research, and a snapshot into the DOD civilian scientist and engineering workforce at a very different moment in time.

Having access to the 2010 dataset as well as the 2025 dataset creates a rare opportunity to close a gap in research and examine the same knowledge worker population across an extended period. The bulk of research in the field of generational cohorts and organization behavior relies on data collected at a single point in time, which constricts the researcher's ability to assess whether the results are due to change over time or an event that happened to influence the population in that moment. The opportunity to resample the same population 15 years later allows for a deeper examination of how workforce attitudes remain the same and/or evolve over time.

This long-term analysis is particularly useful for organizations such as the Department of Defense, where it is common practice to work their entire career within the DOD system as a civilian. Due to the culture of working their entire career as a civilian, the workforce is stable and studying the same group fifteen years later makes it possible to see how the different generational cohorts view their work, but also how the culture of the time and work events influence attitudes. Comparing Gilliam's 2010 baseline findings with 2025 research provides a rare opportunity to examine both what has remained consistent and what has changed within the DOD civilian workforce.

Table 5. Hypotheses H_4- H_7 Change Over Fifteen Years

Hypothesis	Type	Statement
H_4	Null	The importance of work factors, job satisfaction, and work engagement **will not differ** between 2010 and 2025.
H_5	Alternative	The importance of work factors **will differ** between 2010 and 2025.
H_6	Alternative	Job satisfaction levels **will differ** between 2010 and 2025.
H_7	Alternative	Work engagement levels **will differ** between 2010 and 2025.

3. Generation Z Versus Other Generational Cohorts (2025)

The third grouping of hypotheses, shown in Table 6, focuses on Generation Z, the youngest members of today's workforce. Since the maximum age of Generation Z was 9 years old when Gilliam's 2010 study was conducted, they were not old enough to be included in the dataset. The 2025 sample population includes Generation Z, which provides the opportunity to examine whether this generation differs significantly from Baby Boomers, Generation X and Generation Y.

By isolating Generation Z, the analysis allows for direct assessment of whether their job engagement and work satisfaction varies from the data gathered from their older co-workers. This view of Generation Z will allow the Department of Defense to better recruit, manage and retain younger knowledge workers. Due to Generation Z just

beginning to enter the workforce in large numbers, there are no known other studies focusing on the study of Generation Z Department of Defense scientists and engineers. The present research closes that gap. Studying this generational cohort now provides a baseline for future research to build upon to track how their views on work values, job satisfaction and work engagement change over time.

Table 6. Hypotheses H_8 - H_{11} Generation Z Versus Others

Hypothesis	Type	Statement
H_8	Null	Generation Z **will not differ** from Baby Boomers, Generation X, and Millennials in importance placed on work factors, job satisfaction, or work engagement.
H_9	Alternative	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in importance placed on work factors.
H_{10}	Alternative	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in job satisfaction levels.
H_{11}	Alternative	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in work engagement levels.

C. Statistical Analysis Plan

1. Generational Differences in 2025 H_0 - H_3:

One-way Analysis of Variance (ANOVA) will be executed on Job Satisfaction, Work Factors and Work Engagement with Generation (Baby Boomer, Generation Y, Generation X or Generation Z) as the independent factor to show statistically significant

differences. If the ANOVA p-value is less than .05, Tukey's HSD will be used to examine which groups differ.

2. Changes Over Fifteen Years (2010-2025) H_4- H_7:

One-way ANOVA will compare the 2010 baseline versus 2025 dataset results on Work Factors, Job Satisfaction and Work Engagement. Since there are only two groups being examined, the p value result will be identical to a t-test. For verification purposes, independent t-tests were conducted to confirm the ANOVA results are correct.

3. Generation Z Versus Other Cohorts H_8 - H_{11}:

One-way ANOVA testing will be done on Work Factors, Job Satisfaction, and Work Engagement with Generation as the factor for Generation X versus the entire 2025 workforce, then Tukey HSD analysis was conducted. The analysis will determine whether Generation Z differs from Baby Boomers, Generation X and/or Generation Y.

D. Reproducibility

To ensure reproducibility of the 2025 procedures, all statistical analysis was completed using the Python programming language. Analysis scripts were saved by the researcher to ensure that replication of the results presented in Chapter 5 is possible.

Raw data was exported from the SurveyMonkey platform to Microsoft Excel. The data was then cleaned, and incomplete surveys were discarded. Data files used for the statistical analysis were saved in a password-protected Excel file within a secured project folder. The Excel files were used to import the data into Python to run ANOVA testing and Tukey HSD. Excel was used as a tool to create figures and tables.

CHAPTER V RESULTS AND DISCUSSION

A. Results Overview

The primary goal of the present study was to build upon Gilliam's 2010 study of Department of Defense civilian Scientists and Engineers by researching generational differences in job satisfaction, work engagement and importance of work factors. Generation Z was not present in the baseline study and was added to the 2025 sample population in order to evaluate their levels of job satisfaction, work engagement and work factors and how they do/do not differ from other generational cohorts. There was also comparison between 2010 and 2025 datasets to compare across the time periods.

The results are broken into three main categories, organized by hypothesis topics. First, analysis for H_0 - H_3 examines generational differences in the 2025 Department of Defense workforce. This section covers whether Baby Boomers, Generation X, Generation Y and Generation Z currently report differences in job satisfaction, work engagement and importance of work factors compared to other generational cohorts. Second, H_4- H_7 analysis evaluates change over the last fifteen years, from Gilliam's 2010 baseline to the current 2025 dataset on the subjects of job satisfaction, work engagement and work factor importance. Lastly, there is analysis on the Generation Z group taken from the 2025 dataset to understand if the youngest cohort differs significantly from their older co-workers in the Baby Boomer, Generation X and Generation Y groups, or if they are more similar than different.

In order to assess these hypotheses, one-way Analysis of Variance (ANOVA) was performed for each dependent variable. After the H_0 - H_3 ANOVAs were run, the results were then used in a Tukey's HSD post-hoc test to reveal the specific differences in the results. To assess H_4- H_7, one-way ANOVA was performed using the year (2010 vs 2025) as the independent factor. To compare 2025 Generation Z versus all other cohorts (H_8 - H_{11}), the ANOVA results from the H_0 - H_3 tests were utilized, then Tukey's HSD was performed to determine if Generation Z had any differences that were statistically significant.

It is important to note that the Job Satisfaction Survey (JSS) purposely includes a combination of positive and negatively worded items. Every JSS item for the H_0 - H_3 and H_8 - H_{11} analysis in Python ANOVA and Tukey HSD was coded as they were scored, meaning the negatively worded items were not reverse coded. The researcher intentionally made this choice to uncomplicate the dataset and reduce the risk of data transformation errors and/or coding errors that could occur during the coding process. Due to this decision, higher scores on negatively worded items represent greater dissatisfaction.

The analysis for the H_4- H_7 hypotheses required using Gilliam's 2010 dataset, which had been reverse coded. The use of his already reverse coded dataset required the present researcher to reverse code the negatively worded items also in order to have a direct comparison to perform analysis.

B. Data Characteristics Summary

A total of 268 responses were collected by the researcher from the Department of Defense Scientists and Engineers in 2025. After review, there were 240 valid responses that were used to create the dataset. Twenty-eight survey responses were discarded due to surveys left unfinished or surveys with one or more skipped questions. The 2025 generational breakdown of the responses was: Generation Z (n = 44), Generation Y (n = 157), Generation X (n = 36) and Baby Boomers (n = 3). Due to the very small Baby Boomer population size, statistical analysis involving the Baby Boomer cohort should be interpreted with caution. The small number of survey respondents prevents meaningful generalizations about that cohort.

C. H_0 - H_3: 2025 Generational Differences Results

1. Work Factor Importance

The Work Factor Importance Questionnaire measured how the sample population valued eleven variables including work life balance, promotion availability, trust, coworker relationships, recognition, pay, organizational communication, benefits, supervisors, the content of their work, and operational policies. Each work factor was graded using a five-point Likert scale with options from 1 (Disagree very much) to 6 (Agree very much). One-way ANOVA analysis was performed with generational cohorts (Baby Boomers, Generation X, Generation Y and Generation Z) as the independent variable. The work factor ratings served as the dependent variables. After significance was found using ANOVA testing (results shown in Table 7), Tukey HSD was performed

on the results to determine which of the generational cohorts' results varied with true significance.

Table 7. Work Factor Questionnaire ANOVA Results

Survey Question	Df	sum sq	mean sq	F	p - value	Significant
Maintaining a Work/Life Balance	3	5.2018	1.7339	3.0690	0.0286	TRUE
Promotion Opportunities	3	5.2527	1.7509	2.4128	0.0674	FALSE
Trust within the organization	3	5.2036	1.7345	2.2920	0.0788	FALSE
Working Relationship with coworkers	3	2.8403	0.9468	1.2909	0.2781	FALSE
Recognition & Rewards for good work	3	3.2883	1.0961	1.2232	0.3019	FALSE
Pay / Salary	3	1.7825	0.5942	1.1424	0.3326	FALSE
Communication within the organization	3	2.6834	0.8945	0.8339	0.4764	FALSE
Benefits	3	1.4232	0.4744	0.8218	0.4830	FALSE
Supervision and Feedback (Relationship with Immediate Supervisor)	3	1.0565	0.3522	0.4503	0.7173	FALSE

Table 7. Continued

Nature of the Work Itself	3	0.4306	0.1435	0.1960	0.8991	FALSE
Operating Policies and Procedures	3	0.6438	0.2146	0.1904	0.9029	FALSE

The results of the ANOVA one-way test shown above in Table 7 show there was one category, maintaining a work/life balance, that showed statistical significance across generations with a p value of .0286. This outlier indicates that 90.9% of the work factors were viewed similarly across the generational cohorts, less the issue of work/life balance.

Post-hoc analysis shown in Table 8 on the work factor dataset revealed that the significant difference for maintaining work/life balance was driven by the Baby Boomer population when compared with their younger co-workers. Baby boomers rated maintaining a work/life balance as less important than Generation X (p = .0149), Generation Y (p = .0224) and Generation Z (p = .0344). These results indicate that the younger three generations (Generation X, Generation Y and Generation Z) value maintaining healthy boundaries that balance work and personal life. It is important to note, once again, that the results in this study highlighting Baby Boomer results should be interpreted with caution due to the low number of respondents (n = 3).

Table 8. Work Factor Tukey HSD Results

group1	group2	mean diff	p-value	reject	Survey Question

Table 8. Continued

Baby Boomer	Gen X	1.3590	0.0149	TRUE	Maintaining a Work/Life Balance
Baby Boomer	Gen Y	1.2616	0.0224	TRUE	Maintaining a Work/Life Balance
Baby Boomer	Gen Z	1.2222	0.0344	TRUE	Maintaining a Work/Life Balance

Overall, the analysis on work factors indicates that, other than work/life balance, the four generational cohorts within the Department of Defense scientist and engineering civilian population share similar priorities regarding work values.

2. Job Satisfaction Survey

The Job Satisfaction Survey (JSS) consisted of thirty-six items measured on a six-point Likert scale ranging from 1 (Disagree very much) to 6 (Agree Very Much). A one-way analysis of variance (ANOVA) was run to determine whether there were differences amongst the generational cohorts tested, Baby Boomers, Generation X, Generation Y and Generation Z. The Generation is the independent variable, and the dependent variables are the thirty-six JSS items being compared.

Table 9 displays the ANOVA results for all the job satisfaction items. Of the thirty-six total questions, seven items were demonstrated to be statistically significant with a score of $p<.05$. The differences were observed in categories related to organizational clarity, workload, fairness of supervisor and amount of pay.

Table 9. Job Satisfaction Survey ANOVA Results

Survey Question	df	Sum sq	Mean sq	F	p - value	Significant?
*The goals of the organization are not clear to me.	3	35.547	11.849	7.503	0.0001	TRUE
*I have too much to do at work.	3	28.341	9.447	6.250	0.0004	TRUE
*My supervisor is unfair to me.	3	9.418	3.139	4.214	0.0063	TRUE
I feel I am being paid a fair amount for the work I do	3	16.257	5.419	3.408	0.0183	TRUE
*My supervisor shows too little interest in the feelings of subordinates.	3	12.448	4.149	3.323	0.0204	TRUE
*I have too much paperwork.	3	16.328	5.443	3.305	0.0210	TRUE
*The pay I receive makes me feel unappreciated by the organization.	3	14.383	4.794	2.899	0.0357	TRUE

Table 9. Continued

I don't feel my efforts are rewarded the way they should be.	3	13.343	4.448	2.538	0.0572	FALSE
There are very few opportunities for promotion in my current position.	3	14.743	4.914	2.384	0.0699	FALSE
I am satisfied with my chances for promotion.	3	12.986	4.329	2.239	0.0844	FALSE
I feel satisfied with my chances for salary increases.	3	13.208	4.403	2.174	0.0917	FALSE
Pay raises are infrequent.	3	11.211	3.737	2.002	0.1144	FALSE
There is too much bickering and fighting at work.	3	7.798	2.599	1.752	0.1570	FALSE
I find I have to work harder at my job because of the incompetence of people I work with.	3	10.051	3.350	1.610	0.1876	FALSE
I like my supervisor.	3	4.362	1.454	1.598	0.1906	FALSE

Table 9. Continued

I am not satisfied with the benefits I receive.	3	7.296	2.432	1.508	0.2130	FALSE
I do not feel that the work I do is appreciated.	3	7.042	2.347	1.435	0.2331	FALSE
I often feel that I do not know what is going on with the organization.	3	6.800	2.267	1.262	0.2881	FALSE
Many of our rules and procedures make doing a good job difficult.	3	6.821	2.274	1.151	0.3291	FALSE
Communication within this organization is effective.	3	5.895	1.965	1.101	0.3494	FALSE
I receive appropriate recognition when I do a good job.	3	5.078	1.693	1.044	0.3736	FALSE
I feel a sense of pride in doing my job.	3	3.522	1.174	0.982	0.4017	FALSE
My supervisor is very capable in their role.	3	3.589	1.196	0.911	0.4361	FALSE

Table 9. Continued

Opportunities for advancement here are comparable to those in other organizations.	3	4.612	1.537	0.859	0.4629	FALSE
The benefits we receive are comparable to those offered by other organizations.	3	3.529	1.176	0.790	0.5005	FALSE
Those who do well on the job stand a fair chance of being promoted.	3	3.248	1.083	0.678	0.5662	FALSE
There are few/limited rewards for those who work here.	3	3.252	1.084	0.664	0.5752	FALSE
I sometimes feel my job is meaningless.	3	3.491	1.164	0.616	0.6054	FALSE
My efforts to do a good job are seldom blocked by redtape.	3	3.121	1.040	0.556	0.6443	FALSE
The benefit package we have is equitable.	3	1.883	0.628	0.546	0.6516	FALSE

Table 9. Continued

There are benefits we currently lack but should have.	3	2.340	0.780	0.487	0.6918	FALSE
Work assignments are not fully explained.	3	1.849	0.616	0.308	0.8199	FALSE
I enjoy my coworkers.	3	0.832	0.277	0.292	0.8310	FALSE
I find the work I do enjoyable.	3	1.080	0.360	0.205	0.8931	FALSE
My job is enjoyable.	3	0.817	0.272	0.164	0.9203	FALSE
I like the people I work with.	3	0.183	0.061	0.072	0.9747	FALSE

Analysis on the Table 9 shows significant generational differences in the following seven of the thirty-six items:

1. The goals of the organization are not clear to me
2. I have too much to do at work
3. My supervisor is unfair to me
4. I feel I am being paid a fair amount for the work I do
5. My supervisor shows too little interest in the feelings of subordinates
6. I have too much paperwork
7. The pay I receive makes me feel unappreciated by the organization

All items other than "I feel I am being paid a fair amount for the work I do" were negatively worded, meaning the respondent agrees more and reflects higher dissatisfaction.

Table 10 displays the post-hoc Tukey HSD comparisons that were taken from the significant ANOVA JSS results. All seven of the items ANOVA found significant had at least one pairing that was also found significant in the Tukey HSD test. Table 10. Job Satisfaction Survey Tukey HSD Resultsis listed in order from lowest to highest p-value to highlight the strongest and most significant differences in the data first. The below discussion of results will group the items to discuss the multiple pairings of item responses.

