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Oculus

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Letter from the Editor

Dear Reader,

Our editorial team is proud to present the Eleventh Volume of the Journal of Undergraduate Research at Ohio State. In this publication, you can expect to find the excellent and innovative research conducted by undergraduate students here at The Ohio State University. I would like to thank and acknowledge the dedicated efforts of both the authors and editorial staff that have aided in the production of this journal, along with the Office of Undergraduate Research and The Ohio State Publishing and Repository Services staff. Without their contributions, the creation of this journal would not be possible.

The Ohio State University has world-renowned academics and research expertise. This journal exhibits a sliver of the creative and resourceful research done by undergraduates here at Ohio State. We welcome research from all fields and backgrounds. From Biology to Economics and Art to Physics, our objective is to provide a platform for undergraduates from all disciplines to celebrate and hone their hard work.

As you explore the research within these pages, we hope that you are inspired by the creativity, dedication, and scholarly pursuits of our undergraduate community. We are excited to share their work with you and offer insight into the research undertaken at The Ohio State University.

Best regards,
Nathan Lu
Editor-in-Chief

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Desperate Times, Unprecedented Measures: The Confirmation of Gen. George C. Marshall to Serve as Secretary of Defense

Primary Author: - Colin Adler

Abstract

In his fifty-seven years as a public servant, George Catlett Marshall Jr. served as an operations officer, the 13th Deputy Chief of Staff of the United States Army, 15th Chief of Staff of the United States Army, United States Special Envoy to China, 50th United States Secretary of State, 10th President of the American Red Cross, and 3rd United States Secretary of Defense. As Army Chief of Staff, Marshall orchestrated the largest expansion in U.S. military history, becoming a five-star general in the process and being named *Time* magazine's Man of the Year in 1943. As Secretary of State, he was one of the main architects of the Marshall Plan which provided $12 billion in aid for the recovery of Western Europe in the aftermath of World War II, earning him the *Time* Man of the Year honor once again as well as a Nobel Peace Prize in 1953. By 1950 Marshall had established a reputation as both a military man and a statesman, making him an ideal replacement for Secretary of Defense Louis A. Johnson, whose failure to prepare for the

Korean War led to his removal by President Harry S Truman. Due to his status as a five-star general at the time of his nomination, Marshall's appointment to the position of Secretary of Defense raised some concerns regarding the principle of civilian control of the military but was largely approved of by the senate. Marshall's appointment to Secretary of Defense in a time of war also highlights the rising concerns over national security in the United States, a more aggressive American military presence overseas, and the increased emphasis on defense spending in light of the looming Soviet threat in the Cold War. While some Republicans in Congress feared that allowing a military man to serve as Secretary of Defense would set a dangerous precedent allowing future presidents to continue nominating military officials for the post, Marshall remained the only military official to hold the position for the next sixty-seven years. However, Marshall's actions as Secretary of Defense were often informed by his own military experience and did indeed reveal some of the potential dangers associated with sacrificing civilian control of the military.

I. Early Military Service

George Marshall graduated from the Virginia Military Institute in 1901 and was sent to the Philippines to serve as second lieutenant of the infantry in February of the following year. There, he was regarded by his peers as disciplined, quiet, and self-confident individual in possession of a fierce temper that he had learned to control.[1] Upon returning from the Philippines, Marshall was selected to serve as aide-de-camp for Medal of Honor recipient General J. Franklin Bell, who tasked him with selecting candidates for training as military officers and organizing the training camps in preparation for America's entry into World War I.

On June 9th, 1917, just two months after the 65th United States Congress declared war on Germany, Marshall was promoted and sent to France to serve as the 1st Infantry Division's operations officer. It was at this post that Marshall caught the eye of Commander of the American Expedition Forces (AEF) General John J. Pershing, who adopted the young officer as his protégé. One day in October General Pershing was furious with the 1st Division's execution of a training exercise and proceeded to lambast their commander, General William Sibert, in front of the regiment. When Pershing turned to leave after delivering his vitriolic remarks, George Marshall—then a lowly operations officer thirty years his junior—reached out and grabbed him by the arm. In front of the entire 1st Division, Marshall delivered a furious critique of Pershing's headquarters and staff and blamed them for the division's lack of progress. Friends of Marshall who were present for the confrontation were sure that the outburst had effectively ended his career, but rather than being insulted by this insubordination, Pershing was impressed. Marshall's courage in speaking his mind and his reputation for

[1] *Pogue, Forrest C. "George Catlett Marshall." Encyclopædia Britannica. 27 Dec. 2019. Web. 07 Oct. 2020.*

honest criticism led to him becoming an informal advisor to Pershing for the rest of the war.[2] In mid-1918 Marshall was sent to the AEF's headquarters where he continued to work closely with Pershing. There, Marshall was a key figure in the planning and coordination of the Meuse-Argonne Offensive that ended with the defeat of the German Army on the Western Front. During his time with the AEF Marshall would meet another man who would have a major impact on his life, though neither knew it at the time. In late 1918 then-Colonel Marshall inspected the AEF artillery school at Coëtquidan, France where he encountered a thirty-four year old army captain named Harry S Truman.[3] By the end of WWI Marshall had built up a military reputation that, according to military historian Forrest Pogue, was "unexcelled by any other officer his age in the Army."[4] On April 30th, 1919, Marshall was chosen by General Pershing to serve as his personal aide-de-camp. During this five-year stint Marshall learned several lessons from Pershing which would prove invaluable later in his career. Shortly after WWI, Congress began considering bills to reorganize the armed forces and create a standing army of half a million men. With Marshall by his side, General Pershing testified before the Senate and the House against the proposed standing army and instead suggested universal military training and a standing army of only about 275,000 men. Pershing's opponents eliminated the proposal for universal military training but abandoned the idea of a standing army of 500,000 men. The result was the National Defense Act of 1920, providing "an authorized strength of 17,726 officers and 280,000 men, and a structure for a standing regular army, general staff, organized reserve, and war plans division, which Marshall would eventually inherit in 1939."[5]

[2] *Roll, David L. George Marshall: Defender of the Republic. New York: Dutton Caliber, 2019. 20-21.*
[3] *Miller, Merle. Plain Speaking. Berkley, NY: C. 1973. Print. 203*
[4] *Roll 56*
[5] *Roll 65*

II. Rise to Prominence

In May of 1938, then-Brigadier General Marshall was ordered from his command of the 7th Infantry at Vancouver Barracks to the War Department at Washington where he was to act as head of the War Plans division and later become deputy chief of staff. Marshall's move coincided with the rise of Hitler's Nazi Germany to the level of an international threat, as the German chancellor set his sights on Czechoslovakia. With Chief of Staff General Marlin Craig's four-year term set to expire at the end of August, 1939, President Franklin Delano Roosevelt was carefully weighing his options for a replacement. As a brigadier general, Marshall was in consideration for the job, but was only 34th in seniority and outranked by 21 major-generals and 11 other brigadier-generals. On November 14, 1938, Marshall was called into the Cabinet Room at the White House for a top secret meeting with the rest of the War Department and President Roosevelt. In light of German Chancellor Adolf Hitler's military power and threat to take Czechoslovakia by force, Roosevelt announced that he had decided that the U.S. must expand its capacity to produce warplanes and, if necessary, lend them to countries in Europe to deter further German aggression. After he finished speaking, Roosevelt scanned the room for the military men's reaction and was met with the general approval of most of those present, with the exception of General George Marshall. Noticing Marshall's silence Roosevelt pressed him on the matter, saying "Don't you think so, George?" Moderately irritated by the President calling him by his first name, General Marshall replied that no, he did not think so at all. In Marshall's opinion, Roosevelt's proposal for an increase in air power was amateurish and oversimplified, as it failed to take into account the training required of the pilots and undermined the importance of ground

forces. Roosevelt was visibly surprised by Marshall's unabashed and outright disagreement and adjourned the meeting. Marshall's colleagues were certain that he'd just destroyed any chance that he had of becoming chief of staff, and bade him farewell after the meeting, thinking that his career in Washington was over.[6] But just as General Pershing had been impressed by a young George Marshall's unmitigated honesty and refusal to be intimidated by an authority figure, President Roosevelt thought highly of Marshall after their encounter. On April 23, 1939, President Roosevelt met privately with General Marshall, telling him "I have it in mind to choose up as the next Chief of Staff of the United States Army. What do you think about that?" Marshall made no visible reaction, simply answering "Nothing, except to remind you that I have the habit of saying exactly what I think…Is that all right?" Roosevelt smiled and answered with a yes.[7] Within days the *Los Angeles Times* was reporting on Marshall's appointment to chief of staff, running a story on April 28th titled "Army's Staff Chief Picked: White House Upsets Precedent in Naming Brig. Gen. Marshall." The article spoke to Roosevelt's faith in the man he chose over several superior officers and highlighted the rising concern over the situation in Europe, claiming that Marshall's selection as chief of staff "was immediately tied up with administration plans for solidarity of defense in the Western Hemisphere." [8]

III. Chief of Staff

Marshall was sworn in as Chief of Staff on September 1st. Two days later Britain and France declared war on Germany. Inheriting a small and unprepared army of 188,000 men, George Marshall was immediately tasked with creating a fighting force that could not only protect America from attack,

[6]Roll 111-112
[7]Roll 111
[8]"Army's Staff Chief Picked." *Los Angeles Times*. 28 April, 1939

but also take the fight to foreign soil. With the public strongly opposed to another war and a largely isolationist Congress, it seemed an impossible task. Marshall put the army's overall preparation needs at a staggering $50 billion in spending and decided that in the short term the absolute minimum for even a modest increase in the nation's defense capability was $650 million. Thus, when he learned of President Roosevelt's proposal to cut the military budget by $18 million in the 1940 election year, Marshall was apoplectic. He and Treasury Secretary Henry Morgenthau Jr. both initiated a meeting with the President to prevent this cut in spending, and though he initially dismissed their requests, Roosevelt relented after a discussion with General Marshall. Three days later with France crumbling under the German onslaught and Prime Minister Winston Churchill requesting aid, Roosevelt appeared before Congress and asked for a military appropriation of $1.1 billion. With reports of German victories pouring in from Europe, Congress voted to appropriate $300 million more than Roosevelt had initially requested.

This spending increase was not a one-time occurrence, as it had to not only be sustained, but increased over the next few years and then beyond to both prepare the U.S. for war and to fund the war effort once it had begun. Within the first ten fiscal months of 1941 total spending was already $10,087,080,696 greater than it had ever been in a peacetime year before, with $4,403,814,039 going to arms programs within that timeframe.[9] In addition to funding Marshall also needed to provide a dramatic increase in military manpower leading up to the U.S. entry into WWII. Some men, it seemed, were all too willing to enlist on their own accord. In 1940 then-Senator Harry S Truman met with Marshall in the hopes of enlisting in the Army. Truman reminded Marshall that he had

[9]"April Military Spending Tops ¾ Billion Dollars." *Chicago Daily Tribune*. 3 May, 1941.

trained young soldiers in WWI and asked to command a regiment. Marshall, who was sixty at the time, told the fifty-six year old Truman that he was too old to enlist. When Truman pointed out that he was four years younger than the general, Marshall replied "Yes, but I'm already in." [10] Despite Truman's eagerness, the necessity of a military draft was recognized by Washington and went unchallenged in the Senate, so Marshall was relieved of the impossible task of creating a sufficient army based on voluntary enlistment. The Chief of Staff encountered a hitch when the one-year service obligations of the first wave of 600,000+ draftees were fulfilled six months prior to the nation entering the war, but he narrowly petitioned Congress for an extension of these men's services (H.J. Res. 222 passed the House by one vote in 1941) due to the national interest being imperiled by the Tripartite Pact and Hitler's army extending into Russia. Preparing these men for war was another matter entirely. With time of the essence, Marshall approved a much-abbreviated training detail for the draftees consisting of little more than basic infantry skills, weapon proficiency, and limited combat tactics. When the U.S. finally entered the fight, these men were given their guns and hurried overseas.

As Army Chief of Staff, General Marshall was also presented with the decision of how the army would interpret the recent anti-discrimination provisions inserted by Congress into the Selective Training and Service Act of 1940. With *Plessy v. Ferguson* still the law of the land, the army was segregated. Ostensibly adhering to the "separate but equal" motto of segregation, black troops in the army were almost entirely relegated to menial labor or service jobs. But now with anti-discrimination legislation and the NAACP publicly calling for the desegregation of the army, Marshall was forced to confront the issue of race and

[10]Miller 204

decide on whether or not to progressively integrate the army. Unfortunately, Marshall was a staunch opponent of desegregation in the army, stating that "It is the policy of the War Department not to intermingle colored and white enlisted personnel in the same regimental organization" and rejecting the notion that it was the task of the army to solve the "negro problem" at "the expense of national defense." To save money on heating and shelter, General Marshall also sent black troops to train in the South where he knew they would face brutal treatment from white men and women. Two years before his death Marshall expressed regret for this action, but claimed that the treatment of black soldiers at the hands of white ones was "utterly beyond our control." Historian David L. Roll eloquently summarized General Marshall's record on race in his 2019 biography, *George Marshall: Defender of the Republic*:

"Though there is evidence that Marshall believed a movement to investigate "'brutal treatment' of negro army personnel" was backed by Communists, he was never outwardly hostile toward black soldiers. Rather, he was a blend of indifference and condescension, probably driven, as was Roosevelt, by racist beliefs that African Americans were fundamentally inferior to white people. One could try to explain Marshall's attitude toward race by saying he merely reflected society at large, that he was a captive of his times. But Marshall was by no means a conformist. He was capable of rising above army tradition and societal mores. In the case of racial integration, however, he did not rise, convincing himself that war was not the time for engaging in social experimentation."[11] Marshall was a man rigidly true to his beliefs and had no fear of challenging the status quo. He was not a follower, but a leader. As an operations officer in WWI he talked back to the

[11]Roll 149

commander of the AEF and twenty years later as a brigadier general he challenged the President of the United States in the Cabinet Room of the White House. If his personal belief on any issue ran counter to that of his superiors, General Marshall was willing to die on that hill. By rejecting calls to integrate the military and choosing to continue the status quo set by *Plessy v. Ferguson*, George Catlett Marshall may well have revealed himself as a staunch opponent to racial progressivism. By the time Pearl Harbor was bombed and the U.S. declared war on Japan on December 8, 1941 and on Germany and Italy three days later, George Marshall had presided over a fortyfold increase in America's military manpower, turning the 188,000 man army he inherited into a civilian army of over 8 million solders within two years. Marshall's organizational skills were on full display in the early years of the war, and he was personally responsible for bringing men like Dwight D. Eisenhower, George S. Patton, and Omar Bradley to their prominent roles in WWII. Having maintained a "Germany first" policy to the wars in the European and Pacific theaters, Marshall was a key figure in the planning of the invasion of Europe that was Operation Overlord. It seemed a foregone conclusion that the Chief of Staff would become the Supreme Commander of the Invasion, but that turned out not to be the case. Roosevelt was caught between Marshall and Eisenhower for the role and was unsure if it would be wise to remove Marshall from his duties as chief of staff to send him overseas. It became apparent to Marshall that if he wanted command of the invasion, he would have to ask for it, something the general was too proud to do. When Roosevelt asked him point-blank what he preferred, Marshall remained noncommittal and advised the President to act "in the best interests of the country" and

"not in any way to consider [Marshall's] feelings." Roosevelt responded "Well, I didn't feel that I could sleep at ease if you were out of Washington." [12] With that, Marshall remained in Washington as Chief of Staff while Eisenhower became the Supreme Commander of Operation Overlord. Marshall coordinated Allied efforts throughout the remainder of the war and was made America's first five-star general in December of 1944. With Roosevelt's health rapidly deteriorating in early 1945, the four-term president handed all matters of diplomacy with Prime Minister Winston Churchill over to George Marshall. Marshall was declared *Time* magazine's Man of the Year for 1943 and resigned as Chief of Staff after the conclusion of WWII. Dwight Eisenhower succeeded him as Chief of Staff. On November 26, 1945 Marshall was photographed at a courtyard ceremony with President Harry S Truman who was congratulating the general on his resignation as Chief of Staff. The very next day Truman called Marshall at his Virginia residence and asked him to go to China as a special envoy to broker a peace between Nationalists and Communists. Marshall replied "Yes, Mr. President" and hung up. It was not the last time Truman would ask Marshall to postpone his retirement to serve his country.

