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A War on Disease. Polio Eradication in the United States

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Abstract

A War on Disease: Polio Eradication in the United States

This paper investigates how widespread acceptance of the polio vaccination was generated in the United States. It shows that Franklin D. Roosevelt transformed the struggle against polio into a national endeavor and that the fear of polio contributed to the widespread acceptance of the vaccine. The medical researcher Jonas Salk played a key role in fostering public trust in the vaccine. The paper argues that a timely switch from Salk's inactive vaccine to Albert Sabin's oral, live vaccine rekindled the national interest in polio and that the war rhetoric on polio further motivated Americans to get vaccinated.

1. Introduction

The World Health Organization (WHO) describes poliomyelitis as an extremely infectious viral disease that mostly affects children under the age of five.[1] The medical term "poliomyelitis" was derived from Greek and describes the effect of the poliovirus on the spinal cord and translates to "gray (polio) marrow (myelon)".[2] There are three types of wild poliovirus. While type 2 and type 3 are declared eradicated, type 1 still exists but can be prevented by a vaccine.[3] The WHO reported in 2020 that merely two countries, Pakistan and Afghanistan, were still affected by type 1 polio.[4]

1 World Health Organization, Poliomyelitis, 2019, https://www.who.int/en/news-room/fact-sheets/detail/poliomyelitis, accessed 24.3.2022.

2 Nidia H. De Jesus, Epidemics to Eradication. The Modern History of Poliomyelitis, in: *Virology Journal* 4 (2007), Issue 4, pp. 1-18, here p. 1.

3 Center for Disease Control and Prevention, Polio Disease and Poliovirus Containment, 2020, https://www.cdc.gov/cpr/polioviruscontainment/diseaseandvirus.htm, last updated 17.9.2020, accessed 24.3.2022.

4 World Health Organization, Poliomyelitis (polio), 2020, https://www.who.int/health-topics/poliomyelitis#tab=tab_1, accessed 28.3.2022.

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The poliovirus is spread through fecal-oral transmission. Most frequently, polio is transmitted via contaminated water or food, or from an infected individual's hands. Oral-oral infections are also possible, albeit less likely, through the transmission of saliva.[5] More than ninety percent of polio infections are asymptomatic or accompanied by a general feeling of discomfort. The abortive form of poliomyelitis occurs in four to eight percent of patients who may experience a blend of fevers, drowsiness, headaches, nausea, vomiting, constipation, and a sore throat.[6] One to two percent of patients suffer from nonparalytic poliomyelitis, which causes stiffness and pain in the back and neck. Symptoms will last between two to ten days and patients recover almost without exception.[7] However, the paralytic form of polio results in a lasting defect in one or more muscle groups. Due to nerve damage, flaccid paralysis may occur, and spasms of undamaged muscles can also befall the patient. There is a wide range of possible outcomes of paralytic poliomyelitis. While some patients may even recover within six months, there can be life-long paralytic effects for the patients.[8] Ultimately, about one in two-hundred infections cause an incurable paralysis that has a five to ten percent chance of fatally disabling the patient's breathing apparatus.[9] In addition, survivors of paralytic poliomyelitis can re-experience symptoms as late as seventy years after their initial infection. This phenomenon is known as post-polio syndrome. Symptoms can include low stamina, obstructed breathing, and post-polio syndrome can have disabling effects for one out of 25 patients.[10]

Polio is only found in humans and its earliest records can be traced back to ancient Egyptian paintings depicting disfigured children. The first known medical description was recorded in 1789 by English physician Michael Underwood.[11] Although the virus had existed for centuries prior, major polio outbreaks only surfaced at the advent of the Industrial Revolution when the process of urbanization began in Europe and North America.[12] Before the advent of the 20th century, children were consistently exposed to the poliovirus. However, up to that point, infected children were usually young enough to still be protected by maternal antibodies. When sanitation practices improved in the 19th century, children started to catch the virus at an older age, when they were no longer protected by maternal antibodies, which caused intensified outbreaks.[13]

By the start of the 20th century, epidemic episodes intensified and occurred more frequently. In 1916, official statements were published by US public health authorities,

5 New York State Department of Health, Polio, 2014, https://www.health.ny.gov/diseases/communicable/poliomyelitis/fact_sheet.htm#:~:text=Polio%20is%20spread%20when%20the,may%20account%20for%20some%20cases, accessed 24.3.2022.

6 J. L. Melnick, Current Status of Poliovirus Infections, in: *Clinical Microbiology Reviews* 9 (1996), Issue 3, pp. 293–300, here p. 293.

7 Ibid., pp. 293-294.

8 Ibid., p 294.

9 World Health Organization, Poliomyelitis.

10 Evelyn Zamula, A new Challenge for Former Polio Patients, in: *FDA Consumer* 25 (1991), Issue 5, p. 21.

11 Man Mohan Mehndriratta/Prachi Mehndiratta/et al., Poliomyelitis. Historical Facts, Epidemiology, and Current Challenges in Eradication, in: *The Neurohospitalist* 4 (2014), Issue 4, pp. 223–229, here p. 223.