1. The goals of the organization are not clear to me:

This item resulted in three respective generational pairings (Gen Y vs. Gen Z, $p = .0018$; Baby Boomer vs. Gen Z, $p = .0031$; Gen X vs. Gen Z, $p = .0063$). Generation Z consistently scored higher than all other cohorts, meaning Generation Z agrees more than all other age categories that the goals of the organization are unclear.

2. I have too much to do at work

Two generational pairings were the outcome of this item. Generation Y vs. Generation Z, $p = .0002$ was the most significant difference in the job satisfaction data. Generation X versus Generation Z also proved to be a significant difference. The higher score indicates that Generation Z agreed with the statement that they feel they have too high of a workload. Older generations reported they feel their workload is less or more manageable.

3. My supervisor is unfair to me:

Significance was found in both Generation X vs. Generation Z ($p = .0038$) and Generation X vs. Generation Y ($p = .0237$) pairings. Generation Z's higher score on this negative item indicates they feel their leadership is less fair. Generation X employees responded with lower scores, meaning they are more satisfied with the fairness of their supervisors.

4. I feel I am being paid a fair amount for the work I do:

This is the only positively worded item in the Tukey HSD group that was significant. Higher scores for positively worded items equate to more agreement, meaning that Generation Y vs. Generation Z ($p = .0278$) displays that Generation Z shows that they feel they are paid less fairly than Generation Y perceives their pay.

5. My supervisor shows too little interest in the feelings of subordinates:

Significant differences were found between Generation X vs. Generation Z ($p = .0223$) and Generation X and Generation Y ($p = .0427$). Generation Z reported a higher agreement to this negatively worded item, showing that they view their supervisors lacking empathy or being less attentive than necessary to their workers. The older cohort, Generation X, responded with much lower agreement, indicating they feel more supported by their supervisors.

6. I have too much paperwork:

Generation X versus Generation Z ($p = .0232$) was found to be significant by Tukey HSD. Generation Z's elevated responses indicated higher levels of dissatisfaction with the amount of paperwork required for them to complete. This response may be linked to

Generation Z expecting a higher level of efficiency by utilizing digital platforms as opposed to their older co-workers.

7. The pay I receive makes me feel unappreciated by the organization:

The Generation Y vs. Generation Z comparison was significant (p = .0187). The higher scores on this negatively worded item indicate higher feelings of being undervalued. Generation Z was noted to feel they were not fairly paid, which corresponds with the fourth item listed above "I feel I am being paid a fair amount for the work I do." The redundancy of the two answers reinforces the understanding that Generation Z does not feel fairly compensated.

Table 10. Job Satisfaction Survey Tukey HSD Results

group1	group2	Mean diff	p-value	reject	Survey Question
Gen Y	Gen Z	-0.8896	0.0002	TRUE	*I have too much to do at work.
Gen Y	Gen Z	-0.7762	0.0018	TRUE	*The goals of the organization are not clear to me.
Boomer	Gen Z	-2.6222	0.0031	TRUE	*The goals of the organization are not clear to me.
Gen X	Gen Z	-0.6496	0.0038	TRUE	*My supervisor is unfair to me.

Table 10. Continued

Gen X	Gen Z	-0.9043	0.0063	TRUE	*The goals of the organization are not clear to me.
Gen X	Gen Z	-0.8291	0.0122	TRUE	*I have too much to do at work.
Gen Y	Gen Z	-0.6391	0.0187	TRUE	*The pay I receive makes me feel unappreciated by the organization.
Gen X	Gen Z	-0.7043	0.0223	TRUE	*My supervisor shows too little interest in the feelings of subordinates.
Gen X	Gen Z	-0.8051	0.0232	TRUE	*I have too much paperwork.
Gen X	Gen Y	-0.4414	0.0237	TRUE	*My supervisor is unfair to me.
Gen Y	Gen Z	0.5973	0.0278	TRUE	I feel I am being paid a fair amount for the work I do

Table 10. Continued

Gen X	Gen Y	-0.5289	0.0427	TRUE	*My supervisor shows too little interest in the feelings of subordinates.

3. Utrecht Work Engagement Scale

The Utrecht Work Engagement Scale (UWES) was used by the researcher to measure three sectors of work engagement on the DOD scientist and engineering civilian workforce: dedication, vigor and absorption. The survey administered consisted of seventeen statements rated on a seven-point Likert scale ranging from 1 (Disagree very much) to 6 (Agree very much). Each of the UWES item served as a dependent variable and the generational cohort (Baby Boomer, Generation X, Generation Y and Generation Z) served as the independent variable. One-way ANOVA testing was conducted to determine if the datasets from the DOD scientist and engineering civilian population contained differences that were statistically significant. Tukey HSD post-hoc tests were then conducted to single out the generational pairings that displayed statistical significance as shown in Table 11.

Table 11. UWES ANOVA Results

Survey Question	**df**	**sum sq**	**mean sq**	**p-value**	**Significant**

Table 11. Continued

It is difficult to detach myself from my job.	3	38.5120	12.8373	0.0011	TRUE
I can continue working for very long periods at a time.	3	14.8839	4.9613	0.0284	TRUE
Time flies when I'm working.	3	12.6109	4.2036	0.0800	FALSE
I feel happy when I am working intensely.	3	8.7639	2.9213	0.1817	FALSE
When I am working, I forget everything else around me.	3	9.1475	3.0492	0.1850	FALSE
To me, my job is challenging.	3	6.0050	2.0017	0.2945	FALSE
I find the work that I do full of meaning and purpose.	3	5.5978	1.8659	0.3563	FALSE

Table 11. Continued

At my job, I feel strong and vigorous.	3	4.7995	1.5998	0.4316	FALSE
I am proud of the work that I do.	3	3.9364	1.3121	0.4577	FALSE
I am enthusiastic about my job.	3	3.6899	1.2300	0.5202	FALSE
My job inspires me.	3	4.2928	1.4309	0.5276	FALSE
When I get up in the morning, I feel like going to work.	3	4.9470	1.6490	0.5495	FALSE
I am immersed in my work.	3	2.9961	0.9987	0.5627	FALSE
At my job, I am mentally resilient.	3	2.5919	0.8640	0.5737	FALSE
I get carried away when I'm working.	3	1.8111	0.6037	0.6993	FALSE
At my work, I feel bursting with energy.	3	1.7570	0.5857	0.8023	FALSE
At my work I always persevere, even when things do not go well.	3	0.9866	0.3289	0.8326	FALSE

Out of the seventeen statements in the Utrecht Work Engagement Scale, only two showed statistically significant differences:

1. It is difficult to detach myself from my job ($p = .0011$)

2. I can continue working for very long periods at a time ($p = .0284$)

Both statements that varied are bound under the absorption and vigor portion of the UWES and relate to how workers immerse themselves in work tasks over time.

Table 12 displays the Tukey HSD post-hoc comparisons which show that Generation X scored lower than Generation Y and Generation Z on two items:

1. It is difficult to detach myself from my job

Generation X scored lower than both generation Y ($p = .0212$) and generation Z ($p = .0004$). The scoring of this absorption statement is interpreted to mean that a higher score equals a higher agreement level, which equates to stronger mental immersion at work. The results show that younger generational cohorts have a harder time disconnecting from work. The results may possibly display the result of a continuous digital connectivity to younger generational cohorts.

2. I can continue working for very long periods at a time

Generation X scored lower than Generation Y ($p = .0167$). For this positively-worded statement, higher scored responses equate to increased stamina and energy at work. Generation Y reported higher vigor, while Generation X reported lower motivational endurance.

Table 12. UWES Tukey HSD Results

group1	group2	Mean diff	p-value	reject	Survey Question
Gen X	Gen Y	-0.6844	0.0167	TRUE	I can continue working for very long periods at a time.
Gen X	Gen Y	-0.7979	0.0212	TRUE	It is difficult to detach myself from my job.
Gen X	Gen Z	-1.3637	.0004	TRUE	It is difficult to detach myself from my job.

3. H_0 - H_3 Discussion

Overall, the results of the 2025 generational analysis (H_0 - H_3) discovered that statistically significant differences exist amongst the four generational cohorts working within the Department of Defense scientist and engineering civilian population. Across the three components of the survey instrument, there were statistical differences displayed in levels of job satisfaction, work engagement and importance of work factors.

The Job Satisfaction Survey uncovered the largest amount of differences in areas related to fairness of supervisor, workload, pay, and understanding of the organization. The Utrecht Work Engagement Scale dataset showed differences in vigor and absorption, with younger civilians showing higher levels of work immersion and energy, but also having a more difficult time detaching from work. The importance of Work Factor survey revealed that work/life balance varied greatly among the populations, with younger cohorts valuing the balance and flexibility more strongly than the older

generations. To summarize the outcomes discussed above, Table 13 provides an overview of the statistically significant findings through ANOVA and Tukey HSD analysis.

Across the three survey tools (Job Satisfaction Survey, Utrecht Work Engagement Scale, Work Factors Importance), there were a total of eighteen significant pairings identified through Tukey HSD post-hoc analysis following one-way ANOVA analysis. As shown in Table 13, the majority of the uncovered differences exist between younger and older cohorts, which indicates that there are meaningful generational differences among the DOD scientist and engineering civilian workforce.

Table 13. Hypotheses H_0 - H_3 Significant Findings Summary

Instrument	Significant Items (ANOVA)	Significant Pairings (Tukey HSD)	Interpretation
Work Engagement (UWES)	2	3	Generation X scored significantly lower than younger cohorts on: 1. I can continue working for long periods 2. It is difficult to detach myself from my job, both indicating lower vigor and absorption.

Table 13. Continued

Job Satisfaction Survey (JSS)	7	12	Differences primarily between younger (Gen Y, Gen Z) Gen X. Higher scores on negatively worded items indicate greater dissatisfaction among younger employees (workload, supervision, pay, clarity).
Work Factor Importance	1	3	Baby Boomers rated Maintaining a Work/Life Balance as less important than younger generations
Total	10	18	Majority of significant differences occurred between younger and older generations, suggesting significant variation in the 2025 workforce.

Table 14 displays the hypotheses results examined for the 2025 dataset. The null hypothesis and three alternatives are displayed.

Table 14. Hypotheses H_0 - H_3 Results

Hypothesis	Type	Conclusion	Statement	Evidence
H_0	Null	Reject	Baby Boomers, Generation X, Millennials, and Generation Z **will not differ** in job satisfaction, work engagement, or importance placed on work factors in 2025.	All three categories differed significantly
H_1	Alternative	Accept	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in importance placed on work factors in 2025.	Work/life balance differed significantly
H_2	Alternative	Accept	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in job satisfaction levels in 2025.	Seven items differed significantly

Table 14. Continued

H_3	Alternative	Accept	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in work engagement levels in 2025.	Two UWES item differed significantly

D. H_4- H_7: Change over Fifteen Years Results

This section is an extenuation of Gilliam's 2010 research. The methods used in this section replicate Gilliam's methods to ensure items are calculated in the same manner. Hypotheses H_4- H_7 do not include Generation Z, since they were too young to be a part of the workforce in 2010 during Gilliam's baseline study.

1. Work Factor Importance

A one-way ANOVA comparing the results from the Work Factors Questionnaire from 2010 and 2025 revealed there are three statistically significant differences. The differences shown in Table 15 reveal the differences are categorized as recognition and rewards for good work, operating policies and procedures and benefits. Mean scores for recognition and rewards decreased from 3.67 in 2010 to 3.46 in 2025 with a p value of .0115. This shows that Generation Y places less emphasis on rewards systems and recognition than they did in the baseline dataset. Operating procedures and policies also declined from 3.25 to 2.92 in 2025, which shows that there is an increase in frustration in how the Department of Defense is operating.

Benefits revealed a statistically significant increase in work factor importance for Generation Y, climbing up from 3.82 to 4.10 with a p value of .0336. This result indicates that in 2025, Generation Y places a greater emphasis on financial and non-financial benefits. This could be due to inflation issues of the economy, or a gradual shift in attitudes about pay and compensation. Taken together, these items show that Generation Y values recognition and fair system, but their shift has moved to items such as strong benefits and flexible policies. This is a possible issue for the Department of Defense, which is known to have more of a rigid structure.

Table 15. 2010-2025 Generation Y Work Factor Importance

Work Factor	Generation	2010 Mean	2025 Mean	2025 - 2010	df	sum_sq	mean_sq	F	p-value
Recognition & Rewards for good work	Gen Y	3.670	3.462	-0.208	1	3.8125	3.8125	5.9500	0.0115
Operating Policies and procedures	Gen Y	3.250	2.924	-0.326	1	6.0016	6.0016	5.4874	0.0199

Table 15. Continued

Benefits	Gen Y	3.820	4.101	0.281	1	1.8159	1.8159	2.8334	0.0336

A one-way ANOVA, shown in Table 16, comparing responses from the 2010 and 2025 dataset found one work factor to be of statistical significance: benefits. The Mean score rose from 4 in 2010 to 4.31 in 2025, which represents a .31 upward shift on the seven point scale over the last fifteen years. This indicates that the Generation X cohort working for the Department of Defense now view benefits such as healthcare as more critical components than they did fifteen years ago.

Table 16. 2010-2025 Generation X Work Factor Importance

Work Factor	**Generation**	**2010 Mean**	**2025 Mean**	**2025-2010**	**df**	**sum_sq**	**mean_sq**	**F**	**p-value**
Benefits	Gen X	4.0000	4.3080	0.3080	1	3.0465	3.0465	9.2772	0.0030

Table 17 displays the changes in 2010 versus 2025 dataset for the comparison of work factor importance as it relates to Baby Boomers. As shown, none of the factors examined were found to be statistically significant, with all p-values scoring above .05. There is stability across all eleven measured items. Very small shifts are visible for trust within an organization (+.36 points on a 6-point scale) and work/life balance, which declined by -.92, but these variations were not large enough to reach statistical significance. Table 17 leads the researcher to conclude that the Baby Boomer cohort has stabilized their views as they near or enter retirement.

Table 17. 2010-2025 Baby Boomer Work Factor Importance

Work Factor	Gen	2010 Mean	2025 Mean	2025-2010	df	Sum_sq	Mean_sq	F	p-value
Trust within the Organization	Baby Boomer	3.9700	4.3300	0.3600	1	1.6220	1.6220	3.0890	0.1042
Supervision and Feedback (Relationship with Immediate Supervisor)	Baby Boomer	3.8200	3.3300	-0.4900	1	2.1801	2.1801	2.5266	0.1220
Maintaining a Work/Life Balance	Baby Boomer	4.2500	3.3300	-0.9200	1	2.1870	2.1870	2.5233	0.1225
Communication within the Organization	Baby Boomer	3.6800	4.0000	0.3200	1	1.2240	1.2240	2.3369	0.1490
Recognition & Rewards for good work	Baby Boomer	3.8500	3.6700	-0.1800	1	0.3898	0.3898	0.7451	0.3936

Table 17. Continued

Nature of the Work Itself	Baby Boomer	4.1900	4.3300	0.1400	1	0.4110	0.4110	0.7845	0.4102
Working relationships with Coworkers	Baby Boomer	4.0900	4.0000	-0.0900	1	0.1920	0.1920	0.3600	0.5560
Operating Policies and procedures	Baby Boomer	3.2500	3.3300	0.0800	1	0.0399	0.0399	0.0414	0.8395
Promotion Opportunities	Baby Boomer	3.4600	3.3300	-0.1300	1	0.0365	0.0365	0.0298	0.8634
Pay / Salary	Baby Boomer	4.0400	4.0000	-0.0400	1	0.0063	0.0063	0.0133	0.9087
Benefits	Baby Boomer	4.0000	4.0000	0.0000	1	0.0027	0.0027	0.0050	0.9439

2. Job Satisfaction Survey

It is important to note that to correctly test the H_4 and H_6 Job hypotheses regarding job satisfaction, the researcher was required to reverse-code the responses to the negatively worded items on the JSS. The 2010 provided data was reverse coded for negatively worded items and to maintain consistency, reverse coding was required for the JSS 2025 dataset as well. Reverse coded items are marked with an asterisk.

One-way ANOVA comparing Generation Y 2010 datasets to 2025 revealed statistically significant changes on ten Job Satisfaction Survey items. Table 18 summarizes the results below showing the survey question, generation, sum of squares, mean squares, F value, P value and the 2010 and 2025 means.