IV. Secretary of State

While Roosevelt clearly saw Marshall as a talented and dignified general, Truman would come to regard him as the greatest American he'd ever met. Marshall immediately developed a reputation of unmatched dependability with President Truman, who remarked in a post-presidency interview that Marshall "had no more than announced his retirement [as chief of staff] and he and Mrs. Marshall had moved down to a new home in Virginia when I had to call on him to undertake another job." [13]

[12] *Roll 294*
[13] *Miller 235*

Marshall was sent to China as special ambassador, but returned in 1947 after he failed to produce a coalition government between Chiang Kai-shek's Nationalist and Mao Zedong's Communist Parties. Upon his return from China, Marshall became Truman's Secretary of State. Though shrewd and capable, Marshall was not a politician, and he passed along many of the responsibilities of the Secretary of State to his under-secretary, Robert A. Lovett. This is not to suggest that he did not have much influence on the proceedings in Washington from 1947 to 1949–indeed the opposite is true. Though Marshall was largely uninterested in the minutiae of the Secretary of Defense position, he was a staunch advocate for the nation's increased presence in foreign affairs. Marshall recognized that the post-WWII world was in a "political crisis" and claimed that any attempt to return to "economic isolationism" could have disastrous implications.[14] On June 5, 1947, Marshall gave a speech at Harvard University that would serve as the basis for the economic recovery program that would later bear his name. In his address, Marshall spoke of the importance of providing for the postwar recovery of Europe, which he claimed had just experienced an unprecedented economic collapse. "It is logical," Marshall said, "that the United States should do whatever it is able to do to assist in the return of normal economic health in the world, without which there can be no political stability and no secured peace."[15] The resulting Marshall Plan, hailed by Winston Churchill as "the most unsordid act in history," appropriated over $15 billion for the recovery of Western Europe and was instrumental in rebuilding the infrastructure of many critically damaged nations. Despite his perhaps more crucial role in preparing the country for WWII, in the eyes of the American public this was undoubtedly the highlight of George Marshall's career.

[14] "World in a Political Crisis, Marshall tells Senate Body." *New York Times*. 15 February, 1947.
[15] "The Address of Secretary Marshall at Harvard." *New York Times*. 6 June, 1947.

Though its passage and implementation were handled mostly by President Truman and Congress, Marshall was seen as the man behind the European Recovery Program and his reputation as a statesman increased dramatically. In addition to potentially saving Europe from economic collapse, the Marshall Plan strengthened America's alliances and precipitated the creation of the North Atlantic Treaty Organization in 1949. For his role in the recovery of Western Europe, Marshall was again named *Time* magazine's Man of the Year in 1948 and later received a Nobel Peace Prize in 1953. The Marshall Plan was also perhaps the informal beginning of the Cold War. Marshall had included the Soviet Union in his Harvard Address as he did not want to create feelings of animosity between the nations by explicitly excluding the communist power, but the officials behind the implementation of the Marshall Plan knew that even if Stalin would have elected to participate in the recovery program, provisions for Soviet aid would have died in Congress. Stalin did indeed reject the offer to participate in the recovery program and a key part of the Marshall Plan's legacy was transformed into a political tool used to stymie the spread of communism and to encourage the free-market economy. George Marshall resigned from his position as Secretary of State due to health concerns on January 7th, 1949.

V. Rising Importance of National Security and Foreign Affairs

Throughout Marshall's tenure as Secretary of State and in the months that followed, the Cold War and the increasing necessity of defense spending were constant talking points within the Truman administration and the American media. While the Truman Doctrine and the Marshall Plan both promoted the containment of communism overseas, providing for the safety and

security of the United States within its own borders became an issue of rising importance among Washington officials. During his first term President Truman was beset with constant financial questions and between 1945 and 1948 "had tried to strike a balance between the warfare state and the welfare state."[16] Though Truman believed in a balanced budget and tried to rapidly demobilize the armed forces after WWII, fears of Soviet aggression ultimately led his administration to continue to increase defense spending. Marshall himself spoke out against the President's plans to shrink the military, equating demobilization with a reduction of America's global role and responsibilities.[17] After the 1948 communist coup in Czechoslovakia, Truman reversed course and asked for a defense budget of $9.8 billion for 1949, which Congress approved. The increasing importance of defense spending coincided with America's emergence as a global superpower with expanding influence outside its own borders. Gone were the days of non-interventionism propagated by the administrations of Warren G. Harding, Calvin Coolidge, and Herbert Hoover. Deep-seated conservative fears over entangling alliances were realized in 1949 by the creation of the North Atlantic Treaty Organization which international media hailed as the "Tombstone of American Isolationism."[18] While he may have been reluctant to increase defense spending, Truman did not hesitate to thrust America to the forefront of international politics. "There is no room for economic isolationism in a world torn between freedom and Communist tyranny," he said in May of 1948, "The United States has no choice but to work with the free nations of the globe in mutual assistance and partnership."[19] Between 1945 and 1949, America's foreign relations—alliances and rivalries both—were strengthened to an extent never before seen in peacetime years. For Marshall's purposes,

[16]Hogan, Michael J. *A Cross of Iron*. Cambridge: Cambridge University. 2007. Print. 119
[17]"Marshall Warns on Rapid Cutting of Armed Forces." *New York Times*. 30 October, 1945.
[18]"Significant Point in Atlantic Pact." *The Times of India*. 20 March, 1949.
[19]"Truman Warns Against Rebirth of Isolationism." *Daily Boston Globe*. 14 May, 1950.

the single greatest factor in determining his future was the outbreak of the Korean War in the summer of 1950. Truman and Dean Acheson—Marshall's successor as Secretary of State—both agreed that the United States had an obligation to intervene on South Korea's behalf when communist North Korea invaded in late June. Though the U.S. ostensibly scored an early victory with the Battle of Inchon, the subsequent northward march into Seoul was slow and revealed the nation's lack of preparation for war, with the Truman administration's hesitancy to appropriate funding for the nation's defense being a key factor. Truman was heavily criticized for America's lack of readiness for the war in Korea, and he determined that a political move had to be made to renew the public's confidence in his administration. Unfortunately for Secretary of Defense Louis A. Johnson, that political move would be a call for his resignation.

VI. Johnson's Failure, Marshall's Return

As Truman's Secretary of Defense from March 28th of 1949 to September 19th of the following year, Louis A. Johnson is best described as a fiscal conservative who was particularly focused on transforming the needs of the military to fit the budget rather than transforming the budget to fit the needs of the military. During his time in office Johnson was a strong ally for Truman in his economization of the defense budget and often sought to reduce spending even in the face of passionate resistance from those in the Department of Defense. Though Johnson was a rigid follower of Truman's economic policy, it was he who would shoulder most of the blame for the nation's failure to hit the ground running in Korea. While Johnson had approved Truman's budget of $13.3 billion in defense spending for 1951, he was forced to propose a supplemental increase of $10.5 billion after only one month of

fighting in Korea. Though he was not the only man at fault for the crisis in Korea, Johnson did himself no favors in Washington. He had a belligerent, abrasive personality that was endearing neither to his peers nor the American public. To combat the ebbing confidence in his administration's defense capabilities, Truman called for Johnson's resignation, replacing him with an old friend, General George Marshall. The *Los Angeles Times* ran a story on the end of Johnson's time as Secretary of Defense which was sympathetic to the outgoing Secretary for the blame he took for Truman's economic policy, but critical of the lack of decorum that precipitated his removal: "As for Johnson, he is something of a scapegoat for the failings of a clumsy administration. Many of Johnson's supposed errors were in fact the mistakes of Harry S. Truman. Johnson was brash and incautious in his utterances, bombastic, assertive, and too rough on anyone who disagreed with him. But his policy of trying to save some money was good policy; that he tried to save it in some of the wrong places is an observation of hindsight. However, it is the duty of a Cabinet officer not only to be right, whether his chief is or not, but it is also the duty of a Cabinet officer to retain the public confidence. Here Johnson failed; and Marshall should succeed."[20] In his final remarks before leaving office, Johnson added that "When the hurly burly's done and the battle is won I trust the historian will find my record of performance creditable, my services honest and faithful commensurate with the trust that was placed in me and in the best interests of peace and our national defense."[21] Though Johnson's intentions may have been honest, he is ranked by many historians as among the least successful Defense Secretaries. When replacing Johnson, Truman knew that Marshall's success in his unprecedented military mobilization as Chief of Staff in

[20]"Marshall, Defense Secretary." *Los Angeles Times*. 14 September, 1950.
[21]"Louis A. Johnson." *Historical Office of the Secretary of Defense*. Web. 09 Nov. 2020

WWII would lend itself well to the pressing situation with Korea, and he knew that Marshall had the confidence of many of the American people in military matters. With his years of service as Secretary of State to build from as well, President Truman recognized that there was no man better suited for the job at hand than General George C. Marshall. Marshall was out fishing in Michigan when his wife received a call from President Truman asking about the former Secretary of State. "He's fishing up in Michigan," Mrs. Marshall replied, "I guess you want to get him in trouble?" Truman told her that yes, he did. "Well, go ahead," Mrs. Marshall answered, "He'll go anyhow." When Truman finally got on the phone with the general several hours later, he told him that he would like Marshall to serve as the new Secretary of Defense. Marshall responded "Yes, Mr. President," and hung up the phone.[22]

VII. Confirmation

On the morning of September 13th, 1950, Chairman of the House Armed Services Committee Carl Vinson received the following letter from President Harry S Truman "My Dear Mr. Chairman: Attached is a draft of legislation which would permit Gen. George C. Marshall to serve as Secretary of Defense. I request that you lay this matter before your committee with a view to obtaining early and favorable action by the Congress. I am a firm believer in the general principle that our Defense Establishment should be headed by a civilian. However, in view of the present critical circumstances and of General Marshall's unusual qualifications, I believe that the national interest will be served best by making an exception in this case. Sincerely Yours, Harry S Truman"[23] Chairman Vinson immediately called for a full committee discussion on the nomination of General Marshall to serve as the 3rd

[22] Miller 236-237
[23] U.S. House. Committee on Armed Services. *Full Committee Discussion on Appointment of General Marshall as Secretary of Defense*. September 13, 1950. 7289

Secretary of Defense for the United States of America. It would not be a routine meeting. To ensure civilian control of the military, U.S. law clearly stated that the office of Secretary of Defense was to be held by a civilian—which as an active five-star general, George Marshall was not—who had not served in the military within ten years prior to his appointment. Now, just three years after the position had been created in the National Security Act of 1947, Congress was faced with the decision to either temporarily sacrifice civilian control of the military or to uphold the law and turn away the man most qualified for the job. It was immediately clear that most representatives present at the meeting had no intention of rejecting the nomination of General Marshall to serve as Secretary of Defense in the middle of the Korean War. The only question was how they could confirm the nominee without changing the law and sacrificing the sacred principle of civilian control of the military. The most logical solution was the creation and passage of a waiver granting a one-time exception for General Marshall to serve as Secretary of Defense. Texas Representative Paul J. Kilday, who was in favor of Marshall's nomination, stated that "If this is reported and passed, it is because of the confidence we have in General Marshall." Chairman Carl Vinson, a Georgia Democrat, justified the waiver, claiming "We are not disturbing in the slightest degree the broad fundamental, well-founded principle of civilian control." While most representatives agreed with this ideological interpretation of the one-time exception, New York Republican Representative William S. Cole quickly fired a rebuttal to Vinson, saying "What do you mean you are not disturbing it, Mr. Chairman? You are setting it aside and nullifying it completely, the principle." When Vinson responded that the principle was only being set aside once in an

emergency situation, Cole rebuffed "That certainly is disturbing it."[24] Vinson again responded to Cole's challenge, arguing that "When you bring a new man in, a civilian, it will take him 5 or 6 months or a year to begin to grasp the working of the Military Establishment of the Government. General Marshall, having had a long and honorable military career, can go right straight along with it."[25] Cole, unsatisfied, shot back that if a military man is so much better in doing the job than a civilian, they might as well just remove the requirement completely. Vinson denied the false dichotomy of leaving the law untouched or removing it entirely, again claiming that an exception was only being made due to an emergency situation. Maryland Representative Landsdale G. Sasscer, a Democrat, challenged Vinson's explanation but not his decision. "Mr. Chairman," Sasscer asked, "isn't the reason possibly a little different from that? It isn't so much suspending it on account of the emergency. If that was the reason, we could suspend it on any emergency. Isn't the real reason the unbound confidence we have in General Marshall as a man, regardless of whether he has been in the military or not?"[26] Sasscer raised a good point, one that Vinson would not deny. Though the U.S. was certainly in an emergency situation regarding the Korean War, this was not just any military man being nominated to Secretary of Defense, this was General George C. Marshall, former Chief of Staff, former Secretary of State, and undeniably the best man for the job. Were Marshall's credentials not so unparalleled and uniquely suited for service in the present situation, Truman and Congress would have chosen the path of least resistance and sought out a civilian to hold the office of Secretary of Defense. But due to the national emergency that was the Korean War, neither President nor Congress was willing to settle for any less than the man who would best serve his