12 Mark A. Pallansch, Enterovirus Infections, Including Poliomyelitis, in: Richard L. Guerrant/David H. Walker/et al. (Eds.), Tropical infectious diseases. Principles, pathogens and practice, Edinburgh 2011[3], pp. 398–405.

13 De Jesus, The Modern History of Poliomyelitis, p. 9.

which announced a full-blown epidemic of poliomyelitis. In New York City alone, over 2,000 fatal infections were reported that year.[14] The most severe epidemic, however, was the one of 1952, when more than 3,000 Americans died, and over 21,000 suffered from varying degrees of paralysis.[15]

The development of two polio vaccines in the 1950s was nothing short of a medical revolution. The two vaccines were developed by two virologists, Jonas Salk and Albert Sabin. In 1947, Salk worked in opposition to the scientific consensus on vaccine development as he utilized non-infectious, killed viruses to create immunity within patients, instead of injecting a weakened, live version of the virus, as was suggested by the medical community. In taking this alternative approach, Salk built on his prior research results, which originated from his work on a vaccine for the influenza virus.[16] In 1954, after large-scale, nationwide trials that even included Salk's family, the researcher announced his vaccine to be safe and efficient by 1955. At the end of the decade, the vaccine was mass-produced and administered in ninety different countries.[17]

In contrast to Salk, Albert Sabin created a live vaccine that is administered orally. He hypothesized that a vaccine based on a live, weakened virus would result in a longer phase of immunity compared to Salk's vaccine. Ultimately, his vaccine proved to be effective against all three strains of the virus.[18] The vaccine was only dispensed in the US in 1962, although it was approved a year prior. Ultimately, Sabin's vaccine would end the polio epidemic.[19]

Both vaccines were so effective that cases in the US decreased from 58,000 to 5,600 during 1956. By the early 1960s, merely 161 cases were documented in the United States.[20] The WHO estimates that roughly 1.5 million childhood deaths were prevented thus far.[21] Through extensive use of the vaccines, cases have dropped by over 99 percent worldwide since 1988.[22] In North and South America, polio was declared non-existent in the 1990s by the WHO.[23] This has been achieved by utilizing an elaborate surveillance system that monitored each case of paralyzation of the extremities in children and adolescents, as well as targeted vaccination campaigns in areas with low immunization rates.[24] The Western Pacific WHO Region was declared polio-free in 2000. In the European Region, the virus was eradicated in 2002.[25] However, the

14 Melnick, Current Status of Poliovirus Infections, p. 293.
15 Zamula, A new Challenge for Former Polio Patients, p. 21.
16 Siang Yong Tan/Nate Ponstein, Jonas Salk (1914-1995). A Vaccine against Polio, in: *Singapore Medical Journal* 60 (2019), Issue 1, pp. 9–10, here p. 9.
17 Ibid.
18 Marc A. Shampo/Robert A. Kyle/et al., Albert Sabin. Conqueror of Poliomyelitis, in: *Mayo Clinic Proceedings* 86 (2011), Issue 6, p. e44.
19 Ibid.
20 Mehndiratta/Mehndiratta/et al., Poliomyelitis, p. 224.
21 World Health Organization, Poliomyelitis.
22 Ibid.
23 A. Windorfer/F. Feil, Der Kampf gegen Poliomyelitis. Die Ausrottung einer Zivilisationsseuche, in: *Bundesgesundheitsblatt – Gesundheitsforschung – Gesundheitsschutz* 43 (2000), Issue 1, pp. 2–6, here p. 4.
24 Ibid.
25 Mehndiratta/Mehndiratta/et al., Poliomyelitis, p. 224.

ongoing transmission of the virus in Afghanistan and Pakistan might cause a high number of new cases worldwide.[26]