Table 18. 2010-2025 Generation Y Job Satisfaction

Survey Question	Generation	sum_sq	mean_sq	F	p - value	2010 mean	2025 mean
I feel I am being paid a fair amount for the work I do	Gen Y	45.2322	45.2322	30.1171	0.0001	4.9800	4.1582

Table 18. Continued

The benefits we receive are comparable to those offered by other organizations.	Gen Y	25.1079	25.1079	19.1206	0.0001	4.7400	4.0380
*My supervisor shows too little interest in the feelings of subordinates.	Gen Y	19.2165	19.2165	14.5214	0.0002	4.8300	4.7000
*There is too much bickering and fighting at work.	Gen Y	21.3080	21.3080	13.1013	0.0004	4.1700	4.6154
*Many of our rules and procedures make doing a good job difficult.	Gen Y	26.7028	26.7028	12.5790	0.0005	2.8500	2.8000

Table 18. Continued

I find the work I do enjoyable.	Gen Y	12.9280	12.9280	9.6319	0.0021	4.7600	4.4000
*The goals of the organization are not clear to me.	Gen Y	14.6511	14.6511	8.3719	0.0041	4.2100	4.4872
*I have too much paperwork.	Gen Y	13.2347	13.2347	7.8629	0.0054	3.2900	3.1282
*There are few/limited rewards for those who work here.	Gen Y	9.8781	9.8781	5.8467	0.0163	3.9700	3.7436
I feel satisfied with my chances for salary increases.	Gen Y	10.1270	10.1270	5.8426	0.0163	4.2900	3.6962

Across the ten significant items (there were thirty-six total JSS questions), eight show decline from 2010-2025. The largest decrease occurred on the item "I feel I am being paid a fair amount for the work I do," which declined from 4.98 to 4.15 $p < .001$). The

next largest decrease was opinions on benefits (mean Δ = -.70, $p < .001$), and potential for salary increases (mean Δ = -.59, $p = .016$). The scores indicate that in 2025, Generation Y employees feel notably less satisfied with pay and compensation packages and benefits. Moderate changes for the 2025 Generation Y dataset also showed promotion opportunities, recognition and work enjoyment declines.

Two areas indicated there was an improvement: "there is too much bickering and fighting at work," which increased .45 points, and "the goals of the organization are not clear to me, which increased .28 points. The results reveal increased satisfaction in less bickering and a better understanding of the goals of their organization.

Overall, the Generation Y results reveal a workforce that is positive but shows declining satisfaction in the areas of pay, benefits, advancement and recognition. This decline is balanced by a slight increase in understanding of organizational goals and interpersonal climate.

One-way ANOVA was performed on the 2010 versus 2025 Job Satisfaction Survey results for Generation X, which showed five items that shifted significantly over the fifteen-year period, with their p value < .05. All negatively worded items are denoted by an asterisk, so that higher mean scores show higher satisfaction. Across many of the items that showed statistical significance, satisfaction overall declined in 2025 relative to 2010. The largest decrease occurred in the following items: "pay raises are infrequent" (mean Δ = -.70, $p = .006$) and "there are few/limited rewards for those who work here (mean Δ = -.59, $p = .023$) and satisfaction with the opportunity for pay increases (Δ = -.5,

p = .024). These scores indicate that in 2025, Generation X civilians feel less recognized and less optimistic about their pay and advancement opportunities.

The only item to show a positive change was "there is too much bickering at work" (Δ = +.46, p = .048), which shows an increased satisfaction in the amount of bickering or conflict in the workplace. Overall, Generation X suggests a shift of being less satisfied with their work environment than they were in 2010. Results are shown on Table 19.

Table 19. 2010-2025 Generation X Job Satisfaction

Survey Question	**Generation**	**sum_sq**	**mean_sq**	**F**	**p - value**	**2010 mean**	**2025 mean**
*Pay raises are infrequent.	Gen X	14.8363	14.8363	7.9508	0.0056	4.1100	3.4103
I am satisfied with my chances for promotion.	Gen X	11.1902	11.1902	5.4868	0.0209	3.8200	3.2821

Table 19. Continued

*There are few/limited rewards for those who work here.	Gen X	8.5687	8.5687	5.3289	0.0227	4.3300	3.7436
I feel satisfied with my chances for salary increases.	Gen X	11.4918	11.4918	5.2405	0.0239	4.1200	3.5897
*There is too much bickering and fighting at work.	Gen X	8.7052	8.7052	4.0053	0.0477	4.1600	4.6154

A one-way ANOVA comparing 2010 to 2025 datasets on the responses to the same Job Satisfaction Survey questions revealed a single statistically significant decrease reported in the pride that Baby Boomers feel in their roles, shown in Table 20. Mean satisfaction scores declined from 5.35 in 2010 to 4.33 in 2025, representing a drop of over one point on the 6-point Likert scale. Although the small baby boomer response population in

2025 (n =3) limits the statistical significance of this find, the sharp contrast in the change of responses suggests that the oldest generational cohort working for the Department of Defense feel less pride in their work than in 2010.

Table 20. 2010-2025 Baby Boomer Job Satisfaction

Survey Question	Generation	Sum_sq	Mean_sq	F	P - value	2010 Mean	2025 Mean
I feel a sense of pride in doing my job.	Boomer	2.9589	2.9589	4.1163	0.0463	5.3500	4.3333

3. Utrecht Work Engagement Scale

All Utrecht Work Engagement Scale items for Generation Y fell within expected statistical patterns, with larger mean decreases corresponding with larger F ratios and smaller p values, which confirms consistency throughout the results. The majority of the items that were shown to be statistically significant in Table 21 (vigor, absorption and dedication) all decreased in the last fifteen years. This suggests there has been reduced work engagement. Work engagement questions related to perseverance and resilience maintained stable, indicating that the Generation Y sense of purpose and dedication to their job remained stable.

Table 21. 2010-2025 Generation Y UWES Results

Survey Question	Gen-eration	df	sum_sq	mean_sq	F	p-value	number	2010 mean	2025 mean
I feel happy when I am working intensely.	Gen Y	1	45.6153	45.6153	33.1254	0.000001	9	4.67	3.82
When I get up in the morning, I feel like going to work.	Gen Y	1	45.2597	45.2597	20.3023	0.00001	8	3.43	2.89
When I am working, I forget everything else around me.	Gen Y	1	36.3245	36.3245	19.9900	0.00001	6	3	2.65
Time flies when I'm working.	Gen Y	1	27.6798	27.6798	16.2549	0.0001	3	4	3.59
I can continue working for very long periods at a time.	Gen Y	1	20.1786	20.1786	13.1523	0.0003	12	4.12	3.58

Table 21. Continued

It is difficult to detach myself from my job.	Gen Y	1	27.1468	27.1468	12.0007	0.0006	16	2.69	2.24
At my work, I feel bursting with energy.	Gen Y	1	15.4478	15.4478	9.4278	0.0024	1	3.45	3.07
I am immersed in my work.	Gen Y	1	11.8838	11.8838	9.3142	0.0025	11	4.03	3.75
I get carried away when I'm working.	Gen Y	1	12.3965	12.3965	8.2751	0.0043	14	3.41	3.01
At my job, I feel strong and vigorous.	Gen Y	1	10.7175	10.7175	7.7030	0.0059	4	3.62	3.28
My job inspires me.	Gen Y	1	9.8889	9.8889	5.7846	0.0169	7	3.67	3.35
I am enthusiastic about my job.	Gen Y	1	7.8490	7.8490	5.6414	0.0183	5	4.09	3.79
To me, my job is challenging.	Gen Y	1	7.4710	7.4710	5.0127	0.0260	13	3.97	3.77

A one-way ANOVA comparing the 2010 versus 2025 Generation X dataset (Table 22) for the item “at my job I am mentally resilient” revealed that there was a statistically significant increase in work engagement ($p = .0408$) with mean scores raising from 3.97

to 4.18 in 2025. The upward trend is moderate, but still notable. The .21 increase on the 6-point Likert scale shows that there has been an improvement in the Generation X cohort's mental resilience.

Table 22. 2010-2025 Generation X UWES Results

Survey Question	Generation	df	sum_sq	mean_sq	F	p-value	number	2010 mean	2025 mean
At my job, I am mentally resilient.	Gen X	1	5.9309	5.9309	4.2811	0.0408	15	3.97	4.18

ANOVA analysis examining the 2010 versus 2025 dataset revealed that the Baby Boomer population was very consistent over the last fifteen years. One statistically significant difference, shown on Table 23 was discovered on the Utrecht Work Engagement Scale item "time flies when I'm working," ($p = .0307$). The score declined from 4.63 to 3.33, which is a 1.3 point decline on the six-point Likert scale. This decrease indicates that the Baby Boomer population experiences less absorption in 2025 than they did in 2010.

Table 23. 2010-2025 Baby Boomer UWES Results

Survey Question	Generation	df	sum_sq	mean_sq	F	p-value	2010 mean	2025 mean
Time flies when I'm working.	Boomer	1	4.7832	4.7832	4.8617	0.0307	4.63	3.33

3. H_4- H_7 Discussion

Over the last fifteen years, Generation X's outlook shifted moderately downward on views tied to their pay/compensation, promotion and recognition. The pattern suggests that mid-career employees (Generation X is currently 45 – 65 years old), are moderately less optimistic and feel less rewarded than they did in 2010. Statistically, five items with statistical significance ($p < .05$) occurred, but the size of the differences is minimal, representing an 8% to 10% shift on the 1-6 Likert scale. However, despite these moderate declines in job satisfaction, generation X displayed signs of improved work engagement over the same time period. The Utrecht Work Engagement Scale highlighted one large change in the area of mental resilience. The mean score increased from 3.97 in 2010 to 4.18 in 2025 ($p = .041$). The upward trend shows that Generation X are more flexible and adaptable to change. Although the other UWES items remained stable, the pattern shows that the Generation X cohort continues to show consistent levels of dedication, vigor, absorption and a small rise in resilience.

The analysis for the Baby Boomer generation revealed there was one significant change over the fifteen-year period. The one-way ANOVA analysis compared 2010 and 2025 data to reveal a p- value of .046 when comparing answers for "I feel a sense of pride in doing my job". Mean satisfaction declined in that area from 5.35 to 4.33 in 2025, representing a decline of approximately one point on the 1-6 Likert scale. Although the small ($n = 3$) 2025 Baby Boomer sample population limits the ability to generalize the cohort based on their answers, the direction of change is notable. It suggests that the Baby Boomer population experiences lower pride in their work than

they did fifteen years ago. Results from the Utrecht Work Engagement Scale were consistent with the pattern shown in the Job Satisfaction Survey, showing no statistically significant increases in vigor, dedication or absorption in the Baby Boomer population. Overall, the trend shows that the Baby Boomer generational cohort is starting to disconnect from their emotional and motivational connection to work as they prepare for retirement.

Generation Y employees indicated moderate, yet statistically significant declines in job satisfaction over the years of 2010 and 2025. The most severe decline was in the areas of pay and compensation, benefits, recognition and opportunities to be promoted. Generation Y reported slight improvement in "bickering in the workplace" and their understanding organizational goals. Taken altogether, the pattern indicates that Generation Y Department of Defense civilian scientists and engineers are engaged but concerned with the financial parts of their careers the most. Results from the UWES support the results from the Job Satisfaction Survey. Across almost all of the UWES items (13 of the 17 items), Generation Y had a decrease in scores from 2010 to 2025, with the most prominent declines in the area of vigor and absorption (happiness when working intensely, energy levels and enthusiasm). The consistent downward shifts show that Generation Y Department of Defense civilians are less excited day-to-day and are less immersed in their work as opposed to fifteen years ago. As a whole, the patterns show that Generation Y is dedicated to their jobs, but has experienced a reduction in their motivation. Results from the Work Factor Importance Questionnaire reinforce this conclusion, Generation Y employees displayed statistically significant differences in

three key areas: recognition and rewards, operating policies and benefits. Generation Y places less value on formal recognition and organizational procedures and greater emphasis on benefits and stability.

Table 24 summarizes the statistically significant differences revealed from the analysis between Gilliam's 2010 dataset and the 2025 results. The table consolidates all of the statistically significant ANOVA findings from the three survey instruments used.

Table 24. Hypotheses H_4–H_7 Significant Findings Summary

Survey Instrument	Significant Items (ANOVA)	Interpretation
Work Factor Importance	4 (3 Gen Y, 1 GenX)	Gen Y = value benefits more, value recognition less Gen X = value benefits more
Job Satisfaction Survey	16 (10 Gen Y, 5 Gen X, 1 Baby Boomer)	Overall = declined satisfaction on benefits, pay, recognition Baby Boomer = less work pride
Utecht Work Engagement Scale	15 (13 Gen Y, 5 Gen X, 1 Baby Boomer)	Gen Y = decline in vigor & absorption Gen X = resilience improved Baby Boomer = absorption decreased

Results for the H_4- H_7 hypotheses are displayed on Table 25.

Table 25. Hypothesis H_4- H_7 Results

Hypothesis	Type	Conclusion	Statement	Evidence
H_4	Null	Reject	The importance of work factors, job satisfaction, and work engagement **will not differ** between 2010 and 2025.	All three categories differed significantly
H_5	Alternative	Accept	The importance of work factors **will differ** between 2010 and 2025.	Benefits, Recognition & Rewards and Operating Policies differed significantly
H_6	Alternative	Accept	Job satisfaction levels **will differ** between 2010 and 2025.	Sixteen JSS items differed significantly

Table 25. Continued

H_7	Alternative	Accept	Work engagement levels **will differ** between 2010 and 2025.	Fourteen UWES items differed significantly

E. H_8 - H_{11} Generation Z Differences

The 2025 dataset allowed specific testing to understand whether Generation Z differs from the other generational cohorts that make up the Department of Defense scientist and engineer workforce in the areas of:

1. Importance of work factors
2. Job satisfaction
3. Work engagement.

Hypotheses H_8 - H_{11} isolates the Generation Z responses and evaluates its pairing against Baby Boomers, Generation X and Generation Y using Tukey HSD analysis, which was drawn from the one-way ANOVAs displayed in Table 7, Table 9 and Table 11. Across the three instruments utilized (Work Importance Factor Questionnaire, Job Satisfaction Survey and Utrecht Work Engagement Scale), eighteen statistically significant generational pairings were identified. Twelve of the eighteen (66.7%) pairings featured Generation Z. This heavy concentration on Generation Z displays the youngest generational cohort as the main source of generational differences in 2025.

1. Work Factor Importance

The Work Factor Importance questionnaire was a measurement of how civilian employees across the four cohorts (Baby Boomers, Generation X, Generation Y and Generation Z). The questionnaire studied how the different cohorts viewed key work issues such as recognition, work environment, supervisors, communication, pay, promotion and work/life balance.

The one-way ANOVA results on Table 7 identifies only one statistically significant factor across the various generations: work/life balance. Tukey HSD testing was done post-hoc to determine the exact pairing that caused the statistically significant results. It was found that the difference was driven by Baby Boomers view on work/life balance versus all other cohorts. Table 26 shows the results as they relate to Generation Z with p = .0344. Baby boomers rated the importance of maintaining work/life balance much lower than Generation Z.

Table 26. Generation Z Work Factor Tukey HSD

group1	group2	mean diff	p-value	reject	Survey Question
Boomer	Gen Z	1.2222	0.0344	TRUE	Maintaining a Work/Life Balance

The researcher chose to explore the results including the Baby Boomer population, but it should be noted that due to the low number of respondents, n = 3, results including Baby Boomers should be interpreted and used with caution.

Generation Z scored an average much higher than Baby Boomers, meaning that the younger generation places a higher value on work/life balance than the Baby Boomer population. Baby Boomers have a notoriously strong work ethic, which comes with difficulty balancing work with family life (Cennamo & Gardner 2008). This type of work does not parallel with Generation Z's weight on the importance of work/life balance. Baby boomers are used to the "old days" of 9-5 in office work. Baby Boomers are now between 65 and 81 years old, with their child-rearing years behind them and likely enough time to devote as much energy as they would like to work. Generation Z entered the workforce at a time where mental health is widely discussed and hybrid work environments are available, which is a stark contrast to the Baby Boomer experience. Generation Z is full of young adults in the stage of early marriage and young children. The statistically significant result shown above leads us to believe that to Generation Z, work/life balance is a requirement, not a luxury.