[24]U.S. House. September 13, 1950. 7293.
[25]U.S. House. September 13, 1950. 7293.
[26]U.S. House. September 13, 1950. 7293-7294.

country. When it came time for the closing arguments before the meeting was adjourned, Sasscer again made a brilliant and impassioned statement on the greater emphasis of Marshall's unique qualifications rather than the national emergency "Mr. Chairman, I haven't too much difficulty about [the proposed waiver]. I approach it from possibly a somewhat different angle. I think that the time is more of a factor than the question of the emergency. We know that the matter of hours and days are important. I don't put as much stress on the danger of the military man being head of the Defense Establishment—although I think that as a matter of precedent it is better not to have the military man—as I do on the structure of the legislative monstrosity known as the Unification Act under which, as we have seen it administered, you are building up an unlimited power in that head. I think it is vitally important for this committee and the Congress to try to relieve some of the power they have given away to the military. Whether you are a civilian, [or] in the military makes little difference. Neither Hitler nor Mussolini came from the military, but they had unlimited power and they bought badge and uniforms afterward. So I think it all boils down to a simple issue that General Marshall is an outstanding American. He is a good administrator. He will relieve the situation over there concerning which many of us have been disturbed for some time. We are exceedingly fortunate to be able to get his services. I will vote for the bill without any difficulty."[27] Thereafter the meeting was adjourned until a vote was to be called two days later on September 15th. An hour later on the same day, Chairman of the U.S. Senate Committee on Armed Services Millard Tydings (D-Maryland) called a meeting to discuss the very same waiver. This meeting was very similar to its House of Representatives counterpart and many

[27]7299-7300.

senators expressed the very same sentiments of their peers in the House. Like Chairman Vinson, Chairman Tydings harped on the unique qualifications of General Marshall and the extreme circumstances regarding the crisis in Korea. Most senators clearly agreed with the chairman and sought to do the same as the House had done only hours earlier, that being approving the nomination of General Marshall to serve as Secretary of Defense without permanently sacrificing civilian control of the military. Again the solution seemed to be a one-time exception to the law and a forty-two year-old senator by the name of Lyndon B. Johnson (D-Texas) rose to make his argument "I feel because of the peculiar circumstances surrounding General Marshall and the fact that the people feel as they do about him and the further fact that he has washed some of the military background off himself as Secretary of State, that we should make an exception under these circumstances for the man, George Marshall, but not for any other military leader, and if we are ever confronted with it, we ought to face up to it at that time just as we are facing up to this."[28] Most senators agreed with the future president, but Senator William F. Knowland, a Republican from California, was not one of them. Senator Knowland recognized Marshall's accomplishments and qualifications but opposed the passage of the waiver because of his strong belief in maintaining civilian control over the military. "If this nation is so bankrupt that out of our 150 million people there is no other man qualified to take this position, why, that is something else again," he remarked, "I do not believe that is the case." Knowland also showed his fears over a 'one-time exception' setting a dangerous precedent, saying that "Once having waived the law, it is going to be far easier for the President or any President to ask for its waiver a second time."[29] Several other

[28] U.S. Senate. Committee on Armed Services. *Letter of President on General Marshall's Appointment: Report of Proceedings*. September 13, 1950. 5-6.
[29] U.S. Senate. September 13, 1950. 7-8

senators agreed with the sentiment expressed by Senator Knowland, but for the most part those present did not think that a one-time exception to the National Security Act in a time of war would irreparably damage the principle of civilian control of the military. Senator Edward Gurney (R-Florida) spoke passionately in favor of Marshall's appointment "I believe the American people will immediately after this appointment remember the great confidence they had in General Marshall and the super manner in which he handled the World War II effort as Chief of Staff. It is my feeling and always has been that the people of the United States owe probably as much to General Marshall as to any other man in the period of World War II, any other man in Government any place. Therefore, my vote will be cast in favor of the language in front of us."[30] When roll was called the motion to consider the bill was passed in the senate with only two votes against it, coming from Senators Knowland and Harry P. Cain (R-Washington). The official vote for the waiver was set for both the House and the Senate on September 15th.

The House of Representatives passed H.R. 9646 authorizing Marshall to serve as Secretary of Defense on a one-time exception to the National Security Act after a brief debate on September 15th. Representative Dewey Short, an excitable Republican from Missouri, highlighted the debate by calling Marshall a "catspaw and a pawn" brought back to government "to bail out desperate men who were in a hole," those men being Dean Acheson and Harry S Truman.[31] Aside from Dewey's dramatics, the debate was unspectacular and the motion passed easily by a vote of 220-105. The breakdown of votes is as follows:

Yea: Democrats—192	Republicans—27
Nay: Democrats—5	Republicans—100

The Senate also debated on the passage of the waiver on September 15th. While the

[30] U.S. Senate. September 13, 1950. 15
[31] Roll 564

previous sessions regarding Marshall's nomination had gone rather smoothly, this one would not. With most of the Senate in favor of the waiver allowing Marshall to serve as Secretary of Defense, Senator William E. Jenner, a McCarthyite Republican from Indiana, launched into a hysterical, hour-long diatribe against General Marshall, the Democratic Party, President Harry S Truman, Franklin D. Roosevelt, and Secretary of State Dean Acheson. In his twelve years in the Senate, Jenner would develop a reputation as being second to only the infamous Joseph McCarthy in his shameless, fear-mongering claims that the U.S. government was corrupted by a vast conspiracy of Communist agents. After a far too lengthy career, Jenner refused to seek a third term in 1958, saying that he was disgusted and tired of Washington. As far as Washington was concerned, the feeling was mutual. But on September 15th, 1950, Jenner was as present as ever, and he would not let the proceedings end before he had spoken his mind in full. After obtaining the floor, Senator Jenner first stated that he would not yield until he had concluded his prepared remarks, then began his now-infamous speech laden with historical inaccuracies, unsubstantiated conspiracy theories, baseless accusations, and marked by a sensationalist understanding of international foreign policy. Not only did Jenner make an incredibly personal attack on General Marshall who was a hero in the eyes of the American people, the Senator further shocked his peers by disparaging the late Franklin D. Roosevelt, who held the confidence of the American people over the course of his unparalleled twelve years as President of the United States, winning all four elections with no less than 81.4% of the electoral vote. Senator Jenner began his hyperbolic attacks by accusing the Truman administration of covering up "the most

frightening betrayal of America in history" and hiding the truth "of how the Democratic Party has been captured from within and used to hasten our destruction, both from within and without, during these tragic years." The sheer boldness of these opening remarks no doubt came as a shock to most individuals present, as over the last eighteen years two Democratic presidents had seen the nation through the Great Depression and World War II—if they wanted to destroy America, the Democratic Party would have succeeded long ago. Of course, these observations were lost on a man like Jenner, who continued undaunted, shouting that "the time has come to expose this whole sordid, tragic conspiracy in which we are caught." And what of General Marshall, the military man who had dedicated the past forty-eight years of his life to the service of his country? Senator Jenner called him "a front man for traitors" and "a living lie." By this point at least one senator, Majority Leader Scott W. Lucas (D-Illinois), had heard enough, asking if Jenner would yield the floor, a request that the McCarthyist firebrand promptly shot down. Returning to his attack on General Marshall, Jenner claimed that the former Secretary of State "has helped to betray his solemn trust and to set the stage for the staggering Soviet victory that is sweeping across the earth." Before moving on to the "facts," Jenner delivered one more particularly insulting attack to Marshall's character "General Marshall has either been an unsuspecting, well-intentioned stooge, or an actual co-conspirator with the most treasonable array of political cutthroats ever turned loose in the executive branch of our Government."[32] The sheer violence with which the words were said and the magnitude of the accusations leveled against a lifelong military man of exemplary dignity and poise made Senator Jenner wildly unpopular with his peers, but for his part, Jenner never

[32] U.S. Senate. Committee on Armed Services. *Appointment of Gen. Marshall to Serve as Secretary of Defense.* September 15, 1950. 14913

thought twice about his conduct. "I've never regretted that," he said years after his tantrum on the Senate floor, "I nailed him [Marshall], but I paid a hell of a price for it. A lot of people never got over what I said, but I would say it again."[33] But Jenner wasn't finished. He accused Marshall of being part of a conspiracy with President Roosevelt wherein secret commitments regarding the U.S. entry into WWII were made with the British between the years of 1939 and 1941. Thereafter, Jenner absurdly denounced General Marshall for the extension of aid to the Soviet Union under the Lend-Lease Act in 1941. Though this aid was of course sent to the Soviet Union not with the intention of creating a communist empire, but in an effort to defeat Nazi Germany, it was clearly enough—at least in Jenner's mind—to label George Marshall a communist sympathizer. Jenner, apparently intent on holding the general accountable for the acts of his wartime presidents, also attacked Marshall for the agreements made with the Soviet Union at the Yalta and Potsdam conferences. The Senator from Indiana rambled through several other 'acts of treason'—hiding President Roosevelt's health from the American people, trying to stop the civil war in China, supporting the United Nations (which Jenner called "a ruthless instrument of power politics")—before turning his attention to the Marshall Plan. Despite its reputation as a communist deterrent in Western Europe, Jenner claimed that the Marshall Plan was "pouring into Soviet hands the war materials and potential which has enabled her to continue her fantastic armaments race and her growing conquest of the world."[34] He finished his remarks by insulting President Truman and Secretary Dean Acheson. Years after his presidency, writer Merle Miller asked President Truman how to explain a man like Senator Jenner. "There's no explaining him," Truman responded, "Birds like that

[33] "Anti-Communist Ex-Senator Jenner Dies." *Los Angeles Times*. 13 March, 1985.
[34] U.S. Senate. September 15, 1950. 14916

are just part of the dirt that comes up when we're in for a run of hysteria in this country. He's just one of the dirty sonsabitches that gets elected to the Senate and elsewhere when we're going through one of those periods."[35] Unflappable as always, Marshall didn't even dignify Jenner's comments with a response. When he was told about the attack on his character a day or so later, he simply remarked "Jenner? Jenner? I do not believe I know the man."[36] Perhaps the most unfortunate part of Senator Jenner's outburst was that it irreparably damaged the arguments of Senators Knowland and Cain, while dooming the efforts of the other one hundred twenty-seven Republicans and six Democrats who would vote "no" on H.R. 9646 in an effort to prevent a military man from serving as Secretary of Defense. While the debate had previously been on the grounds of the principle of civilian control of the military, Senator Jenner's personal attack on George C. Marshall roused several of his fellow senators—Republicans and Democrats both—to stand and speak in defense of the general's character. Jenner's speech completely shifted the tone of the proceedings from professional to personal, and the conviction of those who believed no military man should ever serve as Secretary of Defense was lost in the process. When Senator Jenner finally concluded his statement, Senator Leverett Saltonstall, a moderately conservative Republican from Massachusetts, rose and addressed the presiding officer and gave an impassioned rebuke of Jenner's remarks. Senator Saltonstall went on to echo the sentiments of most members of Congress who had made their cases regarding the waiver on September 13th, saying that he was in favor of civilian control of the military but would vote in favor of the bill due to the emergency situation and the general's unique qualifications. Thereafter the debate continued largely along party lines, but with

[35] Miller 238
[36] Roll 564

some other Republicans standing with Senator Saltonstall in defense of General Marshall's character. Ultimately, H.R. 9646 passed in the Senate by a vote of 47-21. The voting breakdown is as follows:

Yea: Democrats—37	Republicans—10
Nay: Democrats—1	Republicans—20

Despite Senator Knowland's concerns over the Marshall waiver setting a dangerous precedent for future presidents to ignore the requirement that the Secretary of Defense position be filled by a civilian, General Marshall remained the only individual granted such a waiver for sixty-seven years until President Donald J. Trump nominated General Jim Mattis. Public reaction to the passage of H.R. 9646 was more directed at the lack of decorum on the part of men like Dewey Short and William Jenner than the bill itself. The *New York Times* ran a headline the next day titled "Congress Votes Marshall Bill in Unusually Bitter Sessions" that contained the reactions of several senators to Jenner's outburst. Democratic Senator Scott W. Lucas, for example, called Jenner's speech "reprehensible, irresponsible, the most diabolical speech in a hall of Congress that I have ever heard in sixteen years here!"[37] With the passage of H.R. 9646, Marshall's confirmation was all but assured, with his hearing before the Senate set for September 19th. Marshall's confirmation hearing on September 19th before the Senate Committee on Armed Services lasted only fifty-five minutes. Throughout the questioning, General Marshall was dignified, quiet, and answered all questions quickly and succinctly. The confidence that most of the senators on the committee had for Marshall was immediately apparent, as Senators Russell, Gurney, Byrd, Saltonstall, Chapman, Morse, and Johnson all began the session by voiding their time for questions and simply expressing their gratitude to the general for his willingness to once again serve his

[37] William S. White. "Congress Votes Marshall Bill in Unusually Bitter Sessions." *New York Times*. 16 September, 1950.

country. Even Republican Senator Harry P. Cain, who would vote against Marshall's confirmation, had only good things to say about the nominee " I want to say to General Marshall that because he is a military man—and I like to point out that he is one of the most distinguished persons in the annals of American military history—who has been nominated for the post of Secretary of Defense, which I believe completely should be filled by a civilian, there is absolutely nothing I can or would do to secure this post for General Marshall. If General Marshall were a combination, which no man can possibly be, of the finest characteristics of Alexander, Caesar, Napoleon, Wellington, Grant, Lee, Foch, Pershing, Eisenhower, and Bradley, I would not vote to confirm General Marshall as Secretary of Defense. In my opinion, America will not solve her problems by endeavoring to find a soldier, old or young, to carry burdens which ought to be borne and conquered by ordinary civilians. I wish, however, to state directly to General Marshall that should the Armed Services committee favor your nomination, and if the Senate confirms it, as seems most likely, the Senator from Washington [Cain himself] will stand always ready to be of assistance to your responsibilities in every conceivable way. Upon the assumption that you will shortly become America's Secretary of Defense, I wish you well, sound health, and a long life."[38] Senator Cain's effusive praise for the man whose nomination he would vote to oppose may well have been a conscious effort to distance his dissent from Senator Jenner's personal attacks just a few days prior, but it was an honorable moment of cooperation and support while staying true to one's principles. Senator Knowland, who voted no on H.R. 9646, was next to question Marshall, asking him a series of questions about the situation in Korea. Marshall offered no new information about the