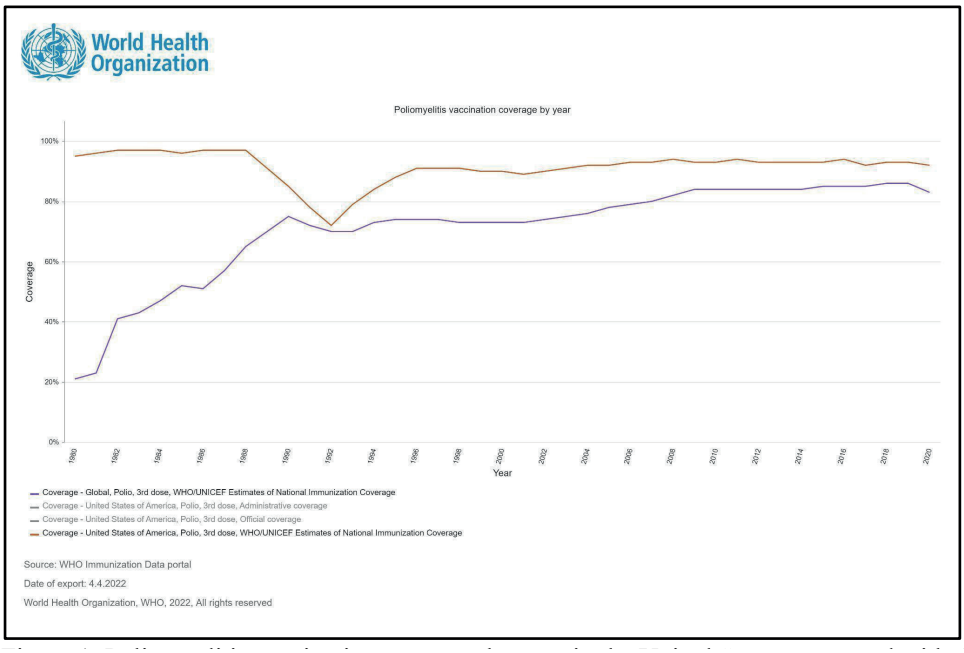

Figure 1: Poliomyelitis vaccination coverage by year in the United States compared with the global rate.

Figure 1 shows the vaccination rate for polio in the US (orange line), compared to the global vaccination rate (purple line). It is most salient that the US reached a 95 percent vaccination rate in 1980, as the rest of the world averaged a 26 percent vaccination rate. Furthermore, the figure shows that from the 1990s onward, the US polio vaccination rate is about ten percent higher than the global standard.

Nowadays, the number of people who distrust vaccinations is increasing. This phenomenon is most salient when COVID-19 vaccinations are considered as an example. Although the vaccine is widely available and free for everyone in the United States, less than 66 percent of the adult population were immunized by March 2022.[27] This hesitancy is not only affecting vaccines for adults, but also childhood vaccinations such as measles, mumps, or rubella.[28] This trend is not a new occurrence, as vaccines have been a controversial topic since the early 19th century, when concerned parents protested the mandatory smallpox vaccination in American schools. At the time, parents were outraged as they felt that schools were appropriating their children's lives.[29] This contemporary, widespread uncertainty gives rise to the question of how the United States generated widespread acceptance for the polio vaccination in the late 20th century.[30]

26 World Health Organization, Poliomyelitis.

27 Our World in Data, Coronavirus (COVID-19) Vaccinations, 2022, https://ourworldindata.org/covid-vaccinations?country=USA#what-share-of-the-population-has-received-at-least-one-dose-of-the-covid-19-vaccine, accessed 24.03.2022.

28 Richard J. Altenbaugh, Vaccination in America. Medical Science and Children's Welfare, Berlin 2018, p. 1.

29 Altenbaugh, Vaccination in America, pp. 49–50.

30 WHO Immunization Data Portal, Poliomyelitis vaccination coverage, 2022, https://immunizationdata.who.int/pages/coverage/POL.html?CODE=Global+USA&ANTIGEN=POL3&YEAR=, accessed 4.4.2022.

This paper seeks to investigate which factors contributed to the widespread acceptance of the polio vaccine in the US. The paper argues on the basis of literature research and the survey of 20th-century newspaper articles that the fight against polio was successful because the most famous polio patient, Franklin D. Roosevelt (FDR), gave a face to the disease and founded essential institutions for funding polio research, such as the March of Dimes. In addition, it assumes that the extensive involvement of the public transformed the struggle against polio into an American war narrative of "good versus evil". The continuous media coverage generated fear of the virus as well as anticipation of the vaccine. This gave rise to widespread euphoria when the vaccine became available. In this context, Salk was rendered as an American hero and this image produced additional trust in his vaccine. Lastly, the timely switch to the live, oral polio vaccine rekindled the war on polio as Sabin's inactive vaccine lost its appeal in the early 1960s.

2. National Fundraising Efforts and a Famous Patient

Franklin D. Roosevelt's role in combating the poliovirus was crucial as he supported research efforts and established foundations, such as the Warm Springs Resort. In addition, Roosevelt himself was arguably the most famous polio patient. The higher Roosevelt rose in the political ranks, the stronger his commitment to fighting polio grew. He would ultimately proceed to establish the National Foundation for Infantile Paralysis (NFIP) in 1938. The March of Dimes, which emerged from the NFIP, would become a decisive factor in the funding of Jonas Salk's efforts towards the development of a vaccine.[31] FDR's role in rallying support for the vaccine was significant as he himself was a prominent polio combatant who changed the public image of the disease which made the American public aware that anyone could fall victim to the virus. Furthermore, FDR inspired the public to partake in the struggle against the epidemic which would later contribute to the widespread demand for the polio vaccine in America as the fight against polio was transformed into a collective American struggle.

2.1 Roosevelt as a Polio Patient

FDR was America's longest-serving President of the United States (POTUS) as he got elected into office four times.[32] Before the Twenty-second Amendment was ratified in 1951, it was still possible for candidates to assume the office of POTUS more than twice.[33] FDR was in office from March 4, 1933, until his death on April 12, 1945.[34] The timing of his elections is significant as he was elected twice during the Great Depression, and twice during the Second World War.[35]

31 Tan/Ponstein, Jonas Salk, p. 9.

32 Christopher Clausen, The President and the Wheelchair, in: *The Wilson Quarterly* 29 (2005), Issue 3, pp. 24–29, here p. 24.