2. Job Satisfaction Survey

The Job Satisfaction Survey ANOVA results, Table 9, identified seven items that were statistically significant, which explained the areas in which generational cohorts differ in their opinions as civilians for the Department of Defense. After the one-way ANOVA was utilized, Tukey HSD was performed on the dataset to confirm that ten out of the twelve statistically significant pairings involved Generation Z, shown on Table 27. The confirmation that 83.3% of the significant pairings involved Generation Z showed that the youngest cohort differs vastly from Baby Boomers, Generation X, Generation Y and in multiple areas of job satisfaction.

It is important to note that the Job Satisfaction Survey contains both positive and negatively worded items that were all coded consistently without reverse coding during analysis. Due to this nuance, the higher scores on negatively worded items reflect higher levels of dissatisfaction and higher scores on positively worded items represent higher satisfaction. This framework is crucial for interpretation of the differences across the JSS items. Negatively worded items are noted below with an asterisk.

Table 27. Generation Z JSS Tukey HSD Results

group1	group2	mean diff	p-value	reject	Survey Question
Gen Y	Gen Z	-0.8896	0.0002	TRUE	*I have too much to do at work.
Gen Y	Gen Z	-0.7762	0.0018	TRUE	*The goals of the organization are not clear to me.
Baby Boomer	Gen Z	-2.6222	0.0031	TRUE	*The goals of the organization are not clear to me.
Gen X	Gen Z	-0.6496	0.0038	TRUE	*My supervisor is unfair to me.
Gen X	Gen Z	-0.9043	0.0063	TRUE	*The goals of the organization are not clear to me.

Table 27. Continued

Gen X	Gen Z	-0.8291	0.0122	TRUE	*I have too much to do at work.
Gen Y	Gen Z	-0.6391	0.0187	TRUE	*The pay I receive makes me feel unappreciated by the organization.
Gen X	Gen Z	-0.7043	0.0223	TRUE	*My supervisor shows too little interest in the feelings of subordinates.
Gen X	Gen Z	-0.8051	0.0232	TRUE	*I have too much paperwork.
Gen Y	Gen Z	0.5973	0.0278	TRUE	I feel I am being paid a fair amount for the work I do

The areas of consistent difference amongst Generation Z and other cohorts could be grouped into four main categories: workload, supervisor fairness and empathy, organizational communication and compensation issues.

1. Workload

The largest and most consistent statistically significant difference between Generation Z and other cohorts were related to workload. Generation Z responded with much higher agreement with the negatively worded statement on the JSS statements: I have too much work to do (Generation Y vs. Generation Z, p = .0002) and I have too much paperwork (Generation X vs. Generation Z, p = .0122). Generation Z scored much higher on both of the pairings which shows that Generation Z feels substantially more overloaded by their work than Generation Y and Generation X. Both differences are statistically significant, but the Generation Y vs. Generation Z comparison (p = .0002) is the most pronounced in the entire 2025 JSS dataset. The pattern and strong statistical significance suggest that Generation Z DOD scientist and engineer civilians find the volume of work, pace or intensity of the tasks to be more demanding than their older co-workers. This view could be influenced by several potential factors including being "new to the job" and differences in cultural expectations. Generation Z employees are the youngest generational cohorts in the workforce, with the oldest members of the group being approximately 24 years old. Given their recent onboarding with the Department of Defense, it is possible they are still developing strategies to handle time management and workload. Cultural expectations could also pay a big part of the difference in responses between Generation Z and others regarding workload. Younger workers are known to place a higher value on mental health and work/life balance, as shown in Table 8. Therefore, what older generations feel is normal may feel overwhelming or too much to Generation Z.

2. Supervisor Fairness and Empathy

Statistically significant differences were observed the Generation Z cohort in supervisor-related items such as “My supervisor is unfair to me” (Generation X vs. Generation Z, p = .0038) and “My supervisor shows too little interest in the feelings of subordinates” (Generation X vs. Generation Z, p = .0223). The higher Generation Z scores indicate that the cohort feels their leaders have lower levels of empathy and fairness than their older co-workers. This group of items uncovers a potential gap in the current communication and leadership style of supervisors versus Generation Z expectations. Generation Z desires a clear understanding of the parameters and expectations of their job and desire consistent communication with their supervisors and appreciates transparency. Frequent check-ins provide a feedback loop that Gen Z highly values. (Western Governors University, 2021). Generation X is looked at as independent and enjoying autonomy (Cennamo & Gardner 2008). There is a disconnect since Generation X likely prefers traditional styles of leadership that does not line up with Generation Z’s preferences.

3. Organizational Communication

The third and final area of the JSS affecting Generation Z is based on communication and clarity within the Department of Defense organization. Generation Z scored noticeably higher on “The goals of this organization are not clear to me” than Generation Y (p = .0018) and Generation X (p = .0063). The results show that the young employees do not understand the Department of Defense’s long-term mission as well as feel out of the loop with day-to-day communication within their smaller organization. It should be noted that the Department of Defense has historically always been known for a “top down” management style, where communications are formal and come from very high levels of

leadership. Generation Z has expectations for continuous feedback and open communication, and those needs are not being met.

4. Compensation Issues

The results for compensation-related items further highlight the differences between Generation Z and the older cohorts (Baby Boomers, Generation X and Generation Y). There were two pay-related items in the JSS that Generation Z varied significantly: "the pay I receive makes me feel unappreciated by the organization" (Generation Y vs. Generation Z, $p = .0187$) and "I feel I am being paid a fair amount for the work I do" (Generation Y vs. Generation Z, $p = .0278$). Generation Z scored lower on the positively worded statement and higher on the negative statement, both indicating a consistent feeling of being paid too little for the work being done. The Department of Defense understands the issue of civilian workers being paid less than contractor counterparts and justify the lower pay with benefits such as low priced healthcare and a pension.

3. Utrecht Work Engagement Scale

Table 11 displays the Utrecht Work Engagement Scale ANOVA results, which featured one main item of significance involving Generation Z, "It is difficult to detach myself from my job." This is displayed on Table 28, which shows the two groups, mean differences, p value (which showed statistical significance), if the hypothesis was rejected and the survey question.

Table 28. Generation Z UWES Tukey HSD Results

group1	group2	mean diff	p-value	reject	Survey Question
Gen X	Gen Z	-1.3637	0.0004	TRUE	It is difficult to detach myself from my job.

The Tukey HSD analysis on the pairing identified that Generation Z scored 1.36 points higher than Generation X on the Likert Scale (1-7). A 1.36 change on a 1-6 scale is a large variation, which is a statistically significant finding. The strong .0004 p-value validates there is a low probability the difference is random. The UWES categorizes this question under the absorption category and can be explained that Generation Z has a much more difficult time "turning off" work than Generation X.

3. H_8 - H_{11} Discussion

Overall, the results of H_8 - H_{11} reveal that Generation Z represents a very clear departure from the work attitudes of the older generational cohorts within the Department of Defense civilian workforce. Across all three measurement instruments, The Job Satisfaction Survey, The Utrecht Work Engagement Scale and the Work Factor Importance Questionnaire, Generation Z consistently displayed statistically significant differences from their older co-workers as shown in Table 29 below.

Table 29. Hypotheses H_8 - H_{11} Significant Findings Summary

Instrument	Significant Items (ANOVA)	Significant Pairings (Tukey HSD)	Interpretation
Job Satisfaction Survey (JSS)	7	10	Generation Z differed significantly from Gen X and Gen Y on **workload, supervision, organizational clarity, and pay**. This shows feelings of "too heavy" workloads, less fairness and empathy from supervisors, lack of understanding of organizational goals and feeling underpaid/ undervalued.

Table 29. Continued

Work Engagement (UWES)	2	1	Generation Z scored significantly higher than Generation X on "It is difficult to detach myself from my job" ($p = .0004$). indicating stronger absorption and greater psychological involvement in work.
Work Factor Importance Questionnaire	1	1	Compared to Baby Boomers, Generation Z rated Maintaining a Work/Life Balance as more important ($p = .0344$), reinforcing their stronger preference for flexibility and boundary management.

Table 29. Continued

Total	**10**	**12**	Across all instruments, the majority of significant results involved Generation Z. These findings confirm that the youngest members of the 2025 DoD workforce display a statistically proven divergence from their older co-workers

Table 30 displays the H_8 - H_{11} hypothesis set, conclusion, statement and evidence for each hypothesis.

Table 30. Hypotheses H_8 - H_{11} Results

Hypothesis	Type	Conclusion	Statement	Evidence
H_8	Null	Reject	Generation Z **will not differ** from Baby Boomers, Generation X, and Millennials in importance placed on work factors, job satisfaction, or work engagement.	All three categories differed significantly

Table 30. Continued

H_9	Alternative	Accept	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in importance placed on work factors.	Work/life balance differed significantly
H_{10}	Alternative	Accept	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in job satisfaction levels.	Ten JSS pairings differed significantly
H_{11}	Alternative	Accept	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in work engagement levels.	One UWES item differed significantly

CHAPTER VI CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

The purpose of this study was to build upon Gilliam's 2010 baseline research and extend it into 2025 by adding up-to-date research including Generation Z, which was not a part of the workforce or dataset. This study examined job satisfaction, work engagement and the importance of work factors across the Baby Boomer, Generation X, Generation Y and Generation Z cohorts.

Analysis of the 2025 dataset revealed statistically significant differences among generational cohorts in several areas. Generation Z consistently emerged as an outlier in the datasets, statistically differing from the older generations in multiple areas. Generation Z and Generation Y consistently placed the greatest importance on factors such as work/life balance, pay and benefits. A five-point Likert scale was used to score the importance of work factors, where the higher number indicates more importance to the respondent.

In 2010, Generation X rated work/life balance as the highest priority (4.51), followed by benefits and pay; Generation Y also scored work/life balance the highest (4.63) followed by pay and benefits.

The 2025 results mirrored the previous dataset with Generation X scoring work/life balance the highest (4.95) followed by pay and benefits; Generation Y also scored work/life balance the highest (4.59) followed by pay and benefits. The 2025 data results show a similar pattern with Generation Z, but placed an even greater emphasis on flexibility and career growth than any other cohort. Generation Z scored work/life

balance 4.55, pay 4.44, and promotion opportunities 4.02, indicating that balancing their personal life, fair pay and advancement matter the greatest to them. Generation Z scored lowest on operating policies and procedures (2.95) and communication within the organization (3.37), indicating the group is less focused on structure and more on issues they feel directly affect their lives. The consistent scores show that "younger" employees across the generational cohorts continue to value flexibility and balance more strongly than the older cohorts, such as Baby Boomers, who rated work/life balance 4.25 in 2010 and 3.33 in 2025.

For Job satisfaction, the 2025 results showed that Generation Y reported the highest overall satisfaction, closely followed by Generation X. Generation Z reported lower satisfaction and stood out as an outlier in most areas of the study. Tukey HSD post-hoc analysis was done on the data where Generation Z's scores varied significantly on multiple items from the older cohorts.

Generation Z employees were more likely to feel overloaded and uncertain about organizational goals and scored much higher on negatively worded items such as "I have too much to do at work" and "the goals of the organization are not clear to me." Generation Z clearly responded that they do not feel enough direction or transparency within the organization and they feel more overloaded.

The relationships with Generation Z and their supervisors appeared as a consistent problem within the generational cohort. Compared to Generation X, they scored lower on "My supervisor is unfair to me" and "My supervisor shows too little interest in the feelings of subordinates." These findings show that Generation Z employees could be

more sensitive than older employees, or require more feedback and time spent with the supervisor and their older co-workers.

Workload is another burden to the Generation Z population. Generation Z rated "I have too much paperwork" lower than Generation X with the mean difference of -.81 and p=.02, showing that the cohort is unhappy with the current workload.

Taking into account the full list of differences, it helps explain the big picture of why Generation Z's overall job satisfaction scores are noticeably lower than other generations. Generation Z faces frustration with workload, organizational clarity and supervisory support. Given that Generation Z placed the highest value on work/life balance, the data did not directly measure whether or not they feel supported in receiving it. The high value of work/life balance combined with their lower overall satisfaction may indicate a gap between what they expect from a workplace and what they experience.

For work engagement questions, all of the cohorts scored similarly, showing that all age groups feel engaged and motivated at work. When compared against other cohorts, Generation Z once again stood out. The youngest generation placed the highest emphasis on work/life balance and career growth, while showing less concern about job security and benefits as older employees. These findings mirror other findings in the study and are logical results since Generation Z is younger and they have much more room to grow as opposed to their mid and upper career level co-workers.

Overall, the 2025 results confirm that generational differences continue to shape how the civilian employees view their Department of Defense scientist and engineering jobs. The results are all useful, but the highlight of Generation Z and their statistically significant differences than other generational cohorts must be considered by Department of Defense leadership as more Generation Z workers enter the civilian workforce. DOD leaders that offer flexibility, strong communication, professional development as well as stability valued by older cohorts will be able to engage, satisfy and retain their employees. Table 30 displays the full set of research hypotheses, conclusions, statement and evidence.

Table 31. Hypotheses H_0- H_{11} Results

Hypothesis	Type	Conclusion	Statement	Evidence
H_0	Null	Reject	Baby Boomers, Generation X, Millennials, and Generation Z **will not differ** in job satisfaction, work engagement, or importance placed on work factors in 2025.	18 total pairs differed significantly

Table 31. Continued

H_1	Alternative	Accept	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in importance placed on work factors in 2025.	Work/life balance differed significantly
H_2	Alternative	Accept	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in job satisfaction levels in 2025.	Seven items differed significantly
H_3	Alternative	Accept	Baby Boomers, Generation X, Millennials, and Generation Z **will differ** in work engagement levels in 2025.	Two UWES item differed significantly

Table 31. Continued

H_4	Null	Reject	The importance of work factors, job satisfaction, and work engagement **will not differ** between 2010 and 2025.	All three categories differed significantly
H_5	Alternative	Accept	The importance of work factors **will differ** between 2010 and 2025.	Benefits, Recognition & Rewards and Operating Policies differed significantly
H_6	Alternative	Accept	Job satisfaction levels **will differ** between 2010 and 2025.	Sixteen JSS items differed significantly

Table 31. Continued

H_7	Alternative	Accept	Work engagement levels **will differ** between 2010 and 2025.	Fourteen UWES items differed significantly
H_8	Null	Reject	Generation Z **will not differ** from Baby Boomers, Generation X, and Millennials in importance placed on work factors, job satisfaction, or work engagement.	All three categories differed significantly
H_9	Alternative	Accept	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in importance placed on work factors.	Work/life balance differed significantly

Table 31. Continued

H_{10}	Alternative	Accept	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in job satisfaction levels.	Ten JSS pairings differed significantly
H_{11}	Alternative	Accept	Generation Z **will differ** from Baby Boomers, Generation X, and Millennials in work engagement levels.	One UWES item differed significantly

B. Study Limitations

Both the 2010 and 2025 studies performed on this subject area investigated the entire Scientist and Engineer Department of Defense civilian population, however the sample population came from one government facility. By law, the government facility must closely match the Department of Defense workforce profile, therefore the sample demographics are representative of the DOD workforce, but all survey results were taken from individuals working on Redstone Arsenal in Huntsville, Alabama. Adding diversity to the geographical location of the DOD civilian worker by including participants from other locations would make the dataset more robust since there are DOD civilians working all over the United States.

A second limitation to the 2025 study is the small number (n=3) of Baby Boomer respondents. The small number of participants lessens the ability to conclude statistically meaningful results. The low number of Baby Boomers is consistent with the shifting demographics of the Department of Defense workforce. Almost all Baby Boomers (age 65-81) are eligible for retirement, and they are retiring every day. It is a reasonable assumption that DOD civilians who are close to leaving the workforce or in the process of leaving the workforce may be less motivated to spend time completing a survey about their organization. As a result, their voices and perspectives are underrepresented.

C. Implications for the DOD

The results of this study have many important implications for the Department of Defense scientist and engineering workforce. As a general trend, the overall job satisfaction and work engagement are positive across generations, however there were a large amount of statistically significant variances in the Generation Z population that need to be addressed. Generation Z varies from the older generational cohorts in multiple ways: they place the highest value on work/life balance, pay, career advancement, but are most overwhelmed with workload, unclear organizational goals and lack of feedback from supervisors. The results are positive for the Department of Defense, because they are all variables that can be fixed. It is recommended that Department of Defense leadership adopt management strategies to satisfy and retain their youngest cohort of knowledge workers by improving the following areas:

1. Work/life balance and flexibility

Generation Z's consistently high mean score (4.55 out of 5) shows that flexibility is a strong motivator. When many of the Generation Z cohort started working for the Department of Defense, it was a fully telework or hybrid telework environment due to the COVID-19 pandemic. Telework privileges were completely rescinded for civilians at CCDC AvMC mid-2025. The Department of Defense could explore hybrid work environments and/or more flexible schedules to maintain engagement and satisfaction among the cohort. Although other groups scored lower, increasing work/life balance for the civilian population would boost all the workforce's satisfaction.