[38] U.S. Senate. Committee on Armed Services. *Nomination of General Marshall to be Secretary of Defense*. 19 September, 1950. 2-3

Korean War, simply stating that the key decisions were made by the Truman administration after he had ceased serving as Secretary of State. Senator Knowland then asked General Marshall about his thoughts on the possibility of arming Western Germany "either as a police force or in a more extensive way." Marshall declined to go into details, claiming "I have not formed my own opinion because I have not heard any discussion other than what I have read in the newspapers, so I would be speaking entirely on a very superficial basis of information." Senator Knowland, acknowledging that Marshall was sure to be confirmed as Secretary of Defense later that day, said that he was asking because the prospect of arming Western Germany had been broached in relation to the newly created North Atlantic Pact. Marshall assured the Senator that if he was indeed to be confirmed, he would familiarize himself with the issue by speaking with the Chief of Staff, State Department, and President Truman. Marshall was not a man who spoke on matters that he did not fully understand. Senator Knowland's Cold War-centered line of questioning continued as he next asked for Marshall's opinion on making Spain "a unit to defend Western Europe against the possibility of Soviet aggression." Marshall mentioned that he had, as Secretary of State, formed an opinion on the matter, but in the months that had passed between his resignation and the present, was missing key intel from the British, Belgians, Norwegians, and the French who had particular influence on such a matter, and therefore thought it unwise to give what might by then be an outdated or irrelevant opinion. Secretary Knowland asked a few more questions before yielding his time, each of which received a similarly noncommittal response from the general. Senator Johnson had only one question for Marshall, simply asking if he had ever made any public statements

about the necessity of civilian control of the military. Marshall replied that long ago when he had first joined the army, he had made a statement that for the Army to achieve progress the Secretary of War should be a soldier, but he claimed that after living through some major events in military history, he later came to the conclusion that the Secretary of War should never be a soldier. Though he was not even a member of the Committee on Armed Services, it was again Senator Jenner who drew the most attention at the hearing. Clearly using his platform to boost his own political figure rather than seek answers, Senator Jenner introduced a list of outrageous questions to be asked of General Marshall, much to the chagrin of the other men present. Senator Jenner presented these questions in the form of a letter to the members of the Senate Committee on Armed Services and, as chairman, Senator Millard E. Tydings (D-Maryland) was tasked with reading them to the general. After reading Senator Jenner's letter and growing frustrated with nature of the questions that were about to be asked, Senators John Chandler Gurney (R-South Dakota) and Leverett Saltonstall (R-Massachusetts) requested that the questions be asked off the record in a private executive session. Senator Lyndon B. Johnson (D-Texas) called Senator Jenner's questions "irritating," but argued that since the questions would be made available to the public as a result of being introduced during the open session, the answers should be made public as well. Chairman Tydings put the matter to a vote, and those in favor of asking the questions in the open session carried the majority. Obviously aware of the content of Jenner's character, Senator Tydings apologized in advance to General Marshall for the questioning that he was about to begin and emphasized the fact that the questions were not written by him. Jenner's first question asked why Marshall

had permitted the signing "of the lend-lease agreement with Russia which gave the Russians priority on our war matériel at the expense of American fighting forces." Marshall replied that he did not sign the lend-lease agreement, but that it was signed with the obvious intent of defeating Nazi forces. The next few questions contained inflammatory language, absurd presuppositions, and were intended to further Jenner's narrative that Marshall was a communist sympathizer intent on destroying America. There was discussion of Marshall's postwar failure to set up a coalition government in China which Jenner characterized as an endorsement of a Mao's regime, but Chairman Tydings and the rest of the Committee on Armed Services steered the line of questioning away from such ridiculous conspiracies. Jenner's next question portrayed the Marshall Plan as Soviet aid before being followed with "Are you in favor of surrendering American sovereignty into the hands of an international superstate and the turning of the American Armed Forces into a permanent foreign legion?" It is unclear how Jenner expected this question to play out, but Marshall, amused, replied "That pretty well covers the water front. No; I am not in favor of that."[39] Jenner's questions concluded with a weak effort to cast blame on General Marshall for the American losses during the bombing of Pearl Harbor before the Committee recessed before convening in a private executive session wherein Marshall was confirmed by a vote of 9-2. General George C. Marshall was confirmed by the whole Senate the following day by a vote of 57-11. The vote breakdown is as follows:

Yea: Democrats—42	Republicans—15
Nay: Democrats—0	Republicans—11

VIII. Secretary of Defense

When Marshall's duties began as Secretary of Defense, General Douglass MacArthur had just completed a bold and surprisingly

[39] U.S. Senate. September 19, 1950. 24

successful amphibious landing at Inchon. The Pusan perimeter quickly collapsed after MacArthur's landing and the invading North Korean People's Army was rapidly pushed northwards. By October 1st, the 38th parallel had been restored and South Korea was under United Nations' control. Originally, Truman had approved military intervention in Korea with the goal of returning the region to its former borders. But with the NKPA retreating northward, the joint chiefs and the State Department encouraged Truman to authorize MacArthur to pursue the fleeing NKPA forces across the 38th parallel and destroy them. While newly-confirmed Secretary of Defense Marshall did not necessarily believe in an invasion of North Korea, he agreed that MacArthur should be allowed to pursue the retreating NKPA forces and advised President Truman as such. On September 27th, Marshall approved a directive for MacArthur to peruse and destroy NKPA forces north of the 38th parallel, with Truman approving the directive later on the same day. However, U.S. General Walton Walker had indicated that he would halt his Eighth Army at the 38th parallel until he was expressly authorized by the UN, not the U.S., to move further north. Due to the overwhelming likelihood of a Soviet veto, President Truman maneuvered to bypass the issue of UN approval by claiming that MacArthur found operations north of the 38th parallel to be a matter of military necessity. On September 29th, Marshall personally sent an "eyes only" message to MacArthur stating that instead of waiting for UN approval, MacArthur and all of his field commanders should "feel unhampered tactically and strategically to proceed north of the 38th parallel." MacArthur responded by saying that "Unless and until the enemy capitulate I regard all of Korea open for our military operations." To this comment, Marshall made no response. Given the benefit of

hindsight, the decision to allow General MacArthur to pursue NKPA forces north of the 38th parallel was the greatest mistake of George Marshall's career. On October 19th, 1950, Chinese forces surprised MacArthur and U.S. intelligence by entering the war and pushing the UN forces back into South Korea. For the remainder of the war ground forces were locked into a stalemate near the 38th parallel while the U.S. began a massive bombing campaign against North Korea. General MacArthur was removed by President Truman following a series of remarks perceived as critical to Truman's policy, a move which was extremely unpopular with the public who welcomed the general as a hero on his return home. With Marshall's military background taken into consideration an important interpretational question is raised: Were the fears of Senator Knowland and Senator Cain over sacrificing civilian control of the military realized during General Marshall's tenure as Secretary of Defense? While it is unknown how a civilian Secretary of Defense would have reacted to the situation presented to George Marshall regarding the decision whether or not to pursue the NKPA past the 38th parallel and into North Korea, Marshall's decision was undoubtedly rooted in his own experience as a general. George Marshall was both a general and a statesman, but he was never a politician. Before being promoted to Chief of Staff, he believed in 1939 that, as a brigadier general, he knew better than President Franklin Delano Roosevelt when the latter proposed an increase in the nation's manufacturing of warplanes. Marshall believed that while the military was to take orders from the president and from Congress regarding foreign policy, the means for achieving the intent of its superiors should be left to the discretion of the military's own field commanders. As a general himself, Marshall trusted MacArthur's judgement on the

situation in Korea; if MacArthur thought it necessary to pursue NKPA forces beyond the 38th parallel, Marshall would allow him to do so. He did not trust the international political figureheads within the United Nations to make decisions regarding U.S. military operations. Marshall resigned as Secretary of Defense in September of 1951, but his decision to allow MacArthur to operate north of the 38th parallel resulted in the continuation of the Korean War for another two years.

IX. Conclusion

While Senator Knowland and Senator Cain feared that allowing Marshall to serve as Secretary of Defense would set a dangerous precedent allowing future presidents to seek waivers that might allow more military men to become Secretary of Defense, General Marshall remained the only individual granted such a waiver for sixty-seven years until President Donald J. Trump nominated General James "Jim" Norman Mattis to serve as his Secretary of Defense in 2017. The waiver for Mattis' nomination passed by comfortable margins in the House and the Senate and he was confirmed by a vote of 98-1. The sole "no" vote was from Senator Kirsten Gillibrand (D-New York) who echoed Senator Harry P. Cain by saying that while she deeply respected General Mattis' service, "Civilian control of our military is a fundamental principle of American democracy, and I will not vote for an exception to this rule."[40] General Mattis served as Secretary of Defense for two years before resigning after a disagreement with President Trump regarding the latter's decision to remove U.S forces from Syria. Trump accelerated Mattis' resignation—which was set to become effective on February 28th, 2019–to January 1st and claimed that he had "essentially fired" the Secretary of Defense.[41] Trump's rift with

[40] Schor, Elena. "Gillibrand says she won't vote for Mattis waiver," POLITICO, 2 December, 2016.
[41] Haberman, Maggie. "Trump Says Mattis Resignation Was 'Essentially' a Firing, Escalating His New Front Against Military Critics." *New York Times*. 2 January, 2019.

Mattis could perhaps indirectly be tied to the general's military background, as Mattis' own military experience may well have influenced his staunch opposition to the President's decision to remove troops from Syria.With only two exceptions among the twenty-seven men nominated to serve as Secretary of Defense in the position's seventy-three year history, there is perhaps too little evidence to say for certain whether or not a military man serving as Secretary of Defense is more likely to depart from the norms of the position as set by civilians. However, it can be said that in the case of General George C. Marshall, it was not possible for the Secretary of Defense to remove himself from the ideas and values cultivated during his decades-long career in the military. With President Joseph Robinette Biden Jr.'s newly appointed Secretary of Defense, General Lloyd Austin, recently confirmed by a Senate vote of 93-2 and thus becoming the third military official to hold the position, it appears that Congress' once-fervent conviction that the office of Secretary of Defense should be held by a civilian has significantly lessened. How this shift will affect the post going forward, however, remains to be seen.

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JUROS Issue 11
Article

The Geopolitical Role of Kaliningrad Oblast & Suwałki Gap since the Invasion of Ukraine

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Abstract

This publication focuses on the current status of Kaliningrad Oblast (KO) as a Russian territory surrounded by NATO and EU members, which has led Russia to strategically assert influence in the Baltic Sea Region through exporting energy, influencing trade, and attempting to enhance its diplomacy– particularly amid the strained Russia-West relations due to the invasion of Ukraine. Geopolitically, KO and the Suwałki Gap play a major role in security, strategic and economic concerns, while their mere presence demonstrates the potential for a full-scale invasion. The Suwałki Gap will remain vital for the NATO-EU Baltic states to reinforce collective defense and concerns of potential isolation, necessitating defense strategies in the region. The futures of Kaliningrad Oblast and the Suwałki Gap are intertwined, shaped by the ongoing war in Ukraine amidst uncertain NATO-Russia security policies.

I. Kaliningrad Oblast

After the dissolution of the Soviet Union in 1991, the Russian Federation faced a significant transformation in its geopolitical landscape, including the emergence of independent states of Latvia, Estonia, and Lithuania in the Baltic Sea Region (BSR). The status of Kaliningrad Oblast (KO) became particularly complex, as it became an isolated Russian territory surrounded by aspiring countries joining NATO and the European Union (EU). Since the end of WWII, Russia has sought to address the challenges posed by Kaliningrad's geographic isolation by attempting to formulate strategies to maintain influence in the BSR through the only year round ice-free port, access to energy and trade routes, as well as bilateral and multilateral cooperation channels. Since February 24th, 2022, the current relations between Russia and other European nations have been severely impacted by the former's full-scale invasion of Ukraine. Since the continuous hybrid-warfare tactics in the past decade, KO holds strategic importance for Moscow due to its proximity to the European Union and (new) NATO member states in the Baltic Sea Region. As Kaliningrad Oblast hosts Russia's Baltic Fleet[1], KO gives Russia a strong military presence in the Baltic Sea Region and the 2023 NATO addition of Finland. KO allows Russia to concentrate its naval capabilities in the Baltic Sea. Since Russia's Naval Doctrine[2] was last published in July 2022, Moscow makes it very clear that its ambition is to remain a naval powerhouse. Its naval capabilities and assets are continually changing, including modernization efforts and acquisitions, despite other circumstances such as the conflict in Ukraine. However, there are for naval fleet expansion as Russia (and the Soviet Union before) has had endless financial problems to develop a fleet of

[1] Steve Wills, *Kaliningrad: Impregnable Fortress or "Russian Alamo?"*, CAN
[2] Russia Matters, *Full text of the 2022 Russian Maritime Doctrine (in Russian), https://www.russiamatters.org/russian-strategic-documents*

carriers for many decades, as carriers are quite an expensive investment. For instance Russia's only aircraft carrier, the "Admiral Kuznetsov" has had a long history of complications and setbacks.[3] This is especially vital for Moscow to remain a global naval power that it seeks to be, especially because NATO countries surround Kaliningrad. In September 2023, Ukraine had sent a missile attack on Moscow's Naval Headquarters in Crimea,[4] suggesting a troubled future for Russia's Navy. Geo-economically speaking, the Baltic Sea serves as a crucial transit route for Russia energy exports right by Kaliningrad Oblast, particularly for the Nord Stream pipelines. As Russia expands its investment in the energy infrastructure, the Nord Stream gas pipelines ensured the smooth flow of resources to Europe since 2012 until major leaks were found due to explosives[5] in September 2022, with no one taking responsibility. But what does this mean for the EU? Even without the operation of the Nord Stream pipelines, the EU has had to find alternative pipelines since the beginning of the invasion. In May 2022, the EU launched the REPowerEU[6] to end its reliance on Russian fossil fuels by 2030. Unfortunately for the EU, European countries are still buying from Russia. Instead of oil, EU countries such as Spain, Belgium, France and among others, are buying Liquefied Nitrogen Gas (LNG) on quite a large scale— estimated to have bought 52% of all of Russia's LNG exports between January and July, a market share that exceeds the 49% mark of 2022 and 39% of 2021.[7] Since Since many EU countries are not able to utilize the Nord Stream pipelines anymore, Russia is also unable to make revenue from such gas exports either. Until September 2022, the Nord Stream pipelines had normally supplied the