33 The Westport Library, Twenty-Second Amendment, 2022, https://westportlibrary.libguides.com/twenty_secondamendment#:~:text=It%20was%20formally%20proposed%20by,27%2C%201951, accessed 3.4.2022.

34 Wikipedia. The Free Encyclopedia, Franklin D. Roosevelt, updated on 28.3.2022, https://en.wikipedia.org/wiki/Franklin_D._Roosevelt, accessed 03.4.2022.

35 Clausen, The President and the Wheelchair, p. 26.

Roosevelt became the governor of New York in 1928. As he rose the ranks in his political career, he was already struggling with his health as he was infected with polio in 1921. Henceforth, he depended on mobility aids such as canes, leg braces, and even wheelchairs. It must be highlighted that, at the time, people with disabilities could be refused education as well as employment, which frequently resulted in economic deficits as well as social inferiority for individuals with disabilities. Considering these hardships, it is astounding how Roosevelt managed to navigate the social-, and political field.[36]

The surveyed literature is ambiguous about the extent to which the public was aware of the degree of FDR's disability. On the one hand, individuals with special needs were perceived as incapable at the time, which is why Christoph Clausen has argued that the broad public would not have elected FDR had they known about the severity of his paralyzation, especially not in the face of the Great Depression and World War II.[37] Furthermore, in the context of the 1997 debate about the FDR memorial, Nielsen writes that FDR later tried to hide the degree of his disability from the public with the assistance of members of Congress, other world leaders, and the White House staff.[38] However, Nielsen also recognizes that members of the public, especially people with disabilities, were able to recognize FDR's disability to its full extent. People even sent letters to the White House in which they were giving advice on adaptive equipment such as wheelchairs.[39]

On the other hand, there are multiple reasons to believe that the public was fully aware of FDR's impairment. Dawn Larsen argues that FDR became the public face of polio on September 16, 1921, when "The New York Times" first reported on his condition shortly after his infection.[40] In addition, when Roosevelt was campaigning to be governor of New York in 1928, political opponents frequently exploited his disability in order to make him appear vulnerable and unfit for office.[41] FDR's physical condition became of public concern again when it was openly discussed if FDR would be physically able to assume the office of POTUS in 1931.[42] In the course of this debate, the Roosevelt campaign even sent out copies of a published article that described the politician as a resilient candidate with impaired legs. Roosevelt himself would say that his limited mobility helped him concentrate as he would be forced to concentrate on the matter at hand.[43]

Ultimately, FDR contributed to the fight against polio by changing the disease's public image. Until Roosevelt had caught the virus and before the opening of the Warm Springs rehabilitation center, polio infections were considered "shameful" and "filthy" in American society.[44] Only when Roosevelt gave the virus a face, it began to be perceived

36 Kim E. Nielsen, Memorializing FDR, in: *OAH Magazine of History* 27 (2013), Issue 1, pp. 23–26, here p. 23.
37 Clausen, The President and the Wheelchair, p. 23.
38 Nielsen, Memorializing FDR, p. 24.
39 Ibid., pp. 24-25.
40 Dawn Larsen, The March of Dimes and Polio, in: *American Journal of Health Education* (2012) 43, Issue 1, pp. 47–54, here p. 48.
41 Ibid., p. 49.
42 Clausen, The President and the Wheelchair, p. 26.
43 Ibid., p. 27.
44 Nina Gilden Seavey/Jane S. Smith/et al., A Paralyzing Fear. The Triumph over Polio in America, New York 1998, p. 49.

as a threat to anyone and thus contributed to transforming the fight against polio into a national struggle.

2.2 Fundraising for Polio Research and Rehabilitation

After Roosevelt was infected with polio in 1921, he celebrated his political comeback in 1924 at the Democratic National Convention.[45] When Roosevelt was searching for ways to treat his illness in the early 1920s, he found out about the aquatic therapy provided by the Warm Springs resort in Georgia.[46] It is documented that FDR appreciated the warm water as it improved the feeling in his legs.[47] As a result, Roosevelt was inspired to aid other victims of polio by purchasing the Georgia Warm Springs Resort in 1926; he then transformed it into a non-profit rehabilitation facility for polio survivors.[48] It cost FDR half of his personal fortune to acquire Warm Springs.[49] The newly founded rehabilitation center became an innovative facility that achieved medical as well as social modernizations. One of the revolutionary aspects of the institution was that it focused on enabling patients to lead normal lives. FDR wanted patients to receive competent medical treatment as well as comfort.[50] Various patients gladly reported that they were enabled to lead normal, enjoyable lives in Warm Springs.[51]

Figure 2: Franklin D. Roosevelt at the Warm Springs pool in 1924.