2. Supervisor Communication

Generation Z employees expressed clearly that they do not feel clear on the goals of the organization and that they do not feel supported by their supervisors. Improving leadership transparency and communication within the organization is, once again, an issue that will benefit the group that is struggling with it the most (Generation Z) and also the rest of the workforce. Leadership training that teaches supervisors how to effectively communicate will benefit Generation Z and retention as a whole.

3. Workload Issues

Generation Z scored lower consistently with items such as having "too much paperwork" and "too much to do at work." This is an issue that bleeds into comment #2 above about supervisor communication. Leadership must understand the root of the issue by speaking with employees to differentiate if the issue is a workload problem or if they are tasked too heavily. Streamlining reporting and making processes more efficient is an option to improve workload and increase satisfaction.

4. Retention and recruitment

In order to successfully recruit civilian scientists and engineers, the Department of Defense should highlight the interesting and meaningful work that is being performed, opportunities for growth within the DOD and (improved) work/life balance policies. To retain the Generation Z workers, the DOD should focus on increasing work/life balance opportunities, fair compensation and supervisor communication.

D. Future Research Recommendation

This study extends and adds on to Gilliam's 2010 baseline research with a 2025 dataset and adding Generation Z to the sample population. The same survey instruments (Job Satisfaction Survey, Utrecht Work Engagement Scale and Work Factor Importance Questionnaire) were utilized to keep research methods the same as the baseline. Based on the design of the study, 2025 results and constraints, the following recommendations are given for future research.

1. Collect sample data from multiple government facilities located in different geographical locations in order to see if there is diversification in responses.
2. Update the Work Factors to include modern items such as telework options, hybrid work environments, diversity of the workforce and mental health priority.
3. Explore the dataset demographics and look for statistically significant variance across different ethnic groups, genders, etc.
4. Replicate this work in other federal workforces that are STEM focused, but not the Department of Defense to test if the Department of Defense and other STEM facilities deviate on answers.

5. Extend the present study in 5, 10 or 15 years to see if there are any changes within the generational cohorts and/or within the Army CCDC Aviation and Missile Center.

6. Replicate this study in a privately-owned DOD engineering contractor company to compare the results of the 2025 DOD civilian workforce to the contractor workforce.

7. Use this study as a baseline to replicate in private industry to study the management of Generation Z scientists and engineers. Use Human Resources (HR) exit interviews to note keywords of the primary factors of turnover within that generational cohort and link them to the survey instruments used in this research.

8. Replicate the research using different survey instruments. Review the results to determine if the survey instrument/wording of the items influenced the respondents.

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APPENDIX

APPENDIX A: SURVEY CONSENT

Dear Civilian Government Employee,

Research is being conducted to investigate the contextual factors of the jobs and well being of government employees. Attached you will find a short survey that will help identify the particular areas of interest to Federal Government employees. Your answers to this survey are voluntary and completely anonymous. Since a full sample is required for representative results, we encourage your participation in the survey. The three part survey takes less than 10 minutes to complete, and the resulting data will be available to those that are interested. Thank you for your valuable contribution. Please see the below for more information.

Consent for Research Participation

Research Study Title: 2025 Job and Generation related differences in the job satisfaction and work engagement of civilian department of defense scientists and engineers

Researcher(s): Rachael Armayor, University of Tennessee, Knoxville

Dr. James Simonton, University of Tennessee, Knoxville

We are asking you to be in this research study because you are a CCDC AvMC civilian. You must be age 18 or older to participate in the study. The information in this consent form is to help you decide if you want to be in this research study. Please

take your time reading this form and contact the researcher(s) to ask questions if there is anything you do not understand.

Why is the research being done?

The purpose of the research study is to investigate job satisfaction and work engagement in of various age groups of DOD scientists and engineers.

What will I do in this study?

If you agree to be in this study, you will complete an online survey. The survey includes questions about your experience working as a DOD scientist/engineer and should take you about 10 minutes to complete. You can skip questions that you do not want to answer, but incomplete surveys will not be usable to analyze.

Can I say "No"?

Being in this study is up to you. You can stop up until you submit the survey. After you submit the survey, we cannot remove your responses because we will not know which responses came from you.

Are there any risks to me?

We don't know of any risks to you from being in the study that are greater than the risks you encounter in every day life.

Are there any benefits to me?

We do not expect you to benefit from being in this study. Your participation may help us to learn more about job satisfaction and work engagement of DOD scientists and engineers. We hope the knowledge gained from this study will benefit others in the future.

What will happen with the information collected for this study?

The survey is anonymous, and no one will be able to link your responses back to you. Your responses to the survey will not be linked to your computer, email address or other electronic identifiers. Please do not include your name or other information that could be used to identify you in your survey responses. Information provided in this survey can only be kept as secure as any other online communication.

Information collected for this study will be published and possibly presented at scientific meetings.

Will I be paid for being in this research study?

You will not be paid for being in this study.

Who can answer my questions about this research study?

If you have questions or concerns about this study, or have experienced a research related problem or injury, contact the researchers, Rachael Armayor, 256-876-2448, **Rachael.H.Armayor.Civ@Army.mil** or Dr. James Simonton, **jsimonto@utsi.edu**, 806-789-4304.

For questions or concerns about your rights or to speak with someone other than the research team about the study, please contact:

Institutional Review Board

The University of Tennessee, Knoxville

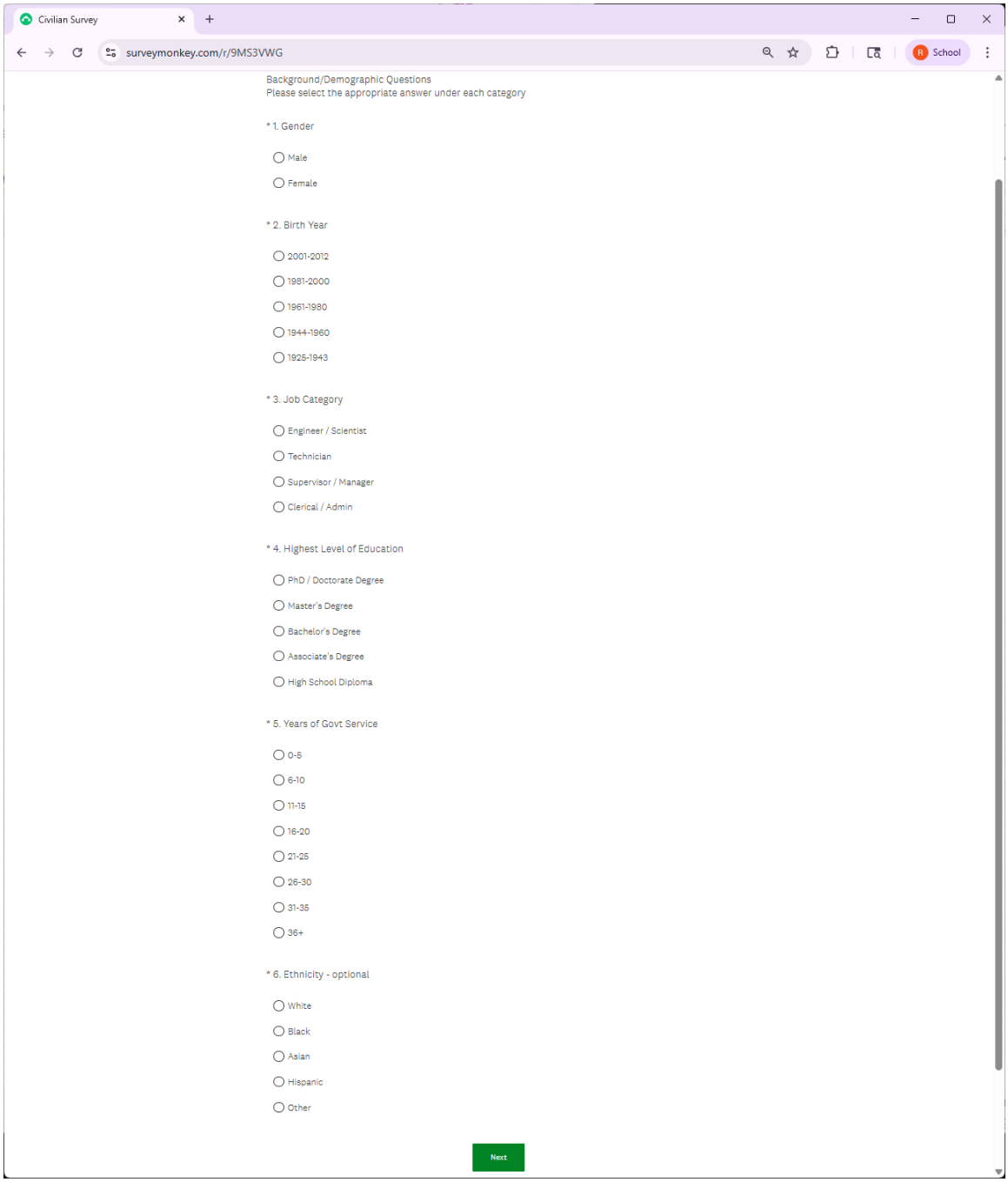
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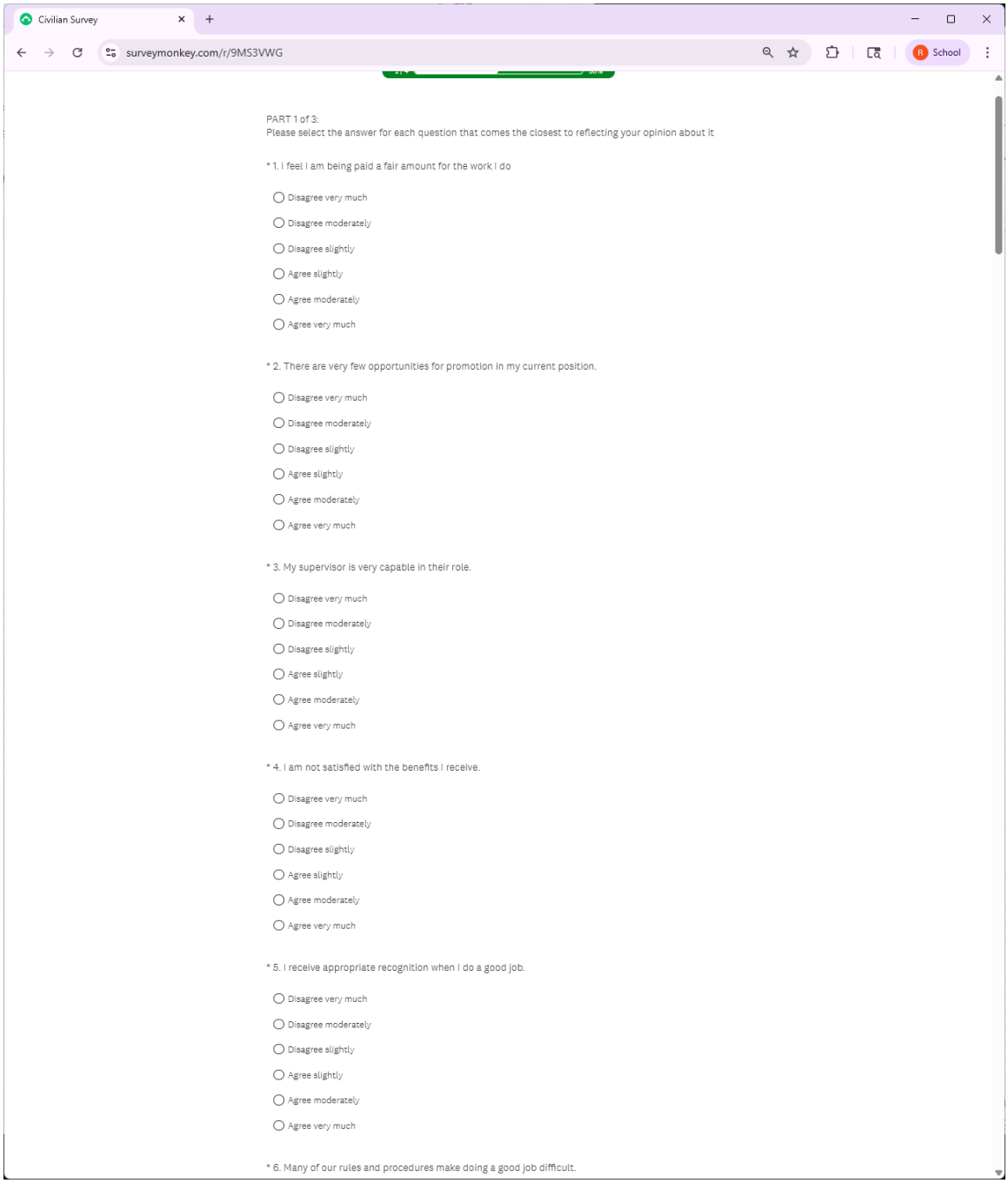
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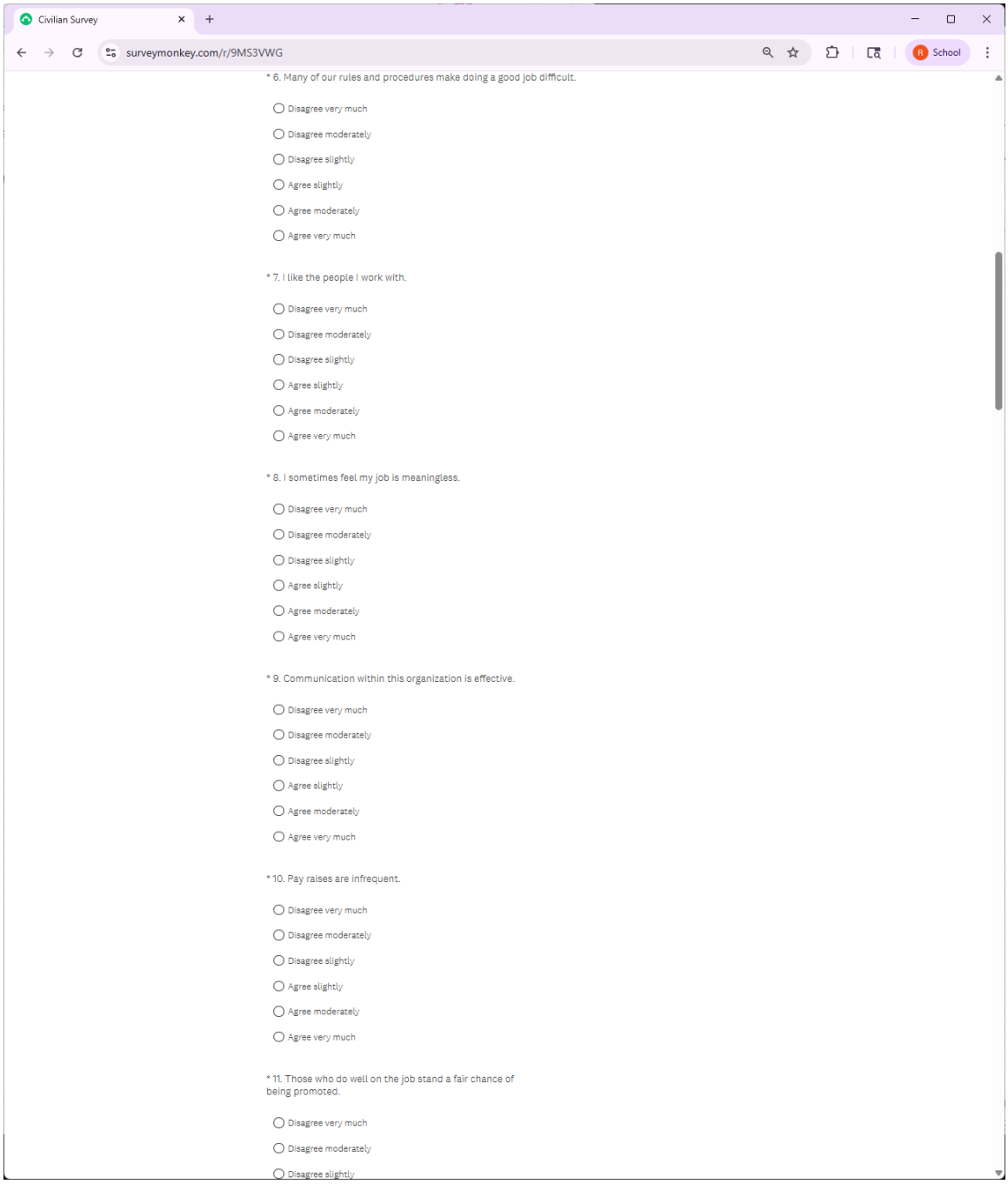
APPENDIX B: SURVEY INSTRUMENT