[3] Gonzalo Orbaiceta, *Global Maritime Power? Russia's Navy faces an uncertain future*, Universidad de Navarra, Global Affairs
[4] Samya Kullab, Dasha Litvinova, *Ukraine launched a missile strike on Russia's Black Sea Fleet headquarters*
[5] Carole Nakhle, *What will Russia do without Nord*
[6] European Union, *REPower EU at a glance*, 2022
[7] Jorge Liboreiro, EU News, *EU purchases of Russian LNG up 40% compared to pre-war levels, new study finds*, 2023

European Union states with about 35% of all the gas they import from Russia.[8] Russia has sought to maintain political influence in the BSR through cooperation with regional organizations. It has engaged in various bilateral and multilateral initiatives, such as the Poland-Lithuania-Russia Cross Border Cooperation Program, to enhance ties with neighboring countries and address common challenges, such as cross-border travel, import/export traffic, etc. and then split into two bilateral programs[9] of Poland-Russia and Lithuania-Russia. For example, from 2014 to 2020, the Lithuania-Russia program has contributed millions of Euros in Lithuania to promote local culture and preservation of historical heritage, environmental protection, and climate change mitigation. These figures show strong commitment from participating countries to further the development of cross-border cooperation, which overall has had a positive impact on the communities living across the borders of KO; it supports sustainable development on both sides to reduce differences in living standards and addresses common challenges.[10] The regional cooperations frameworks such as the Council of the Baltic Sea States and the Northern Dimension[11] were created to promote dialogue, stability, and economic cooperation. However, political tensions between Russia and European nations have at times hinder cooperation[12] and created divisions within the region as NATO's and EU's enlargements have raised concerns in Russia, perceiving them as encroachments on its traditional sphere of influence.[13] This side effect has led to increased geopolitical competition in the region. Russia's aggressive rhetoric and actions towards the BSR within the last ten years include the

[8] BBC News, *Nord Stream 1: How Russia is cutting gas supplies to Russia,* 2022
[9] European Union, European Neighbourhood Instrument (ENI) cross-border cooperation programmes, *Lithuania-Russia ENI CBC*, 2014
[10] The Diplomatic Service of the European Union, *Polish Russian cross-border cooperation continues,* 2018
[11] Ministry for Foreign Affairs of Finland, *Northern Dimension*, 2009
[12] North Atlantic Treaty Organization, *Relations with Russia*, 2023
[13] North Atlantic Treaty Organization, *NATO-Russia Relations: The Facts*

2007 cyberattacks on Estonia and the increasing number of cyberattacks on critical infrastructure. As the cyberattacks were largely distributed denial-of-service(DDoS) attacks, they overloaded Estonia's bandwidth and flooded their servers with junk traffic, rendering them inaccessible to the public.[14] Despite Estonia being a small country with just over 1.3 million people, it has a strong cyber defense infrastructure that ranks third best in the world[15] behind the U.S. and Saudi Arabia. With NATO's cyber base in Estonia, it acts as a tripwire, a safety precaution for the NATO countries in the BSR. Since the cyberattacks, the heightened concerns in Europe has led to the recent accession of Sweden and Finland into the NATO alliance, making the Baltic Sea into a NATO lake, surrounding the Russian Baltic Sea Fleet in Kaliningrad. The geopolitical role of Kaliningrad Oblast will most likely be continuously utilized as a strong point for the Kremlin as Russian forces stationed in the KO would be able to attack energy supplies and critical infrastructure in the BSR. Interestingly, Russia's local oligarchs are not dedicated supporters of a glorious Russia—they are in it for the money. [16] The locals of KO depend on Moscow's financial support, but the invasion of Ukraine has restricted locals, limiting access to goods, services, etc. from EU countries. These restrictions ultimately hurt KO's local economy. Many locals living in KO believe the war has made a negative impact. Citizens indicate that their lives have become significantly diminished because of accessibility to foreign travel. The escalation of Russian aggression in Ukraine has greatly altered the daily lives of Kaliningraders.[17] Locals could once cross the border to Gdańsk to purchase goods at cheaper prices, so KO depends on local trade to keep its

[14] Council on Foreign Relations, *Estonian Denial of Service Incident*, 2007
[15] Invest in Estonia, *Global Cybersecurity Index: Estonia is the #1 cybersecurity country in the EU*, 2021
[16] Brian Michael Jenkins, *Consequences of the War in Ukraine: The Economic Fallout*, RAND Corporations, 2023
[17] Dominika Studzińska, *Kaliningrad as an isolated zone: the impact of the war in Ukraine on the daily life of the residents of the Kaliningrad region. An introduction to the discussion*, 2023

economy afloat with the suspensions of EU goods to and from KO.

II. The Suwalki Gap

The Suwałki Gap, a town just 40 miles wide in northeastern Poland, is politically, economically, and geographically significant as it connects the Baltic States, which are NATO and EU members, with the rest of NATO and the EU. It serves as a transit route for military reinforcements, supplies, and logistics in the event of a crisis or conflict in the region. NATO is able to quickly reinforce and support the Baltic states in case of a military threat and has prefaced its commitment to collective defense. As the Gap lies between the Russian exclave of Kaliningrad Oblast and Belarus, KO's proximity raises concerns of the possibility of isolating the Baltic States from NATO and the EU by cutting off the land connection. Unfortunately, the Suwałki Gap may be the weakest part of the NATO deterrence posture in the region because it creates a choke point. If Moscow closes the Gap, then NATO would have to resupply Estonia, Latvia and Lithuania by air or sea only. Nevertheless, Moscow launching a significant attack on the Baltic nations would trigger the activation of Article 5 within the North Atlantic Treaty, potentially setting off a chain of events that the Kremlin could struggle to manage effectively in the BSR, which seems highly unlikely given the current state of the conflict in Ukraine. While this potential Russian attack on the Gap may worry military strategists on the NATO end, Kaliningrad Oblast faces a similar vulnerability to being isolated and blockaded by NATO, just as the Baltic States confront the risk posed by Russia in the Gap. KO cannot operate autonomously from Moscow to survive, heavily relying on the Kremlin for direction, stability, reinforcements, and resources. KO faces a major challenge as NATO forces heavily outnumber Russian soldiers. Since 2017, the

United States and its NATO partners have established a robust defense capability in response to a potential Russian attempt to block the region. With the uncertainty of changing security policies on both NATO and Russian ends, the fate of both Kaliningrad Oblast and Suwałki Gap will be unknown.

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Article

The Relationship between Socioeconomic Factors and Nutritional Intake in Older Female Cancer Survivors

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Abstract

Healthy diet has been shown to promote disease-free cancer survivorship and improve health-related quality of life (HRQoL) among older adults (≥65 years). However, socioeconomic factors such as education and income that may influence diet are understudied. This study examined the influence of income and education on the diet of older female cancer survivors, while investigating disparities in HRQoL. Older female survivors completed surveys to assess HRQoL (RAND-36), diet quality (Diet History Questionnaire II), demographic and clinical characteristics. Descriptive analyses, correlations, and stepwise linear regressions were utilized. Participants (n=171) were, on average, 72.72±7.40 years old, white (90%) and breast cancer survivors (68%). Thirty-six percent had low-income and 44% had high-income, while 45% had low education and 54% had high education. Average physical and mental HRQoL scores were 41.94±10.50 and 48.47±7.18 out of 100. The mean HEI-2015 score was 66.54±10.01 out of 100. Higher education was associated with higher HEI scores (β=0.417, p=0.032) and higher mental HRQoL (β=0.574, p=0.004). In conclusion, participants were found to have low HRQoL and

suboptimal diets for promoting disease-free survivorship. Diet and HRQoL were associated with education. Results indicate need for nutritional screening and increased access to dietitians who can facilitate behavior change throughout survivorship.

I. Introduction

Due to advances in treatment and management, 67% of individuals diagnosed with cancer will now survive 5 or more years.[1] Of the more than 16.9 million cancer survivors in the United States today, 64% are older adults (≥65 years).[2] This percentage is only expected to grow, as older adults are the fastest growing segment of the population and are the age group most likely to be diagnosed with cancer.[1,3] By 2060, it is estimated that one in four Americans will be over the age of 65.[4] Notably, the majority of older adults are female; as there are only 89 males for every 100 females in the 65 to 74 age group.[3] In 2020, it is estimated that more than 1.8 million individuals will be diagnosed with cancer.[1] Despite higher cancer incidence among women than men, it is estimated that more men will die from cancer than women.[1] These statistics and estimates indicate that older female cancer survivors are a significant and growing survivor population. Older female cancer survivors have unique health needs, as older survivors are more likely to have functional limitations than cancer-free older adults and may experience varying long-term health effects because of treatment.[2,5] Common late-effects of cancer treatment include chronic neuropathy, cardiomyopathy, cognitive impairment, and osteoporosis.[2,6] Similarly, for older adults in general, advanced age is a risk factor for chronic diseases such as chronic obstructive pulmonary disease, cardiovascular disease, and type 2 diabetes.[7,8] In addition to the risk of developing chronic disease, older survivors may also be at high risk of developing second primary cancers.[9,10] These consequences of aging and cancer diagnosis may worsen survivor's health-related quality of life (HRQoL).[11] HRQoL is a self-perceived measure that includes domains related to physical, psychological, and social aspects of health, including health

conditions, functional status, and socioeconomic status (SES).[12] It is particularly important for older survivors to follow dietary guidelines that may help prevent chronic disease and cancer recurrence.[7,13] Van Blarigan et al. found that cancer survivors that followed American Cancer Society (ACS) nutrition and physical activity guidelines had longer overall survival than those that did not.[14] The ACS guidelines[15] emphasize a diet rich in vegetables, fruits, and whole grains while limiting alcohol and red meat consumption, which coincides with guidelines set by the American Institute for Cancer Research (AICR)[16] and the Dietary Guidelines for Americans[17]. Nutritional intake is frequently measured by Healthy Eating Index (HEI) scores, which range from 0 to 100 and quantify the extent to which individuals followed the Dietary Guidelines for Americans in the past year. Following these dietary recommendations can also assist in the management of conditions common in the aging population such as sarcopenia and immune deficiency.[7] Thus, nutritional intake, a modifiable lifestyle behavior, is a valuable target for intervention in an older cancer survivor population. There is strong evidence supporting the importance of healthy diet and weight management in promoting disease-free cancer survivorship.[11,14,18] However, older cancer survivors are particularly susceptible to nutritional deficiencies due to age-related metabolic, sensory, and physical changes.[7,19] Sensory changes may include altered taste, smell, or vision while physical changes may include a loss of muscle mass or teeth.[20,21] These changes can negatively influence the dietary habits of older female cancer survivors. Prior research found that while daily recommendations for sodium intake are far exceeded, many older females do not meet daily whole grain or protein intake recommendations.[22,23] Nutritional deficiency

in older adults is associated with several negative health outcomes including decline in functional status, immune dysfunction, and reduced cognitive function.[24] Despite the known importance of dietary behavior in this population, nutritional issues among older adult survivors is an understudied area of research.[25] The nutritional choices of older females are particularly important because they are more likely than older men to be responsible for household meal preparation.[26] A variety of factors can influence food choice within this population. In addition to the aging-related changes noted previously, social factors such as living situation, size of social network, and SES have all been found to influence the nutritional intake of older adults.[27,28] Two of the most important SES factors that influence nutritional intake are income and education, as limited finances and high costs were among the top reported barriers to good nutrition for older females and educational attainment has been found to be predictive of diet quality.[28-31] Previous studies[32,33] found SES-related nutritional disparities among older adults, as those with lower income and education were found to have worse nutritional intake. However, studies investigating the social factors that may influence the nutritional intake of older female survivors are not evident in the literature. Moreover, evidence regarding the influence of income, education, and nutritional intake on HRQoL within this population is limited. Two baseline characteristics of older female survivors have been shown to influence their nutritional intake. First, older women tend to have higher HEI scores than older men[34], and second, individuals with a history of cancer tend to have higher HEI scores than individuals without a history of cancer.[35] Furthermore, the HEI scores of older adults have been found to increase with both income[32,36] and educational attainment.[32,34]

In a survivor population, Kane et al.[37] found that survivors with a college degree had higher HEI scores than those without a college degree. Regarding HRQoL, previous studies found that multiple lifestyle factors, such as maintaining a normal body weight and healthy diet, are associated with better overall HRQoL.[11,38-42] Income, additionally, has been identified as an important predictor of HRQoL among older survivors.[43] Moreover, lower diet quality and higher financial burden have been associated with lower self-rated health among older adults.[44,45] However, a gap remains as none of these studies specifically investigated the nutritional intake of older female cancer survivors. This study aims to fill this gap by examining the association of income and educational attainment with the nutritional intake and HRQoL of older female cancer survivors, providing results that may be used to identify disparities within this underserved population and to identify survivors more likely to become malnourished. The authors hypothesize that older female cancer survivors with higher education and income will have better nutritional intake and higher HRQoL.