45 Katherine A. Foss, Constructing the Outbreak. Epidemics in Media and Collective Memory, Amherst 2020, p. 174.
46 Daniel J. Wilson, Polio Paradise? Franklin D. Roosevelt's Warm Springs, Physical Therapy, and Disability Culture, in: *Physical Therapy* 101 (2021), Issue 10, pp. 1–3, here p. 1.
47 Clausen, The President and the Wheelchair, p. 27.
48 David M. Oshinsky, Polio. An American Story, New York 2005, cited in Foss, Constructing the Outbreak, p. 179.
49 Seavey/Smith/et al., The Triumph over Polio in America, p. 48.
50 Wilson, Polio Paradise?, p. 1.
51 Ibid., p. 2.

When Roosevelt was campaigning to become governor of New York during the election of 1928, he was no longer able to lead the facility. Thus, he made his partner Basil O'Connor head of the rehabilitation center. O'Connor went on to utilize Roosevelt's image to accelerate fund-raising efforts for the non-profit organization.[52] When O'Connor took charge of the foundation, he began to acquire funding through wealthy patients and their associates.[53]

After strategizing with a public relations agency, O'Connor decided to link his fund-raising efforts to Roosevelt's presidency – Roosevelt assumed office in 1933 – by hosting the President's Birthday Balls.[54] With the slogan "To dance so that others may walk", balls were organized in the President's honor throughout America.[55] The balls were a huge success despite the Great Depression and "The New York Times" reported that approximately 6,000 balls were held nationwide in 1934.[56]

In 1937, Roosevelt announced the foundation of another nonprofit organization, the NFIP, with the aims of raising awareness about polio, providing patient care, and collecting funding for medical research. The NFIP was officially founded in 1938 and Roosevelt made O'Connor president of the foundation. In his new position, O'Connor immediately started to strategize about funding.[57] However, funding steadily declined with each annual President's Ball and reached an all-time low in 1938.[58] As a result, the fundraising strategy was changed as the institution started to reach out to the broad public as opposed to working with wealthy contributors exclusively. This led to a significant rise in funding.[59] On January 30th, 1938 – FDR's birthday – radios invoked the public to send dimes directly to the president's office. As a result, more than 2.6 million dimes arrived at the White House, reportedly congesting the mailroom. This incident supposedly gave rise to the name "March of Dimes" as it was interpreted that the dimes "marched" to the White House.[60] However, it is known that the popular radio host and entertainer Eddie Cantor, who was already involved in fundraising for the President's Birthday Balls, coined the term "The March of Dimes" which was a pun referring to the newsreel series "The March Of Time".[61]

After Roosevelt's death in 1945, the Birthday Balls were discontinued. In addition, Hollywood's interest in polio faded, which was another setback in the struggle against the disease.[62] Ultimately, FDR's death led to new approaches in fundraising efforts. The

52 W. H. Helfand/ J. Lazarus/et al., "...so That Others May Walk". The March of Dimes, in: *American Journal of Public Health* 91 (2001), Issue 8, p. 1190.
53 Seavey/Smith/et al., The Triumph over Polio in America, p. 68.
54 Aaron E. Klein, Trial by Fury. The Polio Vaccine Controversy, New York 1972, p. 15.
55 Ibid., p. 16.
56 New York Times, 1934, cited in: Larsen, The March of Dimes and Polio, p. 49.
57 Foss, Constructing the Outbreak, p. 180.
58 Seavey/Smith/et al., The Triumph over Polio in America, p. 69.
59 Allan M. Brandt, Polio, Politics, Publicity, and Duplicity. Ethical Aspects in the Development of the Salk Vaccine, in: *International Journal of Health Services* 8 (1978), Issue 2, pp. 257–270, here p. 259.
60 Klein, cited in: Brandt, Polio, Politics, Publicity, and Duplicity, p. 259.
61 Seavey/Smith/et al., The Triumph over Polio in America, p. 70.
62 Oshinsky, Polio. An American Story, p. 79.

struggle against polio would now, more than ever, be the responsibility of American families.[63]

In 1929, the Great Depression caused an unemployment rate of 25 to 30 percent in the United States, which, in turn, caused distrust in the government and the democratic institutions.[64] Historian Allan M. Brandt notes that in the face of the economic circumstances, public involvement in combating polio was remarkable.[65]

In the post-war period, the NFIP focused on housewives and mothers in their fundraising efforts as many perceived the fight against polio as a parental obligation. Elaine Whitelaw became head of the newly instated NFIP Women's Division, which recruited numerous volunteers. Furthermore, Whitelaw created the March of Dimes Fashion Show, which would develop to be one of the most important social events for the subsequent thirty years.[66] Ultimately, Whitelaw's efforts would prove to be immensely beneficial as she found various innovative approaches to fundraising. She organized parades, sewing bees, and hosted the first telethons.[67] Based on an idea that originated in Phoenix in 1950, the NFIP organized a nationwide Mothers' March in 1951.

Americans were told to leave on their porch lights if they wanted to support the struggle against polio. The light signaled the marching mothers to collect donations at the respective houses. This method proved to be extremely efficient as disinterested households could be identified and skipped. By 1955, approximately eighty percent of polio patients received aid by the funding of the March of Dimes.[68]

In conclusion, Roosevelt and the institutions he founded gave rise to public involvement in the struggle against polio. By sharing responsibility with the public, polio became a national concern, and many Americans were mobilized to stand united in the funding of vaccine research.