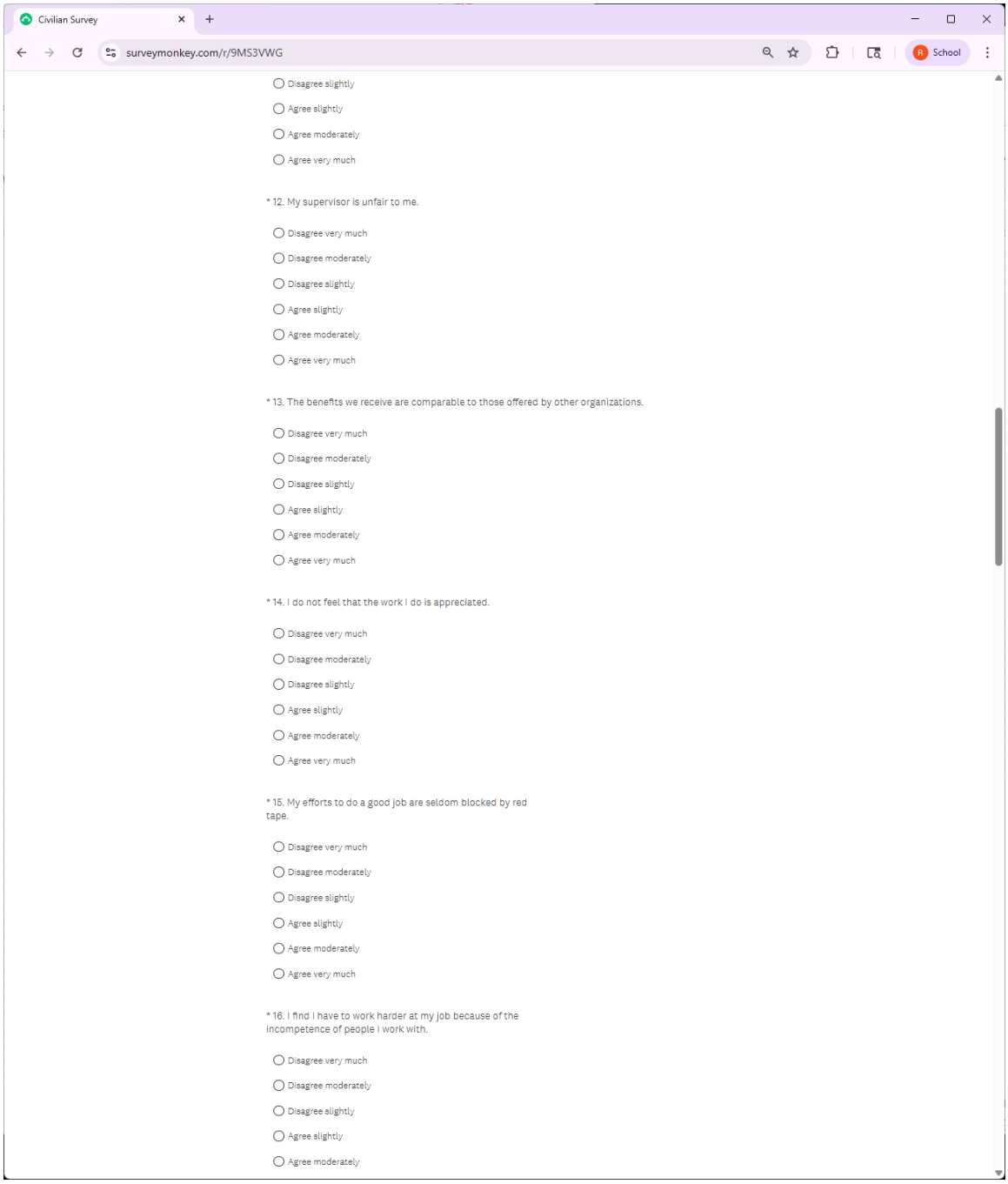
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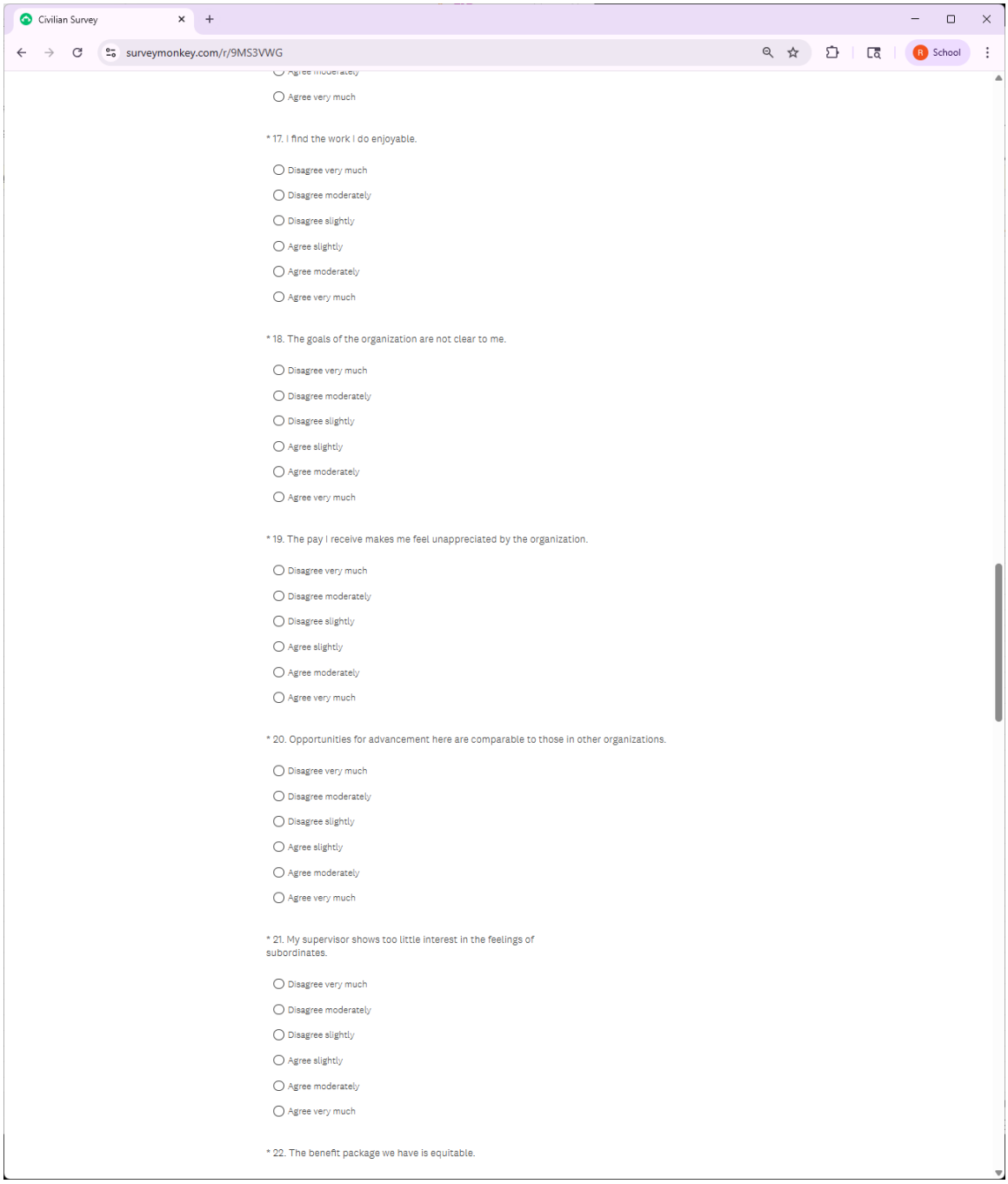


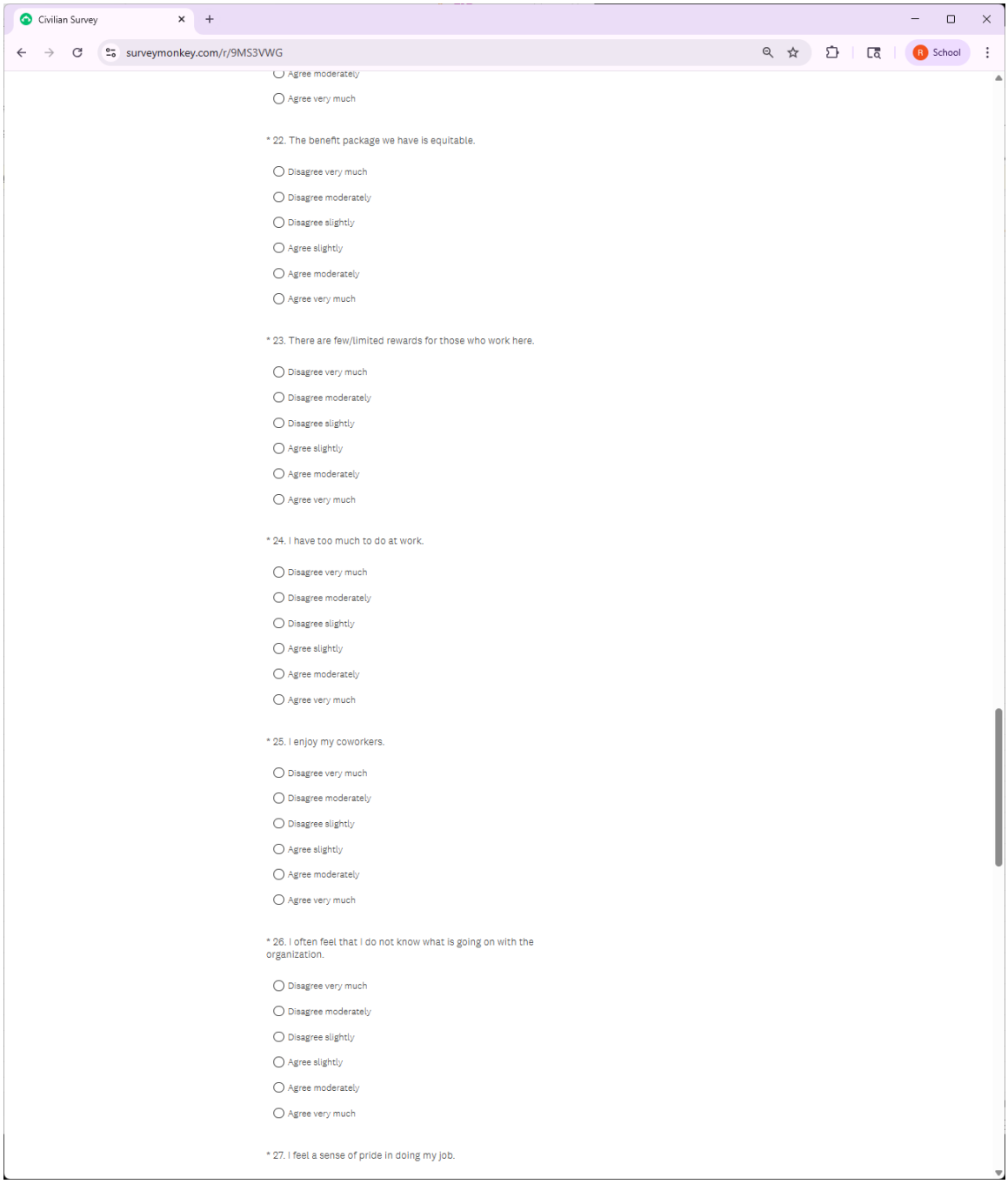
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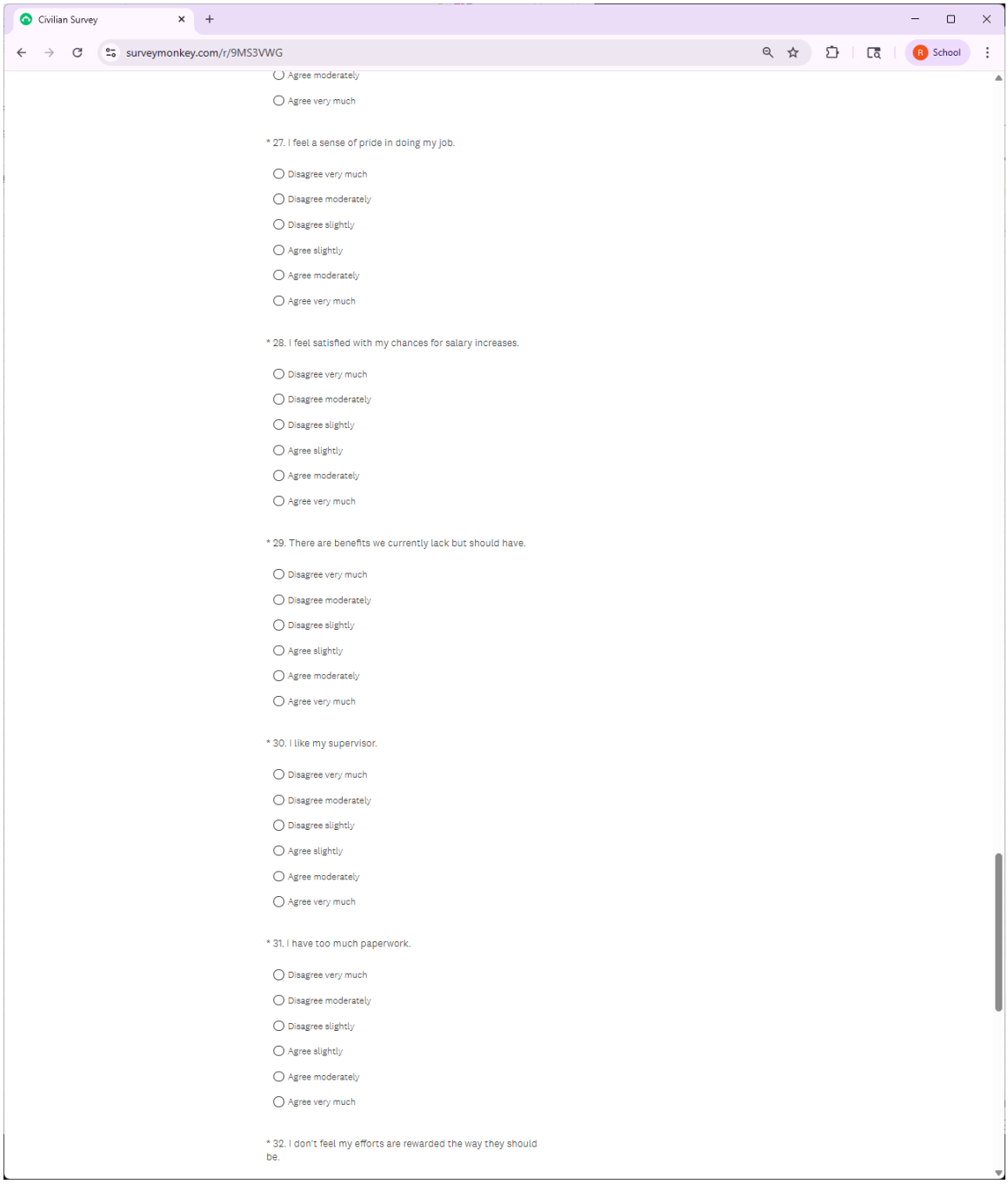