II. Methods

This study was a secondary study utilizing previously collected data from a parent, cross sectional study. To be eligible for the parent study, participants must be older adults, female, cancer survivors who have completed primary cancer treatment (i.e. received chemotherapy, surgery, and/or radiation) within the past five years, and are able to complete a survey in English. A five-year limit was used to ensure the accuracy of diet-related changes after cancer diagnosis. All cancer types and stages were eligible and women receiving adjuvant hormone therapy were included. Older female cancer survivors were recruited to participate in the survey either during follow-up visits to the [BLINDED] Geriatric Oncology Clinic or

through medical records obtained from the cancer center's registry. During follow-up visits, prospective participants were provided with a recruitment flyer containing the study coordinator's name and contact information. When prospective participants in the cancer center's registry were identified as meeting the eligibility criteria, the study coordinator received their name and mailing address. A recruitment letter was subsequently sent to these potentially eligible patients to explain the survey and ask them to contact the study coordinator if interested. Women who contacted the study coordinator were screened to ensure they met all eligibility criteria and then informed of the study's goals. These women were then asked if they were willing to participate and if so, they could complete the survey online or request a survey via mail or telephone. Online surveys were taken via Research Electronic Data Capture (REDCap), a secure web application developed for clinical research. In total, 1,200 women who met the eligibility criteria were contacted for participation, 215 expressed interest in participating and 44 expressed interest but did not respond to follow-up attempts. As 171 women completed surveys, the response rate was 14.3%. 89 (52%) participants completed the survey on paper, 80 (46.8%) completed the survey on REDCap, and 2 (1.2%) completed the survey over the telephone. Prior to the start of the survey, informed consent was obtained from all participants. Additionally, each participant consented to a HIPAA waiver to collect demographic and clinical characteristics from their medical records. Participants who completed the survey online were informed that proceeding with the survey denotes their consent to participate in the survey. All participants received a $10 gift card for their time. The [BLINDED] Institutional Review Board approved the informed consent procedures and study protocol. A REDCap-

based survey was used to assess the physical, emotional, social, and nutritional well-being of participants, while also collecting demographic and clinical information. The survey administered the 36-Item Health Survey (RAND-36)[46,47], eight-item modified Medical Outcomes Study Social Support Survey (mMOS-SS)[48], two-item USDA measure of food insecurity[49,50], the Malnutrition Screening Tool (MST)[49-51], and the Diet History Questionnaire II (DHQII).[52] The survey also collected demographic and clinical information including self-reported chronic conditions, weight gains/changes associated with cancer diagnosis and treatment, cooking, and grocery shopping. For the purposes of this study, the primary measures utilized were the RAND-36 and DHQII, along with self-reported household income and educational attainment. The *RAND-36: T36-Item Health Survey* is composed of eight subscales assessing individual aspects of HRQoL during the previous four weeks: physical functioning, role functioning physical, pain, general health, energy/fatigue, social functioning, role functioning emotional, emotional well-being. Responses to these items are on a Likert scale, but can be converted to scores ranging from 0-100, with 100 as the highest score possible for each subscale.[46,47] For example, a question about feeling tired had responses ranging from "all of the time" to "none of the time," and was evaluated with related questions to yield a numerical energy/fatigue subscale score. Moreover, a physical health composite score (PCS) and mental health composite score (MCS) can be created from the subscales for each. In this study, PCS and MCS were used as measures of physical and mental HRQoL, respectively. Self-rated health was separately measured by a single question with responses ranging from "poor" to "excellent." The *Diet History Questionnaire*

(DHQII) was developed by the National Cancer Institute and consists of 134 food item questions and 8 dietary supplement questions.[52] The food item questions measure dietary intake over the past 12 months considering portion size, frequency, preparation methods, dietary restrictions, as well as alcohol intake. DHQII scores can be converted to HEI total scores. HEI total scores range from 0-100 and include 13 components that describe the extent to which individuals followed dietary recommendations over the previous year, with 100 indicating ideal following of the Dietary Guidelines for Americans[17]. Of the 13 components, 9 assess adequacy of healthy intake and 4 assess moderation of unhealthy intake. For the adequacy components, greater consumption yields higher scores. For the moderation components, greater consumption yields lower scores. Generally, HEI scores >80 indicate a "good" diet, scores ranging from 51 to 80 reflect a diet that "needs improvement," and HEI scores <51 imply a "poor" diet.[53] This study utilized HEI-2015 scores, as nutritional intake was relative to the 2015-2020 Dietary Guidelines for Americans.[17] Participants provided self-reported demographic information including age, gender, race, and ethnicity. Participants also self-reported SES information including educational attainment and household income. These variables were analyzed as independent SES factors. Household income was assessed as combined income from all sources, including wages, salaries, Social Security, and help from relatives. Response options were "less than $20,000," "$20,001-$50,000," "$50,001-$100,000," "$100,000+," "I don't know," and "I prefer not to answer." Educational attainment response options were "less than grade school," "grade school," "high school diploma," "GED," "some college or technical/trade school," "associate degree,"

"bachelor's degree," "master's degree," "professional degree," "doctorate degree," and "I prefer not to answer." For the purposes of this study, household income was dichotomized as either lower-income (</= $50,000) or higher-income (> $50,000), while educational attainment was dichotomized as either lower-education (less than a 4-year college degree) or higher-education (at least a 4-year college degree). Additional information regarding participant's clinical characteristics (e.g., date of cancer diagnosis, AJCC (American Joint Committee on Cancer) stage at diagnosis, treatments received (i.e. chemotherapy, surgery, and/or radiation), cancer recurrence, other chronic conditions, prescription regimen, lab results, etc.) were collected through medical record review. Body mass index (BMI) was calculated for each participant from their reported height and weight in kg/m^2. Based on Centers for Disease Control and Prevention guidelines, BMI was divided into 6 categories: underweight (<18.5), normal weight (18.5 to <25), overweight (25 to <30), Class 1 obese (30 to <35), Class 2 obese (35 to <40), and extreme obesity (≥40).[54] Lastly, risk for malnourishment was measured via the Malnutrition Screening Tool (MST)[49] which is measured by 3 questions. The 3 questions inquire about decreased appetite, unintentional weight loss, and amount of weight loss within the last six months. Descriptive statistics (i.e. frequencies, means, standard deviations) were used for the demographic and health characteristics, HEI-2015 total and subcomponent scores, and HRQoL subscale and subcomponent scores. Based on the 2015-2020 Dietary Guidelines for Americans[17], DHQII scores were converted to HEI-2015 scores by the National Cancer Institute utilizing SAS 24 and Diet*Calc.[55] To compare mean PCS, MCS, self-rated health, and HEI-2015 scores by demographic and clinical

characteristics, multiple t-tests, and analysis of variances (ANOVAs) with Bonferroni post-hoc analyses were utilized. Pearson's correlations were utilized to assess potential associations among individual characteristics (e.g., age, race, education, income, BMI, chronic conditions, cancer type, AJCC stage at diagnosis, time since diagnosis, treatments received), PCS, MCS, HEI-2015 total score, and self-rated health. Stepwise linear regressions were conducted to assess potential associations between income, education, PCS, MCS, HEI-2015 total score, and self-rated health while controlling for demographic and health characteristics. IBM SPSS Statistics version 26.0 was used for all analyses.

III. Results

Participants had a mean age of 72.72±7.40 and were mostly white (90.0%) and breast cancer survivors (68.0%). Approximately 36% of participants were lower-income (</=$50,000) and approximately 44% of participants were higher-income (>$50,000), with the remaining 20% preferring not to answer. Approximately 45% of participants had lower-education (less than a 4-year college degree) and approximately 54% had higher-education (at least a 4-year college degree). The mean BMI of participants was 27.7±6.2, with much of the sample being classified as overweight (31.0%) or obese (32.7%). According to the MST, 27.2% of participants were found to be at risk for malnourishment. Participants most frequently indicated that their self-rated health was good (40.0%) or very good (42.4%). (Table 1)The average PCS and MCS scores of participants were 41.94±10.50 and 48.47±7.18, respectively, out of 100. The lowest HRQoL subcomponent score was for energy/fatigue, with an average score of 42.74±9.90. Conversely, the highest subcomponent score was for social functioning, with an average score of 82.50±21.11 (Table 2).

The mean HEI-2015 score among participants was 66.54±10.01. In terms of percent of maximum possible score, the lowest scoring food components were whole grains (27.0%) and fatty acids (47.3%) while the highest scoring food components included total protein foods (91.4%), whole fruit (90.6%), and total vegetables (86.4%). Among the moderation food components, for which lower consumption yields higher scores, participants had low scores for sodium (50.2%) and saturated fat (53.6%) (Table 3). In Table 4, potential differences in mean self-rated health, PCS, MCS, and total HEI-2015 scores were reported by the sample's demographic and clinical characteristics. Significant differences in self-rated health were found between the high- and low-income groups (p=0.005), as participants with higher household incomes had significantly higher self-rated health. There were significant differences in the mean PCS score by educational attainment (p=0.043), household income (p=0.001), and BMI (p=0.002). Individuals with lower educational attainment, lower household income, and higher BMI had lower PCS scores. Similarly, there were significant differences in mean MCS by educational attainment (p=0.009), as participants with lower educational attainment had lower MCS scores. Thus, participants with at least a 4-year college degree were found to have significantly higher PCS and MCS scores. Significant differences in mean HEI-2015 score were evident between high and low income (p=0.029) as well as high and low education (p=0.001) groups. Specifically, participants with an income below $50,000 (p=0.029) or less than a 4-year college degree (p=0.001) had significantly lower total HEI-2015 scores. Correlations were found between self-rated health, PCS, MCS, total HEI-2015 scores, and demographic and clinical characteristics. A higher total HEI-2015 score was associated with higher

educational attainment (r=0.249, p=0.001), higher income (r=0.224, p=0.009), higher self-rated health (r=0.211, p=0.006), higher PCS (r=0.339, p<0.001), and higher MCS (r=0.171, p=0.044). Higher self-rated health was associated with having higher income (r=0.206, p=0.017), a lower BMI (r=-0.245, p=0.001), fewer chronic conditions (r=-0.336, p<0.001), as well as a higher PCS (r=0.632, p<0.001) and MCS (r=0.249, p=0.003). Higher PCS was also associated with higher education (r=0.173, p=0.043), higher income (r=0.315, p<=0.001), lower BMI (r=-0.342, p<0.001), and fewer chronic conditions (r=-0.336, p=0.001). Higher MCS was associated with older age (r=0.257, p=0.002) and higher education (r=0.222, p=0.009) (Table 5). Stepwise linear regressions determined associations between income, education, self-rated health, HEI-2015 scores, PCS, and MCS. Controlling for demographic and clinical characteristics, having higher PCS was associated with higher self-rated health (β=0.679, p=0.001) while having higher self-rated health (β=0.750, p<0.001) and surgical treatment for primary cancer (β=0.316, p=0.028) was associated with higher PCS. Higher PCS (β=0.430, p=0.028), along with higher educational attainment (β=0.417, p=0.032), was also found to be associated with higher total HEI-2015 scores. Lastly, educational attainment (β=0.574, p=0.004) was found to be associated with higher MCS (Table 6).

IV. Discussion

The aim of this study was to investigate the association between nutritional intake and the SES factors income and education among older female cancer survivors. HRQoL and self-rated health were also investigated to evaluate SES-related disparities within this underserved population. Income and education were examined to help identify characteristics that may influence an older female cancer

survivor's diet quality. The diet quality of survivors is important because inadequate nutritional intake is associated with reduced survival and impaired quality of life.[56,57] Older survivors, in particular, may struggle to maintain an adequate diet due to aging-related changes such as diminished appetite, difficulties chewing or swallowing, and family adjustments like losing a spouse that normally prepared meals. Thus, it is particularly important to identify the social factors that may be associated with inadequate nutritional intake. Results indicated that older female cancer survivors have low HRQoL and poor diet quality, on average. While educational attainment was found to be associated with both HRQoL and nutritional intake, income was not found to be associated with either HRQoL or nutritional intake, after adjusting for social and demographic variables. In the present study, the mean total HEI-2015 score was 66.54 out of 100, with mean component scores of 4.17 out of 5, 4.32 out of 5, and 2.70 out of 10 for total fruits, total vegetables, and whole grains, respectively. Using National Health and Nutrition Examination Survey data, Bluethmann et al. found that the mean total HEI-2015 score of older adults was 64 out of 100, with mean component scores of 3.7, 4.0, and 4.0 for total fruits, total vegetables, and whole grains, respectively.[58] One explanation for the higher total diet quality score in this study could be that the majority of participants were white and highly educated, as these characteristics have been associated with higher HEI scores.[32] Alternatively, this finding could be due to participant's survivor status, as older cancer survivors have been found to have higher HEI scores than older adults without a history of cancer.[35] This higher diet quality may explain why only 27.2% of participants in this study were found to be at risk for malnutrition according to the MST, as this is

a relatively low percentage compared to previously reported at-risk percentages for adult populations of cancer survivors (32%, 36%).[59,60] Notably, while the mean HEI-2015 score observed in this study was above average for older adults, it still falls within the "needs improvement" category, indicating that many older female cancer survivors do not consume the recommended diet known to help prevent cancer recurrence and chronic disease.[13,14] Dietary guidelines[15-17] for cancer survivors specifically, and Americans in general, emphasize a diet rich in vegetables, fruits, and whole grains. The mean HEI-2015 component scores for these foods indicated that participants in this study consumed more total fruits and more total vegetables, but less whole grains, than the general older adult population. This finding parallels research by Inoue-Choi and colleagues[11], which found that older female cancer survivors are more likely to adhere to fruit and vegetable intake recommendations than to whole grain intake recommendations. Depending on factors such as age, gender, race, and SES, cancer survivors have been found to both over-and under-estimate their diet quality on food frequency questionnaires, particularly for fruit and vegetable intake, which complicates interpretation.[61] For example, it was found that older age, higher income, and higher education were strongly associated with cancer survivors being over-estimators, so it is feasible that participants over-estimated their fruit and vegetable intake.[61] In contrast to HEI-2015 scores, the mean PCS (41.94) and MCS (48.47) scores of study participants were below average compared to previously reported ranges for PCS (40.2-45.2) and MCS (47.6-54.0) scores among older female cancer survivors.[11,39,62,63] Despite these lower HRQoL scores, nearly 90 percent of participants self-rated their health as "good," "very good," or

"excellent," which coincides with previous findings among older women.[64] Considering SES, physical HRQoL was lowest among participants with low incomes and mental HRQoL was lowest among participants with low educational attainment. Moreover, self-rated health was higher among participants with higher income and education. Considering disease burden, both self-rated health and physical HRQoL were lower among those with a high BMI and more chronic conditions. These findings, that both HRQoL and self-rated health generally decrease as SES decreases and disease burden increases, are supported by the literature.[39,64,65] Additionally, both physical and mental HRQoL were found to be associated with HEI-2015 scores. Thus, HRQoL was found to be associated with both nutritional intake and BMI, which coincides with the literature showing that improvements in lifestyle behaviors can lead to increased HRQoL.[11,40,41,66,67]