3. *Public Fear and Euphoria*

The relationship between the polio vaccine and the public opinion of the mid-20th century was significant. The following section shows that poliomyelitis was a strong cause for concern within US society and that the American public grew to be increasingly medicalized by the 1950s. Additionally, it demonstrates how the involvement of the public in Salk's vaccine trials, also known as V-Day, fostered the narrative of the American war on polio. The chapter exhibits how Jonas Salk became a national hero and how the widespread acceptance of the vaccine was practically unimpaired by the Cutter Incident.

63 Oshinsky, Polio. An American Story, p. 81.
64 Curtis W. Hart, Franklin Delano Roosevelt: A Famous Patient, in: *Journal of Religion and Health* 53 (2014), Issue 4, pp. 1102–1111, here p. 1103.
65 Brandt, Polio, Politics, Publicity, and Duplicity, p. 258.
66 Oshinsky, Polio. An American Story, p. 86.
67 Ibid., p. 88.
68 Thoru Pederson, Turning on a Dime. The 75th Anniversary of America's March Against Polio, in: *The FASEB Journal* 27 (2013), Issue 7, pp. 2533–2535, here p. 2535.

3.1 Public Fear of Poliomyelitis

In the 20th century, the term "polio" caused fear within American society. Although there are also non-paralytic forms of poliomyelitis, the term was synonymous with children on crutches, shriveled legs, and the infamous iron lungs, which were used to keep patients alive who were no longer able to breathe on their own.[69]

In 1916, the fear of the epidemic even caused Americans to flee from New York City, which was one of the most affected areas by the poliovirus that year. Interactions with other people were drastically reduced as public spaces like cinemas, bathing sites, or theme parks were shut down. Furthermore, children's operations were postponed due to fear of infections during the hot summer months. Children were warned of drinking from water fountains and there were even reported cases of towns in which New York City citizens were chased out at gunpoint.[70] The media, at the time, fuelled the public's fears even further as messages about the dangers of the poliovirus were aired frequently. In addition, initiatives like the NFIP's March of Dimes campaign further intensified the public feeling that polio must be fought.[71] In his Pulitzer Prize-winning book, David Oshinsky reasons that despite the chances of dying from polio being minuscule, polio had a vast impact on the American public as the victims were conspicuous and young.[72] Katherine Foss, a Professor for Media Studies, emphasizes that poliomyelitis was easily the most frightening disease for Americans at the time and parents were especially terrified for their children.[73] In the late-19th century the mortality rate of children was still significantly higher as boys and girls under five accounted for forty percent of the total deaths in New York City in the year 1890.[74]

Foss reports that the American public impatiently awaited a cure as contemporary media, such as newspapers, radio, film, and television, announced that a vaccine was to be released soon.[75] 1953 was the advent of extensive vaccine media coverage as developments in its creation regularly filled the front page of "The New York Times".[76] According to Brandt, the new media landscape contributed to the framing of polio as the leading public disease and that, ultimately, polio became America's collective enemy.[77]

3.2 V-Day

Another significant development in the process of generating a positive attitude towards the polio vaccine was Salk's vaccine trial. In the context of Salk's experiments, the first polio shot was administered on April 26, 1954 – the so-called "V-Day".[78] In the trials, 1.8 million elementary students were vaccinated, given a placebo, or merely

69 Foss, Constructing the Outbreak, pp. 173-174.
70 Zamula, A New Challenge for Former Polio Patients, p. 21.
71 Foss, Constructing the Outbreak, p. 174.
72 Oshinsky, Polio. An American Story, pp. 81-82.
73 Foss, Constructing the Outbreak, p. 173.
74 Altenbaugh, Vaccination in America, p. 11.
75 Foss, Constructing the Outbreak, p. 175.
76 Brandt, Polio, Politics, Publicity, and Duplicity, p. 263.
77 Ibid., p. 258.
78 Altenbaugh, Vaccination in America, p. 61.

observed.[79] The coinage of the term "V-Day" resonated with the American-post-war society as people were reminded of the heroic fighting in Normandy. The term clearly signified the advent of a struggle of good versus evil.[80]

Representatives of the NFIP worked with health departments, schools in 272 counties, and parents to acquire parental consent for the trial.[81] Pamphlets were given out to inform the public about the polio vaccine and O'Connor wrote a letter to parents in which he informed them about the vaccination process. While the letters were effective in notifying parents about the vaccine trial, they were also appealing to their patriotism as test subjects were referred to as "polio pioneers".[82] In addition, the trials were contextualized as one of the most important endeavors in medical history and it was emphasized that its success depended entirely on parents' cooperation. The term "experiment" was omitted from the letter entirely.[83]