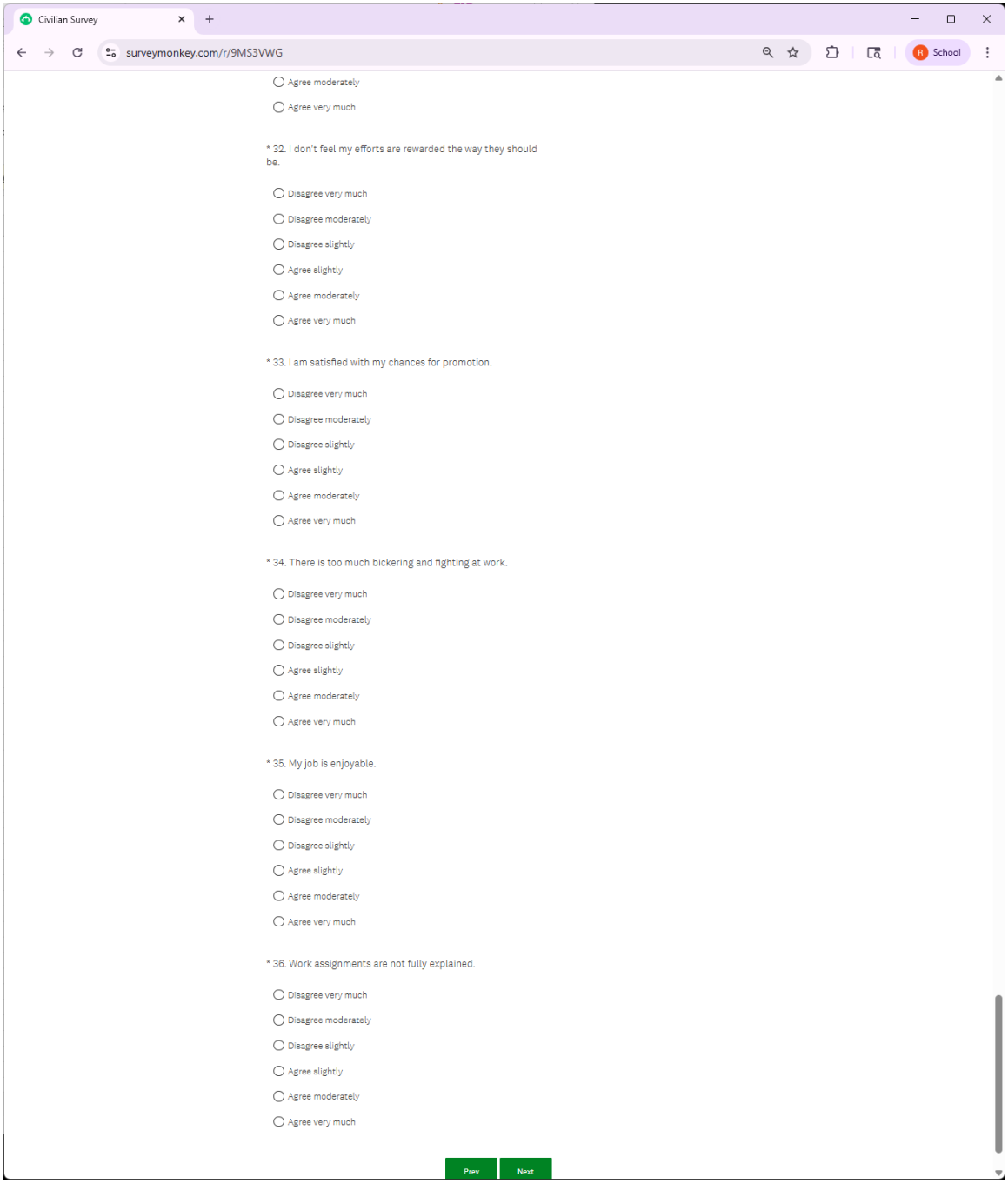

Civilian Survey
surveymonkey.com/r/9MS3VWG
School
* 6. Many of our rules and procedures make doing a good job difficult.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 7. I like the people I work with.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 8. I sometimes feel my job is meaningless.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 9. Communication within this organization is effective.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 10. Pay raises are infrequent.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 11. Those who do well on the job stand a fair chance of being promoted.
Disagree very much
Disagree moderately
Disagree slightly


Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 12. My supervisor is unfair to me.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 13. The benefits we receive are comparable to those offered by other organizations.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 14. I do not feel that the work I do is appreciated.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 15. My efforts to do a good job are seldom blocked by red tape.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 16. I find I have to work harder at my job because of the incompetence of people I work with.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately

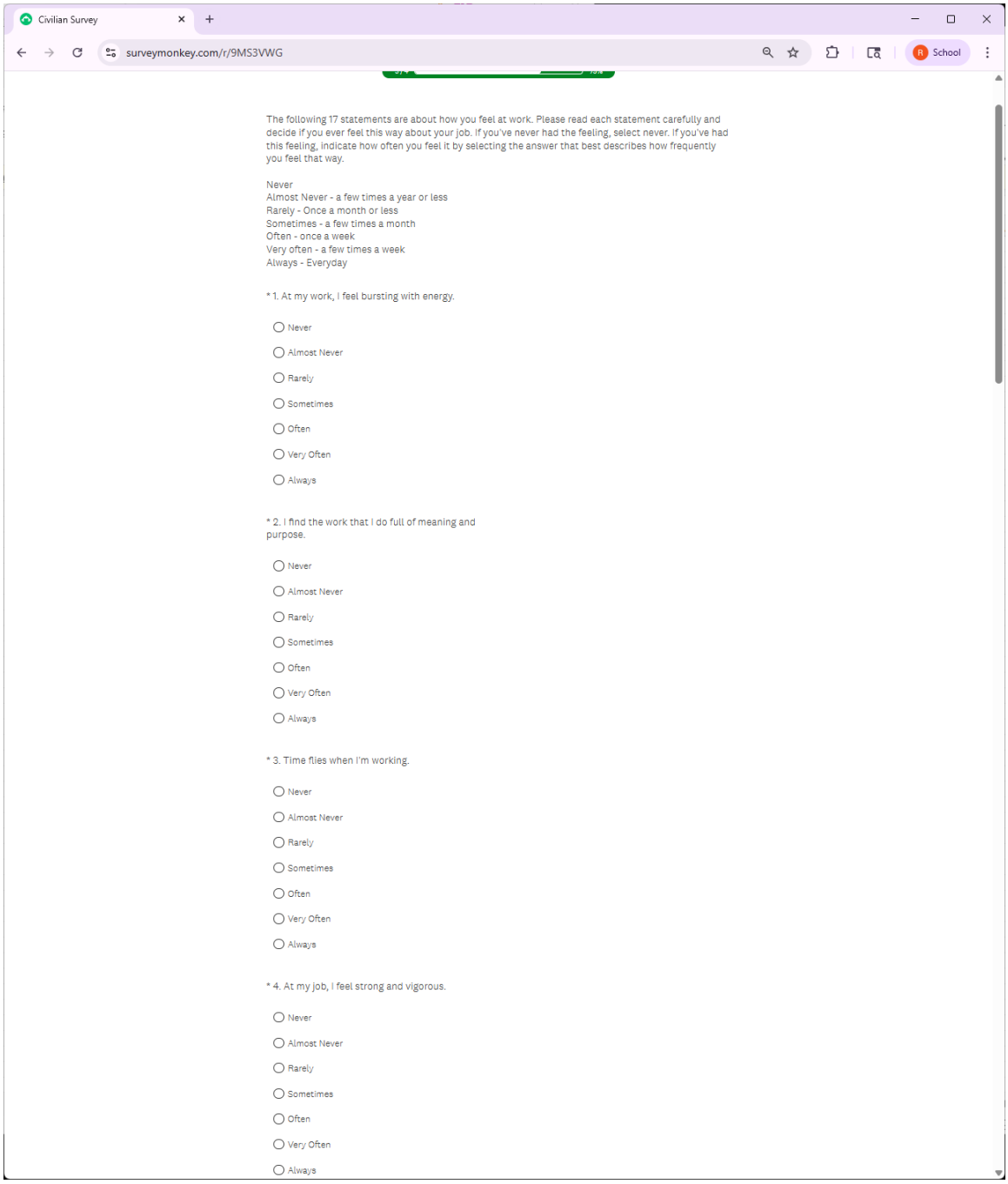

Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Agree very much
* 17. I find the work I do enjoyable.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 18. The goals of the organization are not clear to me.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 19. The pay I receive makes me feel unappreciated by the organization.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 20. Opportunities for advancement here are comparable to those in other organizations.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 21. My supervisor shows too little interest in the feelings of subordinates.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 22. The benefit package we have is equitable.

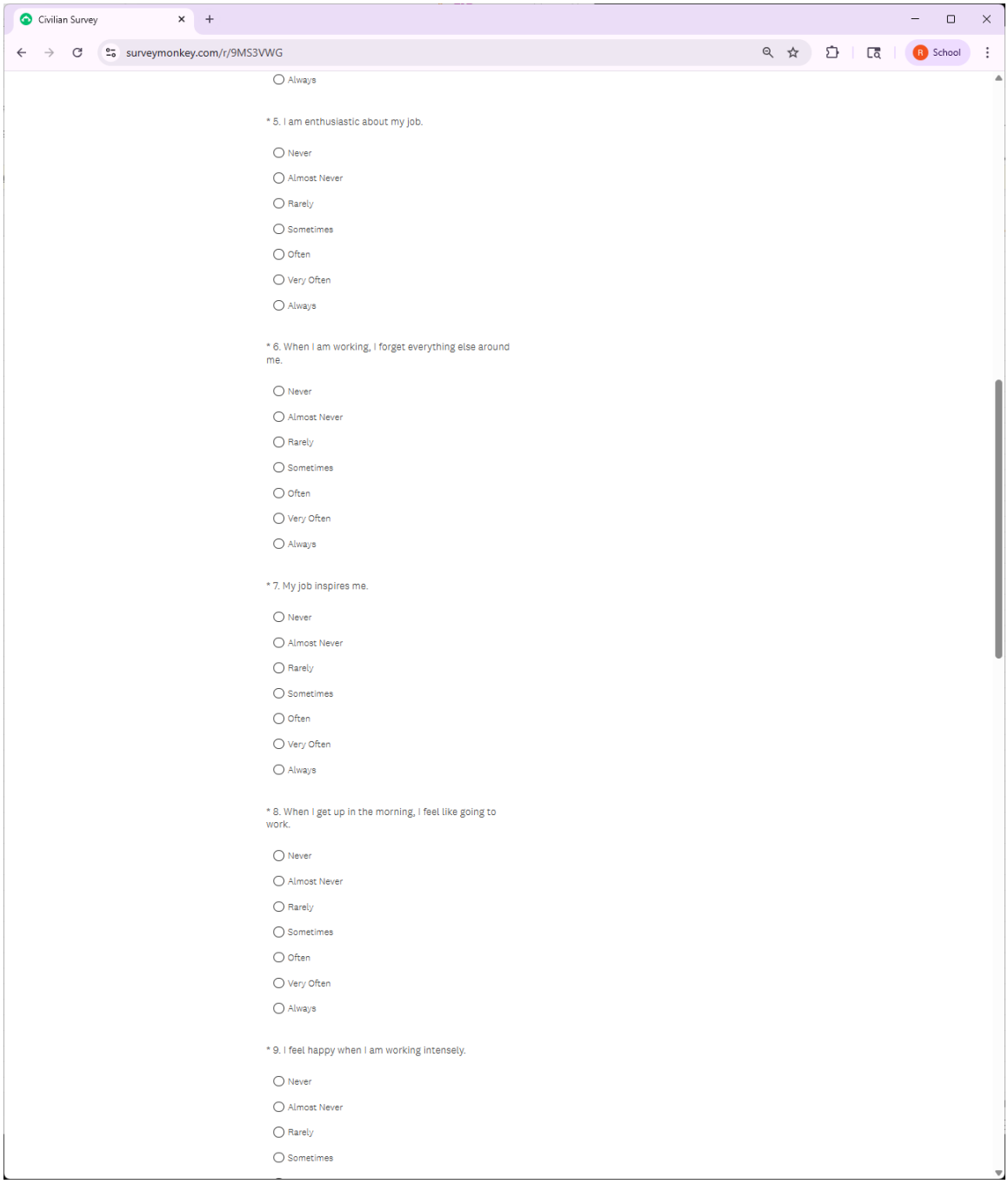

Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Agree moderately
Agree very much
* 22. The benefit package we have is equitable.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 23. There are few/limited rewards for those who work here.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 24. I have too much to do at work.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 25. I enjoy my coworkers.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 26. I often feel that I do not know what is going on with the organization.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 27. I feel a sense of pride in doing my job.

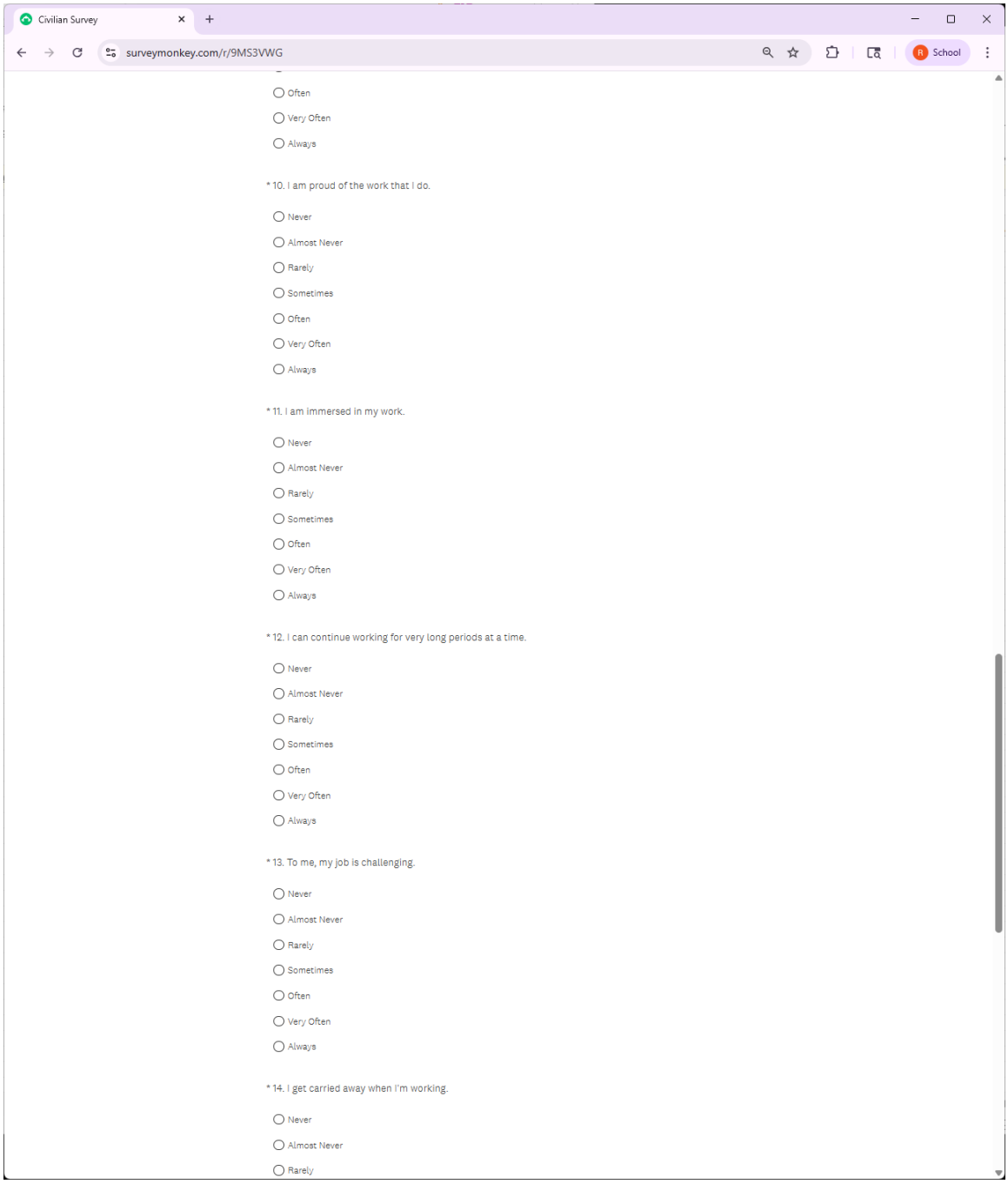

Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Agree moderately
Agree very much
* 27. I feel a sense of pride in doing my job.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 28. I feel satisfied with my chances for salary increases.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 29. There are benefits we currently lack but should have.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 30. I like my supervisor.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 31. I have too much paperwork.
Disagree very much
Disagree moderately
Disagree slightly
Agree slightly
Agree moderately
Agree very much
* 32. I don't feel my efforts are rewarded the way they should be.