After adjusting for demographic and health characteristics, higher physical HRQoL and higher educational attainment were the only factors found to be associated with higher HEI-2015 scores. Similarly, higher educational attainment was the only factor associated with higher mental HRQoL. The link between educational attainment and HEI-2015 scores is supported by the literature, as education has consistently been identified as a factor influencing nutritional intake among older adults.[27,28,32] One potential explanation is the association between higher educational attainment and higher health literacy.[68,69] Health literacy is a multifaceted concept that entails a person's ability and motivation to access, understand, and apply health information in their lifestyle and healthcare decisions. Older adults are the age group most likely to have inadequate health literacy, particularly those with low SES and those belonging to minority populations.[70-73] Among older

breast cancer survivors, Halbach et. al[74] found that nearly half had limited health literacy. The association between education and health literacy may be mediating the study findings because individuals with higher health literacy tend to have healthier nutritional intake.[71,75,76] In relation, the finding that educational attainment is associated with mental HRQoL may also be related to health literacy, as cancer survivors with lower health literacy have been found to have lower quality of life scores.[77-79] The findings of Nilsen and colleagues[78] are particularly supportive of the results in this study, as they found that health literacy was significantly associated with mental, but not physical, HRQoL. Among older adults, maintaining a healthy diet and body weight has consistently been associated with improved health outcomes and HRQoL throughout survivorship.[11,16,38,67,80] Thus, one potential strategy to improve the health outcomes and HRQoL of older female cancer survivors is implementing interventions that target modifiable lifestyle behaviors, such as diet and exercise. This study indicated that the educational attainment of an older female cancer survivor is associated with her nutritional intake and HRQoL. Considering the literature which shows that health literacy is associated with nutritional intake and HRQoL, and the findings of this study that education is associated with nutritional intake and HRQoL, interventions to improve health literacy and knowledge of healthy lifestyle behaviors may improve the nutritional intake and HRQoL of older female cancer survivors. At a minimum, it is crucial for providers to consider a patient's educational attainment and level of health literacy when implementing a lifestyle intervention, so as not to exacerbate the existing disparity between older female cancer survivors with differing educational attainment. Moreover, to help prevent

nutritional deficiencies and potential health disparities, clinicians and dietitians should consistently use validated assessments to examine the dietary intake of all older cancer survivors throughout survivorship. Currently, nutritional screening of cancer patients and survivors is limited and warrants improvement. One method of improving screening may be to increase dietitian staffing, as the average ratio of registered dietitians to patients in outpatient cancer centers has been reported as 2,308:1.[81] Among older adults, an active learning lifestyle intervention has been shown to improve health literacy, dietary variety, and physical activity levels.[82] Furthermore, tailoring patient education interventions to health literacy levels has been shown to be effective among older adults.[83] For older cancer survivors in particular, previous lifestyle behavior interventions[40,84-89] concerning diet, exercise, and weight management have been shown to improve health outcomes and HRQoL. For example, Demark-Wahnefried et al.[90] found that individually-tailored lifestyle interventions lead to long-lasting improvements in dietary quality and physical functioning among older cancer survivors. Despite the growing body of evidence highlighting the positive effect of healthy eating on health outcomes among cancer survivors, the specific associations of dietary quality among older female cancer survivors remain under-studied.[40,44,91-94] Further research on the social factors and educational interventions that influence the nutritional intake of older female cancer survivors is warranted. For it's strengths and limitations, this study had several distinct strengths. First, this study utilized several assessment tools, the RAND-36[46,47], MST[49-51], and DHQII[52], validated for use by older adults and cancer survivors. Moreover, the numerous domains represented in the RAND-36 and DHQII assessments provided

a broad understanding of individual characteristics within each domain. Second, in contrast to the existing literature investigating the HRQoL and nutritional intake of older female cancer survivors, this study was inclusive of survivors of various cancer types, as many past studies[38,40,41] included only breast cancer survivors. In this study, although 68% of participants were breast cancer survivors, the remaining 32% included hematologic, gynecologic, and gastrointestinal cancer survivors, hence providing results more generalizable to the older female cancer survivor population. This study was limited in that it was cross-sectional and thus did not measure changes in nutritional intake or HRQoL over the course of cancer treatment or survivorship. Additionally, while demographic and clinical variables were adjusted for, there were unmeasured variables such as health literacy that may have influenced the associations between income, education, nutritional intake, and HRQoL. As noted previously, the results of this study may have been influenced by participants under- or over-estimating their diet quality and the extent to which their health status affects their quality of life, particularly if participants answered questions in ways they felt were socially desirable. The measurement of nutritional intake was further limited in that the DHQII can underestimate consumption of fiber and whole grains due to the lack of questions regarding whole grain products, as well as the misunderstanding of "whole grain" vs. "whole wheat" on product labels.[95] Also, because the cutoffs for high/low education and income in this study fell above national medians for income and education level among older adults, the results may not reflect differences in nutritional intake and HRQoL between other, non-dichotomous SES levels.[96] Lastly, this study's generalizability is limited due to a smaller

sample size and limited demographic variability, as participants were recruited from one cancer center and the majority were breast cancer survivors with higher educational attainment and income levels.

V. Conclusions

This study sought to examine the nutritional intake, self-rated health, and HRQoL of older female cancer survivors with respect to household income and educational attainment. Results indicated that participants, on average, had less than ideal diet quality and low HRQoL. Educational attainment was found to be associated with both nutritional intake and HRQoL. In contrast, income was found to not be associated with nutritional intake or HRQoL, after adjusting for demographic and clinical characteristics. The importance of nutritional intake in promoting disease-free cancer survivorship, and the associations between social factors and health-promoting lifestyle behaviors, need to be recognized and further explored. The health outcomes of older female cancer survivors could be improved if nutritional intake were tracked throughout survivorship, and educational interventions to promote health behaviors and improve health literacy were delivered.

Supplementary Material:

Table 1. Demographic and health characteristics of older female cancer survivors*

Demographic	**N (%)**
Age (mean (SD))	72.72 (7.40)
Age at diagnosis, (mean (SD))	66.63 (9.40)
Race	
White	144 (90)
Black	13 (8.1)
Asian	2 (1.3)
Other	1 (0.6)
Education Level	
Less than high school	2 (1.2)
High School/GED	26 (15.3)
Some College/Associate's degree	48 (28.2)
College graduate/Graduate degree	93 (54.7)
Household Income	
Less than $20,000	17 (10.1)
$20,001-$50,000	44 (26.0)
$50,001-$100,000	47 (27.8)
$100,000+	27 (16.0)
Health Characteristics	
Self-rated Health	
Fair	18 (10.6)
Good	68 (40.0)
Very Good	72 (42.4)
Excellent	12 (7.1)
Cancer type	
Breast	90 (68)
Hematologic	18 (14)
Gynecologic	15 (11)
Other	9 (7)
Months since Diagnosis (mean (SD))	65.81 (62.56)
AJCC Stage at Diagnosis	

0	8 (13.1)
1A/2B	27 (44.3)
2A/2B	22 (36.1)
3B/3C	4 (6.6)
Treatment Received	
Radiation	107 (70.9)
Surgery	108 (71.5)
Chemotherapy	69 (45.7)
BMI, (mean (SD))	27.7 (6.2)
BMI Category	
Underweight	4 (2.4)
Normal Weight	57 (33.9)
Overweight	52 (31.0)
Class 1 Obese	34 (20.2)
Class 2 Obese	14 (8.3)
Extreme Obesity	7 (4.2)
Malnutrition Screening Tool Mean Score	1.04 (1.83)
At risk for malnourishment	44 (27.2)
Number of Chronic Conditions (mean (SD))	2.4 (1.9)

Note: Other cancers include lung, kidney, pancreas, colon, skin, maxillary sinus AJCC=American Joint Committee on Cancer
*=Not all categories equal n=171 due to missing data

Table 2. Health-related quality of life among older female cancer survivors

Variables	**Mean (SD)**
HRQoL subscales	
Physical composite score (PCS)	41.94 (10.50)
Mental composite score (MCS)	48.47 (7.18)
HRQoL subcomponents	
Physical functioning	59.76 (24.07)
Role limitations due to physical health	60.82 (42.01)
Role limitations due to emotional problems	81.30 (34.28)
Energy/Fatigue	42.74 (9.90)
Emotional well-being	64.97 (10.39)
Social functioning	82.50 (21.11)
Pain	72.73 (22.28)
General health	59.40 (15.33)

Table 3. Mean Healthy Eating Index 2015 (HEI) scores of older female cancer survivors

Components	**Maximum Points Possible**	**Mean Scores (SD)**	**Percent of Maximum Scores**
Total HEI Score	100	66.54 (10.01)	66.54
Adequacy:			
Total Vegetable	5	4.32 (1.03)	86.4
Greens and Beans	5	3.91 (1.43)	78.2
Total Fruit	5	4.17 (1.26)	83.4
Whole Fruit	5	4.53 (1.01)	90.6
Whole Grains	10	2.70 (1.76)	27.0
Dairy	10	6.09 (2.72)	60.9
Total Protein Foods	5	4.57 (0.82)	91.4
Seafood and Plant Proteins	5	4.51 (0.95)	90.2
Fatty Acids	10	4.73 (3.12)	47.3
Moderation:			
Sodium	10	5.02 (2.86)	50.2
Refined Grains	10	8.94 (1.75)	89.4
Added Sugars	10	7.69 (2.91)	76.9
Saturated Fats	10	5.36 (3.24)	53.6

Table 4. Mean Self-rated Health, HEI, PCS and MCS scores by socioeconomic characteristics and lifestyle behaviors

Variable	**Self-rated Health (SD)**	**PCS Mean (SD)**	**MCS Mean (SD)**	**Total HEI Mean (SD)**
Race				
White	3.50 (0.79)	42.46 (10.66)	48.71 (6.97)	66.78 (9.93)
Black	3.00 (0.71)	38.36 (9.82)	45.49 (9.59)	65.08 (11.27)
Other	3.67 (0.58)	42.11 (10.58)	48.41 (7.23)	69.37 (4.49)
p-value[a]	*0.118*	*0.423*	*0.343*	*0.487*
Educational Attainment[b]				
Less than 4-year College Degree	3.37 (0.75)	39.94 (11.77)	46.61 (8.42)	64.04 (9.87)
4-year College Degree	3.53 (0.80)	43.61 (9.23)	49.80 (5.66)	68.99 (9.45)
p-value[a]	*0.153*	*0.043*	*0.009*	*0.001*
Household Income				
Equal to or less than $50,000	3.28 (0.78)	38.39 (10.47)	48.50 (8.81)	63.96 (9.20)
More than $50,000	3.59 (0.70)	44.89 (9.25)	49.38 (5.02)	68.53 (10.58)
p-value[a]	*0.005*	*0.001*	*0.506*	*0.029*
Cancer Type				
Breast	3.48 (0.80)	42.81 (10.67)	47.91 (7.16)	67.03 (9.74)
Hematologic	3.67 (0.59)	43.17 (8.12)	52.07 (3.61)	67.74 (10.01)
Gynecologic	3.40 (0.74)	44.54 (10.36)	47.05 (9.18)	67.19 (8.30)
Other	3.11 (0.93)	38.30 (11.34)	48.48 (8.72)	67.07 (9.59)
p-value[a]	*0.318*	*0.586*	*0.181*	*0.888*
AJCC Stage at Diagnosis				
0	3.38 (0.52)	46.90 (7.61)	46.97 (8.41)	66.59 (7.89)
1A/1B	3.48 (0.70)	44.10 (9.75)	46.82 (6.47)	67.17 (8.94)
2A/2B	3.55 (0.96)	42.70 (11.25)	47.68 (7.57)	67.47 (12.13)
3B/3C	3.00 (0.00)	34.55 (6.62)	43.38 (10.04)	70.53 (9.81)
p-value[a]	*0.668*	*0.324*	*0.829*	*0.953*
Treatment Received				

Radiation	3.50 (0.77)	42.57 (10.29)	49.60 (7.00)	65.90 (10.06)
No Radiation	3.41 (0.84)	41.11 (11.06)	47.23 (6.50)	68.36 (9.93)
p-value[a]	*0.367*	*0.492*	*0.090*	*0.326*
Surgery	3.50 (0.77)	42.68 (10.28)	49.60 (6.96)	66.19 (10.15)
No Surgery	3.40 (0.85)	40.79 (11.07)	47.16 (6.59)	67.70 (9.84)
p-value[a]	*0.295*	*0.380*	*0.083*	*0.494*
Chemotherapy	3.53 (0.76)	43.22 (9.76)	48.56 (6.84)	67.69 (10.75)
No Chemotherapy	3.43 (0.82)	41.33 (11.03)	49.24 (7.02)	65.71 (9.39)
p-value[a]	*0.785*	*0.324*	*0.594*	*0.137*
BMI Categories				
Underweight	4.00 (0.82)	42.37 (12.22)	47.52 (10.51)	62.87 (13.63)
Normal Weight	3.65 (0.83)	46.05 (10.20)	49.01 (5.44)	69.38 (9.51)
Overweight	3.45 (0.70)	42.45 (8.66)	46.80 (8.15)	64.92 (9.92)
Class 1 Obese	3.29 (0.80)	37.66 (10.87)*	49.32 (9.02)	63.82 (9.97)
Class 2 Obese	3.14 (0.66)	40.21 (10.58)	49.32 (9.02)	68.86 (8.88)
Extreme Obesity	3.14 (0.69)	32.20 (9.45)*	49.49 (8.47)	62.57 (12.19)
p-value[a]	*0.051*	*0.002*	*0.614*	*0.168*

[a]p-values for mean differences between groups based on T-test and ANOVA analyses;

[b]PCS and MCS data missing for the two individuals with less than high school education

*Significant differences in PCS scores of class 1 obese and extreme obesity groups compared to normal weight (p=0.007 and p=0.026), respectively.