It is important to highlight that the trials were an operation that was closely monitored by physicians, healthcare workers, public health officials, educators, and volunteers nationwide.[84] Marcia Meldrum asserts that it was pivotal that "V-Day" be turned into such an event as she writes that the widespread involvement of the associated individuals had to represent the struggle against polio thus far. The participation of public and scientific contributors legitimized the trials even further. In summary, the vaccination trials conveyed multiple meanings as they were a scientific demonstration, a political statement, and an event of public participation.[85]

3.3 Salk's Reputation and Public Euphoria

In the early 20th century, a shift in society's perception of science occurred. Scientists began to be represented as heroes in popular culture, which set in motion a process that legitimized science and its institutions. In other words, people began to trust in the scientific process. Altenbaugh argues that this development was only feasible because society had recently become medicalized as people became aware of the benefits of medical developments as well as hygiene at the time.[86]

The results of Salk's extensive vaccine trials were released by the director of the Poliomyelitis Vaccine Evaluation Center, Dr. Thomas Francis, Jr., on April 12, 1955. The date carried symbolic value and was chosen strategically as it was also the tenth anniversary of the death of the famous polio combatant FDR. The press conference was a monumental attraction for the media, Salk's name became famous, and he was hailed as a hero subsequently as he was able to prove that his vaccine had a protection rate of eighty per-

79 Paul A. Offit, The Cutter Incident. 50 Years Later, in: *The New England Journal of Medicine* 352 (2005), Issue 1, pp. 1411–1412, here p. 1411.
80 Altenbaugh, Vaccination in America, p. 218.
81 M. Meldrum, A Calculated Risk. The Salk Polio Vaccine Field Trials of 1954, in: *BMJ* 317 (1998), Issue 1233, pp. 1233–1236, here p. 1234.
82 Altenbaugh, Vaccination in America, p. 220.
83 Ibid.
84 Ibid., p. 61.
85 Meldrum, The Salk Polio Vaccine Field Trials, p. 1235.
86 Altenbaugh, Vaccination in America, p. 61

cent against polio.[87] Church bells were rung in celebration and sirens were activated to signify the medical breakthrough. The declaration transferred the nation into a state of euphoria,[88] as Robert Hill describes: "The predominant question was not, 'Why do my kids have to get the vaccine?' The question was, 'When can my kids get the vaccine?'" [89]

Nevertheless, there was considerable opposition to Salk's vaccine and vaccine trials. The most salient critique probably came from Albert Sabin who accused Salk of testing his vaccine prematurely. Nevertheless, the NFIP and the media managed to generate widespread optimism for Salk and his vaccine.[90]

After Salk's vaccine was declared to be safe and effective in 1955, five pharmaceutical companies were licensed to produce the vaccine. Unfortunately, the licensing process was flawed, and rushed. Consequently, one of the companies, Cutter Laboratories, ended up producing 120,000 doses of polio vaccine that contained live polioviruses. The mistake caused over 150 permanent paralyzations and ten deaths in children. This debacle later became known as the Cutter Incident.[91] Surprisingly, Salk's vaccine found widespread acceptance despite the Cutter Incident, and an additional four million children were vaccinated soon after.[92]

On a personal level, Salk was disliked by colleagues and members of the scientific community. The main reason for this antagonism was that Salk did not recognize the achievements of John F. Enders, Frederick S. Robbins, and Thomas H. Weller, whose Nobel-Prize-winning work on poliovirus paved the way for Salk's vaccine.[93] Nevertheless, Salk was celebrated as a hero in the public domain and received a Congressional Gold Medal, the French Legion of Honor, and a Residential Medal of Freedom, which increased his public fame even further. Samuel Katz, an American virologist, notes that the name Salk was in the top four of the most well-known names in America.[94]

4. *Sabin's Live Polio Vaccine*

At the end of the 1950s, the enthusiasm for vaccination plummeted briefly. Thus far, 42 percent of Americans had been vaccinated. Altenbaugh notes that vaccination numbers were low due to the high cost of physicians rather than the Cutter Incident.[95] Accordingly, the NFIP's new slogans "Polio isn't Licked yet" and "The Fight Goes On" did not have a captivating effect on the public as it appeared that polio cases were declining by fifty percent annually. In addition, public spaces like swimming pools reopened, and media outlets tended to new topics of interest.[96]

87 Samuel L. Katz, From Culture to Vaccine. Salk and Sabin, in: *The New England Journal of Medicine* 351 (2004), Issue 15, pp. 1485–1487, here p. 1486.
88 Altenbaugh, Vaccination in America, p. 233.
89 Robert Hill, COVID-19 from a Polio Perspective, in: *Vaccine* 39 (2021), Issue 49, pp. 7117–7118, here p. 7118.
90 Brandt, Polio, Politics, Publicity, p. 265.
91 Offit, The Cutter Incident, p. 1411.
92 Katz, From Culture to Vaccine, pp. 1486-1487.
93 Ibid., p. 1486.
94 Katz, From Culture to Vaccine, p. 1487.
95 Altenbaugh, Vaccination in America, p. 238.
96 Oshinsky, Polio. An American Story, p. 256.