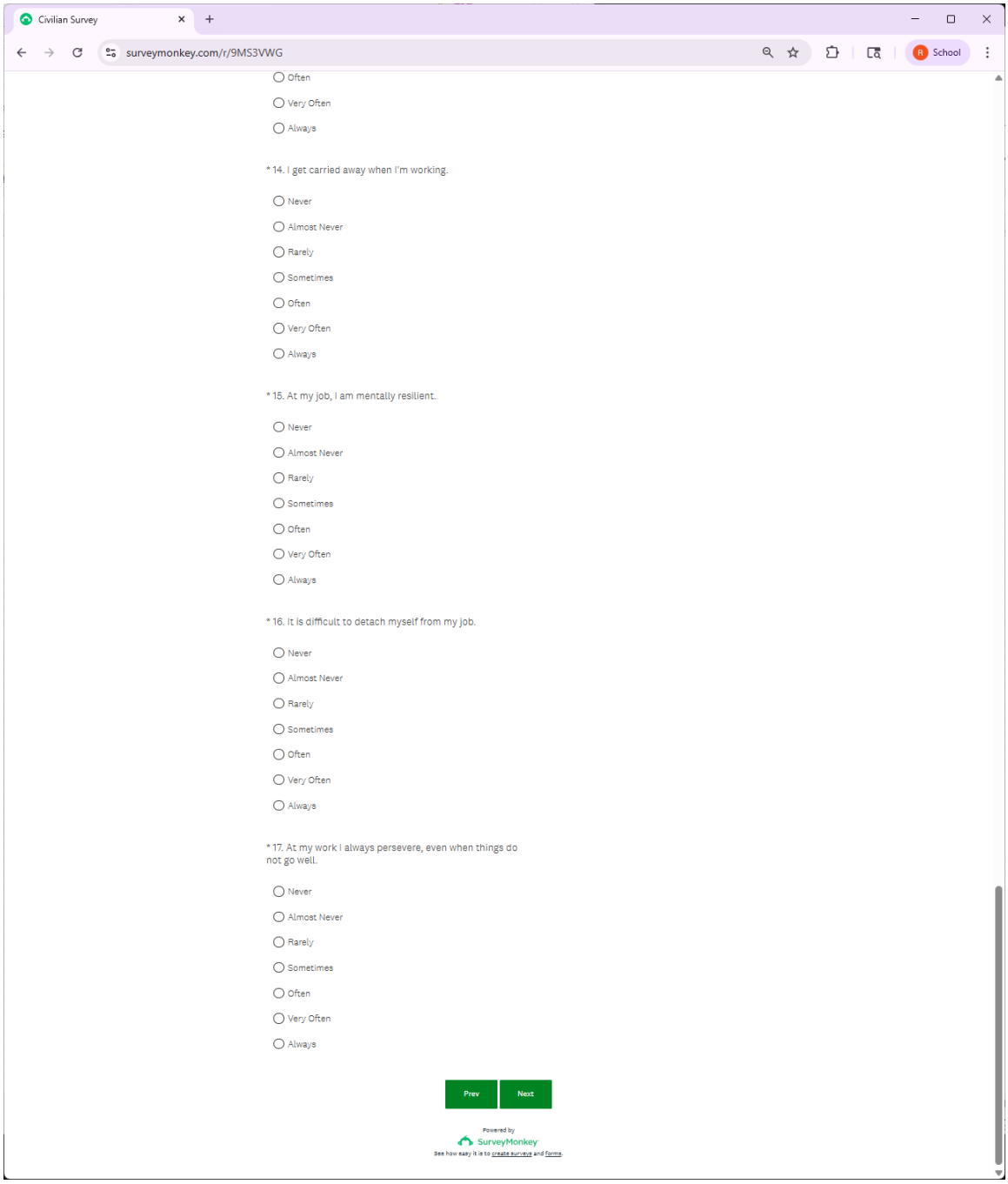


Part 2: Utrecht Work Engagement Scale (UWES) Survey

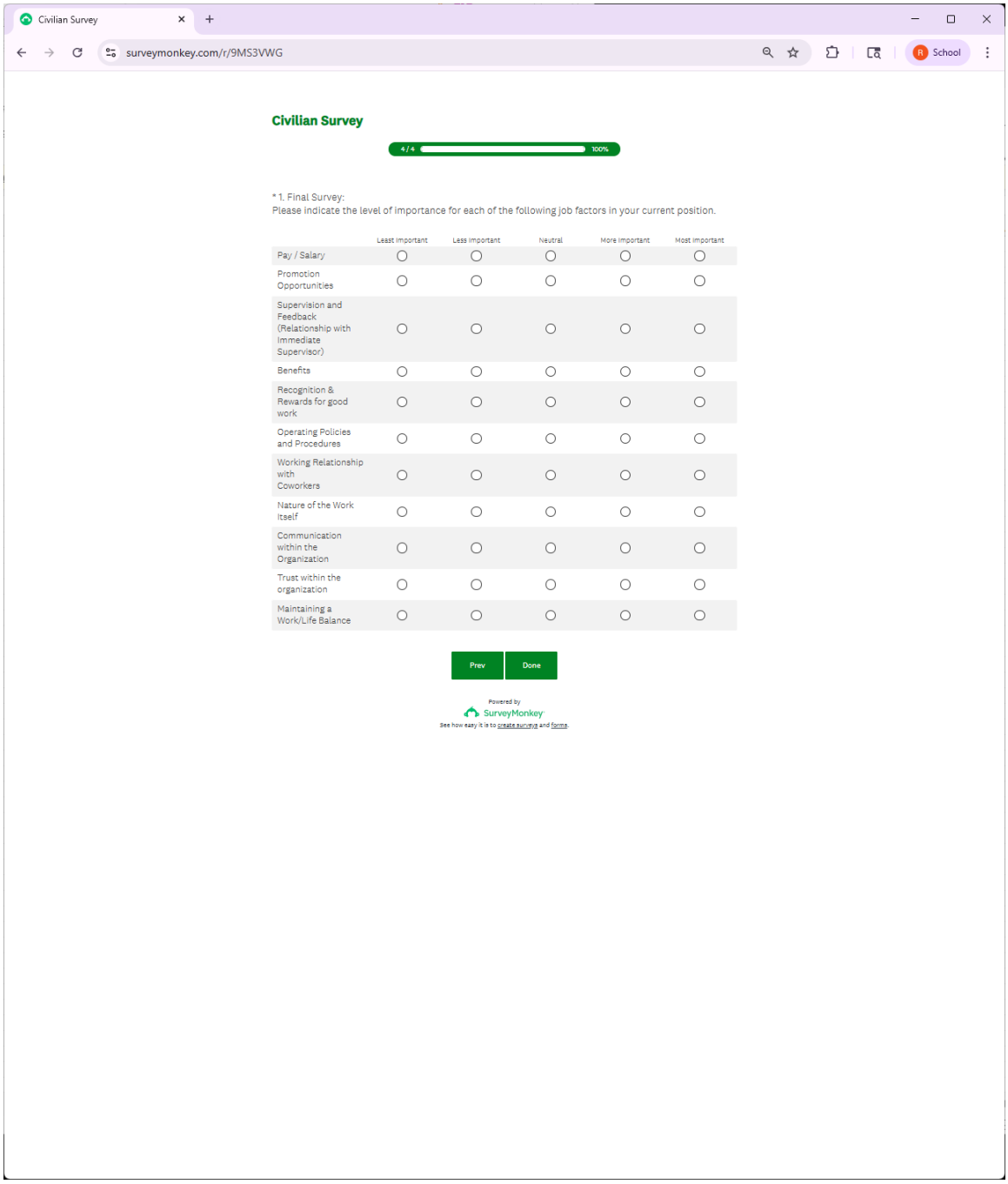

Civilian Survey
surveymonkey.com/r/9MS3VWG
School
The following 17 statements are about how you feel at work. Please read each statement carefully and decide if you ever feel this way about your job. If you've never had the feeling, select never. If you've had this feeling, indicate how often you feel it by selecting the answer that best describes how frequently you feel that way.
Never
Almost Never - a few times a year or less
Rarely - Once a month or less
Sometimes - a few times a month
Often - once a week
Very often - a few times a week
Always - Everyday
* 1. At my work, I feel bursting with energy.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 2. I find the work that I do full of meaning and purpose.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 3. Time flies when I'm working.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 4. At my job, I feel strong and vigorous.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always


Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Always
* 5. I am enthusiastic about my job.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 6. When I am working, I forget everything else around me.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 7. My job inspires me.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 8. When I get up in the morning, I feel like going to work.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 9. I feel happy when I am working intensely.
Never
Almost Never
Rarely
Sometimes


Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Often
Very Often
Always
* 10. I am proud of the work that I do.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 11. I am immersed in my work.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 12. I can continue working for very long periods at a time.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 13. To me, my job is challenging.
Never
Almost Never
Rarely
Sometimes
Often
Very Often
Always
* 14. I get carried away when I'm working.
Never
Almost Never
Rarely



Part 3: Work Factors Survey


Civilian Survey
surveymonkey.com/r/9MS3VWG
School
Civilian Survey
4 / 4
100%
* 1. Final Survey:
Please indicate the level of importance for each of the following job factors in your current position.
Least Important
Less Important
Neutral
More Important
Most Important
Pay / Salary
Promotion Opportunities
Supervision and Feedback (Relationship with Immediate Supervisor)
Benefits
Recognition & Rewards for good work
Operating Policies and Procedures
Working Relationship with Coworkers
Nature of the Work Itself
Communication within the Organization
Trust within the organization
Maintaining a Work/Life Balance
Prev
Done
Powered by SurveyMonkey
See how easy it is to create surveys and forms.

Generation Y ANOVA Results									
Work Factor	**Gen**	**2010 Mean**	**2025 Mean**	**2025-2010**	**Df**	**Sum_sq**	**Mean_sq**	**F**	**p-value**
Recognition & Rewards for good work	Gen Y	3.670	3.462	-0.208	1	3.8125	3.8125	5.9500	0.0115
Operating Policies and procedures	Gen Y	3.250	2.924	-0.326	1	6.0016	6.0016	5.4874	0.0199
Benefits	Gen Y	3.820	4.101	0.281	1	1.8159	1.8159	2.8334	0.0336
Pay / Salary	Gen Y	4.220	4.234	0.014	1	1.1294	1.1294	2.1641	0.1425
Working relationships with Coworkers	Gen Y	3.860	3.981	0.121	1	0.8920	0.8920	1.3900	0.2390
Supervision and Feedback (Relationship with Immediate Supervisor)	Gen Y	4.060	3.930	-0.13	1	0.6420	0.6420	1.0000	0.3190
Communication within the Organization	Gen Y	3.550	3.462	-0.088	1	0.5700	0.5700	0.8901	0.3490
Nature of the Work Itself	Gen Y	4.140	4.076	-0.064	1	0.3874	0.3874	0.6158	0.4410
Trust within the Organization	Gen Y	3.980	3.943	-0.037	1	0.2330	0.2330	0.3600	0.5510
Maintaining a Work/Life Balance	Gen Y	4.630	4.595	-0.035	1	0.1423	0.1423	0.2200	0.6390
Promotion Opportunities	Gen Y	4.020	3.854	-0.166	1	0.0310	0.0310	0.0455	0.8313

Generation X ANOVA Results									
Work Factor	**Gen**	**2010 Mean**	**2025 Mean**	**2025-2010**	**df**	**sum_sq**	**mean_sq**	**F**	**p-value**

Benefits	Gen X	4.0000	4.3080	0.3080	1	3.0465	3.0465	9.2772	0.0030
Pay / Salary	Gen X	4.0600	4.2820	0.2220	1	1.1329	1.1329	2.8295	0.0957
Working relationships with Coworkers	Gen X	4.0400	4.2820	0.2420	1	1.2560	1.2560	2.4220	0.1230
Trust within the Organization	Gen X	4.0100	4.2310	0.2210	1	1.1455	1.1455	2.2200	0.1580
Maintaining a Work/Life Balance	Gen X	4.5100	4.6920	0.1820	1	0.9801	0.9801	1.9000	0.1740
Communication within the Organization	Gen X	3.5000	3.6670	0.1670	1	0.8142	0.8142	1.4536	0.2296
Nature of the Work Itself	Gen X	4.2600	4.0770	-0.1830	1	0.8940	0.8940	1.6506	0.2332
Promotion Opportunities	Gen X	3.7100	3.5640	-0.1460	1	0.9425	0.9425	1.2563	0.2650
Supervision and Feedback (Relationship with Immediate Supervisor)	Gen X	3.8300	3.9230	0.0930	1	0.4140	0.4140	0.7523	0.3880
Recognition & Rewards for good work	Gen X	3.8100	3.7440	-0.0660	1	0.3022	0.3022	0.5446	0.4630
Operating Policies and procedures	Gen X	3.0100	3.0000	-0.0100	1	0.5916	0.5916	0.5132	0.4754

Baby Boomer ANOVA Results

Work Factor	Gen	2010 Mean	2025 Mean	2025-2010	df	sum_sq	mean_sq	F	p-value
Trust within the Organization	Baby Boomer	3.9700	4.3300	0.3600	1	1.6220	1.6220	3.0890	0.1042
Supervision and Feedback (Relationship with Immediate Supervisor)	Baby Boomer	3.8200	3.3300	-0.4900	1	2.1801	2.1801	2.5266	0.1220
Maintaining a Work/Life Balance	Baby Boomer	4.2500	3.3300	-0.9200	1	2.1870	2.1870	2.5233	0.1225
Communication within the Organization	Baby Boomer	3.6800	4.0000	0.3200	1	1.2240	1.2240	2.3369	0.1490
Recognition & Rewards for good work	Baby Boomer	3.8500	3.6700	-0.1800	1	0.3898	0.3898	0.7451	0.3936
Nature of the Work Itself	Baby Boomer	4.1900	4.3300	0.1400	1	0.4110	0.4110	0.7845	0.4102
Working relationships with Coworkers	Baby Boomer	4.0900	4.0000	-0.0900	1	0.1920	0.1920	0.3600	0.5560
Operating Policies and procedures	Baby Boomer	3.2500	3.3300	0.0800	1	0.0399	0.0399	0.0414	0.8395
Promotion Opportunities	Baby Boomer	3.4600	3.3300	-0.1300	1	0.0365	0.0365	0.0298	0.8634
Pay / Salary	Baby Boomer	4.0400	4.0000	-0.0400	1	0.0063	0.0063	0.0133	0.9087
Benefits	Baby Boomer	4.0000	4.0000	0.0000	1	0.0027	0.0027	0.0050	0.9439

Generation Z		
Work Factor	**Gen Z**	**2025 Mean**
1. Maintaining a Work/Life Balance	Gen Z	4.5500
4. Pay / Salary	Gen Z	4.4400
5. Benefits	Gen Z	4.1100
10. Promotion Opportunities	Gen Z	4.0200
2. Nature of the Work Itself	Gen Z	4.0000
3. Working relationships with Coworkers	Gen Z	4.0000
8. Supervision and Feedback (Relationship with Immediate Supervisor)	Gen Z	3.9300
6. Trust within the Organization	Gen Z	3.7500
9. Communication within the Organization	Gen Z	3.3700
7. Recognition & Rewards for good work	Gen Z	3.3700

11. Operating Policies and procedures	Gen Z	2.9500

APPENDIX C: WORK FACTOR ANOVA RESULTS

VITA

Rachael Hughes Armayor

Dr. Rachael Armayor grew up moving between Washington D.C. and Huntsville, Alabama as her family followed her father's civilian career for the U.S. Army. Her family eventually settled in Huntsville, where she was surrounded by, and became fascinated with, the space and missile defense community. Rachael graduated from Virgil I. Grissom High School in 2008 and went on to earn a Bachelor of Science in Mechanical Engineering (2013), Master of Science in Mechanical Engineering (2016) and Master of Business Administration (2016) from The University of Alabama. She then began pursuing her Doctor of Philosophy in Industrial and Systems Engineering at The University of Tennessee. After graduation, she plans to continue her career with the U.S. Army. Rachael is deeply grateful for the love and support of her parents, husband and four children, all blessings from God who have made this journey worthwhile.