Table 5. Correlation analyses between demographic characteristics, health, and dietary quality *=p<0.05; **=p<0.01

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	--															
2. Race	-.065	--														
3. Education	-.061	-.013	--													
4. Income	-.131	-.142	.379**	--												
5. BMI	-.115	.057	-.151	-.166	--											
6. Chronic Conditions	.008	-.149	.037	.057	.281**	--										
7. Cancer Type	.151	-.025	-.124	-.169	-.104	-.138	--									
8. Cancer Stage	-.064	.193	.100	-.054	-.128	.066	.017	--								
9. Time since diagnosis	-.031	.067	.119	.123	.088	.118	.014	-.407**	--							
10. Surgery	.020	.066	.024	-.009	-.073	-.040	.061	.225	.006	--						
11. Radiation	.019	.066	.040	-.062	-.071	-.026	.061	.225	.006	.952**	--					
12. Chemotherapy	.016	.010	.022	.061	-.014	-.089	-.110	-.016	.091	.166*	.149	--				
13. Self-rated Health	.098	-.103	.105	.206*	-.245**	-.336**	-.089	-.036	-.118	.063	.052	.065	--			
14. PCS	-.080	-.083	.173*	.315**	-.342**	-.310**	-.069	-.029	-.042	.080	.063	.090	.632**	--		
15. MCS	.257**	-.112	.222**	.063	.043	.050	.042	-.091	.096	.158	.154	-.049	.249**	-.038	--	
16. Total HEI Score	.015	-.008	.249**	.224**	.105	-.004	-.013	.050	-.006	-.068	-.111	.099	.211**	.339**	.171*	--

Table 6. Predictors of Self-rated Health, Total HEI Scores, Physical Health Composite Scores (PCS), and Mental Health Composite Scores (MCS) among Older Female Cancer Survivors

Predictors	*B*	SE *B*	β	p-value
Self-rated Health				
PCS	.049	.012	.679	0.001
Total HEI Scores				
PCS	.577	.243	.430	0.028
Educational attainment	10.050	4.356	.417	0.032
PCS				
Self-rated Health	9.989	1.779	.750	<0.001
Surgery for primary cancer	5.404	2.287	.316	0.028
MCS				
Educational attainment	8.140	2.537	.574	0.004

Note: R^2=.433, p=0.001 for Self-rated Health; R^2=.318, p=0.010 for HEI scores; R^2=.608, p=0.000 for PCS; R^2=.297, p=0.004 for MCS

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JUROS Issue 11
Article

Two Equations for Perfect Numbers

Primary Author: - Stephanie Caple

Abstract

Perfect numbers have not been documented as numerically even. This document shows that the current perfect numbers can be compiled from the difference between two base-two numbers. There are two equations that compile these perfect numbers. As noted by previous mathematicians, perfect numbers that are currently known end in either 6 or 28. To compile perfect numbers that end in the numerical number 6 (except for the perfect number, 6, itself), the difference between two base-two numbers is represented by 2*(256^m) - (16^m). To compile perfect numbers that end in the numerical number 28 (except for the perfect number, 28, itself), the difference between two base-two numbers is represented by 2*(64^n) - (8^n). These equations are explained more in detail later on in this document.

I. Introduction

A perfect number is a number in which its positive divisors sum up to the number itself. Perfect numbers are rare. Within the set of perfect numbers, it can be seen as an exponential growth. Since these numbers grow exponentially, there have only been 51 confirmed perfect numbers. The ancient Greeks were the first to define a perfect number. Then Euclid discovered that his formula of 2^(p-1)(2^(p)-1), includes all of the perfect numbers (but not exclusively perfect numbers). With this formula, a perfect number appeared when the p in the equation was a prime number. Not all prime numbers were perfect numbers. The only problem with this equation is that it does not predict whether or not a perfect number will be odd.

II. Methods

Beginning with the first seven perfect numbers, the difference between two base-two numbers creates a perfect number.

Perfect Number:	Difference Between Two Base-Two Numbers:
6	$2^3 - 2^1$
28	$2^5 - 2^2$
496	$2^9 - 2^4$
8128	$2^{13} - 2^6$
33550336	$2^{25} - 2^{12}$
8589869056	$2^{33} - 2^{16}$
137438691328	$2^{37} - 2^{18}$

Table 1: Perfect numbers and their corresponding base-two differences.

Table 1 shows that perfect numbers can be compiled from the difference between two base-two numbers. This pattern does continue with the rest of the perfect numbers. It is harder to show this pattern with larger perfect numbers due to the numerical limits on handheld calculators. Since the perfect numbers above can be determined by the difference between two base-two numbers, a multiplicative factor of 2 can be pulled from the first base-two

number for simplification towards two new equations for perfect numbers.

Perfect Number:	Difference Between Two Base-Two Numbers:
6	$2(2^2) - 2^1$
28	$2(2^4) - 2^2$
496	$2(2^8) - 2^4$
8128	$2(2^{12}) - 2^6$
33550336	$2(2^{24}) - 2^{12}$
8589869056	$2(2^{32}) - 2^{16}$
137438691328	$2(2^{36}) - 2^{18}$

Table 2: Factoring out a multiplicative factor from the first base-two number.

The exponents of the base-two numbers grow at an exponential rate. To reduce these rates of growth, the base-two numbers can be represented by a base other than 2. The table below will show a further simplification of what was the difference between two base-two numbers.

Perfect Number:	Difference Between Two Base-Two Numbers:
6	$2(4^1) - 2^1$
28	$2(16^1) - 4^1$
496	$2(16^2) - 16^1$
8128	$2(16^3) - 8^2$
33550336	$2(16^6) - 16^3$
8589869056	$2(16^8) - 16^4$
137438691328	$2(16^9) - 8^6$
2305843008139952128	$2(16^{15}) - 8^{10}$
265845599156...615953842176	$2(16^{30}) - 16^{15}$

Table 3: Simplification of base-two numbers.

Table 3 shows the simplification of the base-two numbers. The table adds two more perfect numbers to show the pattern more clearly. Table 3 also shows two red perfect numbers. These two perfect numbers cannot simplify any further and thus are not a part of the two equations that will be explained in the future due to their lack in pattern. As seen in the table, the second base-two number in each equation is simplified to a base of either 8 or 16. This pattern will be visible in the simplification of the first base-two number as well, but instead of bases 8

or 16, the bases will be larger such as 64 or 256.

Perfect Number:	Difference Between Two Base-Two Numbers:
6	$2(4^1) - 2^1$
28	$2(16^1) - 4^1$
496	$2(256^1) - 16^1$
8128	$2(64^2) - 8^2$
33550336	$2(256^3) - 16^3$
8589869056	$2(256^4) - 16^4$
137438691328	$2(64^6) - 8^6$
2305843008139952128	$2(64^{10}) - 8^{10}$
265845599156...615953842176	$2(256^{15}) - 16^{15}$

Table 4: Final simplification of the base-two numbers.

The table has a pattern that creates two equations. Now, the perfect numbers that end in 28 are of the form 2*(64^n) - (8^n) and the perfect numbers that end in 6 are of the form 2*(256^m) - (16^m) (except for the perfect numbers of 6 and 28). The known perfect numbers follow this pattern. With this pattern, since the perfect numbers are represented by the difference of base-two numbers, they are even. The numerical values of m and n do not have a definitive equation that determines their values as of thus far.

III. Results

To determine perfect numbers, there are two equations that can be used. The equation used to produce perfect numbers that end in a numerical number 6 (except 6 itself) is produced by 2(256^m) -16^m. The second equation used to produce perfect numbers that end in a numerical number 28 (except 28 itself) is produced by 2(64^n) -8^n.

IV. Conclusion

In conclusion, perfect numbers can be determined by two equations. These equations show a new pattern of thinking when it comes to perfect numbers. Using this pattern, it is still undetermined whether perfect numbers can be odd. With this pattern, future research could be conducted to find the exact values that create perfect

numbers and, with this, predict future perfect numbers.

JUROS Issue 11
Article

5000 Baby Project: Screening Newborns to Develop an Algorithm for Early Detection of Neurodevelopmental Disorders

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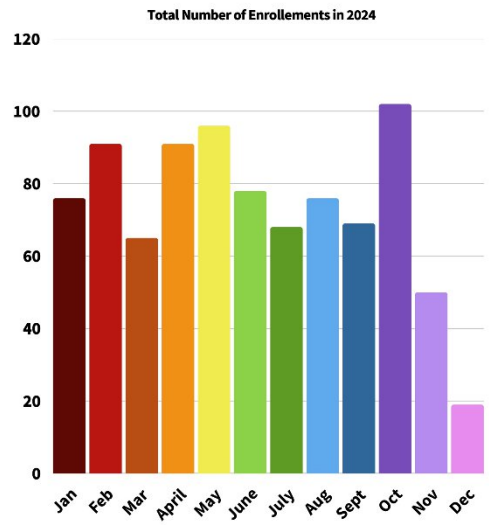
Contributing Author(s): - Linda Lowes, Kathleen Adderley, Emma Wagner, Madison Briggs

Abstract

The *5000 Baby Project* aims to transform early detection of developmental delays, enabling timely diagnosis and intervention within the first months of life. This research employs clinical, evidence-based monitoring to analyze infants' natural motor activity before six months of corrected age. Using video-based sensor technology, skeletal tracking, and artificial intelligence, the study identifies abnormal movement patterns associated with neuromuscular disorders such as autism and cerebral palsy. Infants are recruited from the Nationwide Children's Hospital network of clinics and the Mount Carmel St. Ann's birthing unit. To date, over 3,400 infants have been enrolled, with up to six-minute recordings capturing spontaneous movements while supine. The data extraction and analysis team is refining tracking and processing algorithms to classify



movements as typical or atypical, based on long-term developmental outcomes at ages two and three. Preliminary findings indicate that the algorithm effectively differentiates typical from aberrant movement patterns. With continued enrollment, the study aims to refine cohort classification, enhance early identification, and facilitate prompt intervention while uncovering insights into the underlying mechanisms of these disorders. This approach holds promise for improving early diagnosis, treatment initiation, and long-term developmental outcomes, ultimately enhancing quality of life for affected infants.

I. Introduction

The average age of autism spectrum disorder (ASD) diagnosis is approximately 4 to 5 years, delaying critical early intervention (Lord et al., 2020).[1] Similarly, cerebral palsy (CP) is typically diagnosed around age 2, despite evidence that early intervention significantly improves outcomes (Novak et al., 2017).[2] Research indicates that interventions during infancy can enhance motor, cognitive, and social development (Zwaigenbaum et al., 2015).[3]

The *5000 Baby Project* seeks to address this issue by developing an AI-powered application that analyzes infant motor activity within the first six months of life. By detecting subtle movement abnormalities relative to age-matched norms, the app facilitates earlier diagnosis of ASD and CP. Early detection enables timely intervention, potentially reducing long-term complications. This technology has the potential to transform neurodevelopmental screening, improve outcomes for at-risk children, and allow clinicians to diagnose disorders at a younger age.

II. Methods

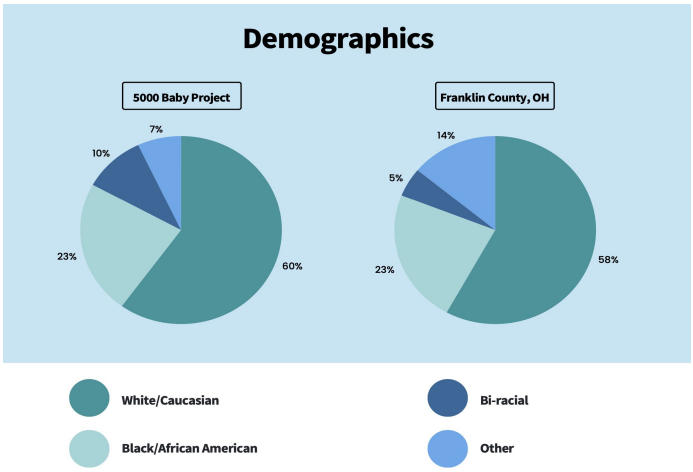
Early intervention in abnormal movement patterns in infants is crucial, as it enables healthcare providers to identify potential neurological and developmental disorders while intervention remains effective. By leveraging technology that distinguishes between normal and abnormal movements, the healthcare system could evolve to facilitate early diagnosis of conditions such as cerebral palsy, developmental delays, and neuromuscular disorders (CDC, 2025).[4]

[1] Lord, C., Elsabbagh, M., Baird, G., & Veenstra-VanderWeele, J. (2020). *Autism spectrum disorder.* The Lancet, 395(10242), 508-520.
[2] Novak, I., Morgan, C., Adde, L., Blackman, J., Boyd, R. N., Brunstrom-Hernandez, J., ... & Badawi, N. (2017). *Early, accurate diagnosis and early intervention in cerebral palsy: Advances in diagnosis and treatment.* JAMA Pediatrics, 171(9), 897-907.
[3] Zwaigenbaum, L., Bauman, M. L., Choueiri, R., Kasari, C., Carter, A., Granpeesheh, D., ... & Natowicz, M. R. (2015). *Early intervention for children with autism spectrum disorder under 3 years of age: Recommendations for practice and research*. Pediatrics, 136(Suppl 1), S60-S81.
[4] Centers for Disease Control and Prevention (CDC). *(n.d.). Learn the signs. Act early.* National Center on Birth Defects and Developmental Disabilities.

Furthermore, physical and occupational therapy has been shown to improve motor function and cognitive development (AAP, 2025).[5] This, in turn, could enhance long-term outcomes by reducing the severity of developmental impairments and promoting neuroplasticity through personalized treatment plans (NICHD, 2025).[6] The future of healthcare aims to promote health equity by ensuring that these advancements are accessible to all populations, regardless of background. Developing a cost-effective platform for easy implementation would integrate this technology into routine pediatric checkups, reducing barriers to access currently faced by families seeking specialized diagnostic tools (WHO, 2025).[7] Additionally, collaboration with community health organizations and government programs could help ensure equitable access to publicly funded technology for all infants (WHO, 2025).[7]

III. Results

While the technology is still in the developmental stages, pilot analyses suggest its capability to distinguish between normal and abnormal movements. In 2024, we successfully enrolled nearly 900 infants across all clinics and the birthing hospital, with the following racial demographics: 60% White/Caucasian, 23% Black/African American, 10% biracial, and 7% classified 58% White, 23% Black, 5% biracial, and 5% Asian (Census Reporter, 2025).[8] Of those enrolled, 480 were under one month old.



[5]American Academy of Pediatrics (AAP). *(n.d.). Developmental surveillance resources for pediatricians.* AAP Patient Care.
[6] National Institute of Child Health and Human Development (NICHD). *(n.d.). Infant care.* NICHD.
[7] World Health Organization (WHO). *(n.d.). Health equity.* WHO Health Topics.
[8] *Census Reporter. (n.d.). Franklin County, OH. Census Reporter.*

IV. Discussion

This study recruits infants from birth to six months of corrected age from Nationwide Children's Hospital clinics, the main hospital, and St. Ann's birthing unit. To date, over 3,400 infants have been enrolled. After obtaining parental consent, the infant is placed on a mat, wearing only a diaper, and their natural movements are recorded for up to six minutes. The technology used for recording is the "ACTIVEmini," which is connected to a camera positioned 3 feet above the baby. Parents also complete a pregnancy and birth history questionnaire to document any birth complications, which are then factored into the analysis. The advanced sensor technology, skeletal tracking, and AI algorithms analyze these recordings, working alongside data scientists to identify and differentiate typical versus atypical movement patterns. To validate these results, participants' charts are reviewed up to 18 years of age as a follow-up to determine if a motor and/or developmental diagnosis was made, serving as a control measure. This allows researchers to compare the predicted diagnosis with actual neurodevelopmental outcomes.

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