The following pages will explore how the oral polio vaccine (OPV) was developed, tested, and subsequently employed in the United States. Furthermore, it will be investigated how the introduction of the OPV rekindled the nation's interest in combating polio.

4.1 Development and Implementation of the Live Polio Vaccine in the United States

Albert Sabin was a medical researcher, born to Polish–Jewish parents in the Russian Empire and immigrated to America as a child.[97] In the public domain, Sabin was recognized as an independent scientist who was struggling for the greater good. Furthermore, Oshinsky points out that he was skilled in utilizing the media in order to surround himself with positive publicity.[98]

The researcher first started to experiment with oral vaccines in 1953 when he found out that the intestinal tract was capable of selecting neurovirulent viruses in chimpanzees.[99] While Sabin's vaccine was developed in the United States, it was predominantly tested in Eastern European states, thereby breaching the restrictions of the iron curtain, as the US had committed to Salk's vaccine at the time.[100] The Sabin vaccine was extensively tested in trials that involved six million adults and children, predominantly from the Soviet Union, and was declared safe by the Soviet Union in 1959.[101] Hence, the vaccine was introduced to Eastern European states first. In Hungary, for instance, the vaccine was employed as early as 1959, two years prior to its rollout in the United States.[102]

Due to the excellent results of the vaccine trials in the late 1950s, American medical experts realized that the oral vaccine would be their strongest weapon against the poliovirus yet.[103] After the implementation of the OPV in Eastern Europe, members of the United States Congress coined the term "vaccine gap", which was a reference to the missile gap of the Cold War as it was deemed unacceptable that American children were unable to receive the OPV while the Soviet Union had access to it. This metaphor is pivotal, as it represents a process in which polio became, yet again, a matter of American pride and national security.[104]

As a result, Sabin was authorized to run local vaccine trials of his own in the United States in 1960. Americans were invited to churches and schools on three successive Sundays to receive Sabin's vaccine.[105] Under the slogan "Sabin Sundays", almost 200,000 individuals from Cincinnati and the surrounding areas were vaccinated with the oral vaccine, which was administered on sugar cubes. The vaccine trials honored the community as it was reported that the entire nation was watching Cincinnati, which would supposedly

97 J. L. Melnick/Stanley A. Plotkin, Oral Polio Vaccine and the Results of Its Use, in: Stanley A. Plotkin (Ed.), History of Vaccine Development, New York 2011, pp. 167–178, here p. 170.
98 Oshinsky, Polio. An American Story, p. 261.
99 Melnick/Plotkin, Oral Polio Vaccine and the Results of Its Use, pp. 170-171.
100 Tan/Ponstein, Jonas Salk, p. 10.
101 Ibid.
102 Dóra Vargha, Polio Across the Iron Curtain. Hungary's Cold War with an Epidemic, Cambridge 2018, p. 147.
103 Melnick/Plotkin, Oral Polio Vaccine and the Results of Its Use, p. 171.
104 Oshinsky, Polio. An American Story, p. 266.
105 UC Magazine, University of Cincinnati, Sabin Saturdays 1960, n. d., https://magazine.uc.edu/issues/0408/on_campus.html, accessed 3.3.2023.

become the first American city in which polio was to be eradicated. Sabin battled for public acceptance of his vaccine, so much so that representatives of Hamilton County became concerned as they felt that Sabin had revived the public fear of polio.[106]

After a long struggle over vaccine superiority between Sabin's live OPV and his adversaries who promoted the inactivated polio vaccine (IPV), the American Medical Association (AMA) got involved in 1961. It became clear that Sabin's vaccine was the unequivocal victor of the dispute as media outlets were advertising the extremely positive results of the Sabin Sundays. In July 1961, the AMA declared that Salk's vaccine was to be replaced with Sabin's OPV.[107] By the year 1968, Sabin's OPV had entirely replaced Salk's IPV in the United States.[108]

4.2 Impact of the Oral Polio Vaccine

The introduction of the OPV in 1961 would have several advantages for its widespread use in the United States as the OPV provides better, long-lasting, maybe lifelong immunity.[109] Another major advantage of the OVP is that it contributes to herd immunity. As the oral vaccine is administered through the oral-gastrointestinal route, the virus leaves the body just as the wild poliovirus would. This causes the vaccine virus to spread to close contacts of the vaccinated individual, thereby supplying their environment with immunity.[110] Furthermore, patients prefer the oral mode of administration over the injection. One of the biggest advantages, however, is that the Sabin vaccine is inexpensive in comparison to Salk's. There are two major reasons for the low cost of the OPV. Firstly, only a single dose needs to be administered, and secondly, no highly-trained medical staff is required for the administration process.[111] However, there are a few disadvantages that need to be considered in the utilization of the OPV. The main issue is that the Sabin vaccine can cause vaccine-associated paralysis. This is very rare and occurs in approximately one in 500,000 children. Also, the OPV is heat sensitive and must be distributed via a cold chain. While the latter tends to be a problem for developing countries, the establishment of a cold chain for vaccine distribution was not a salient issue in America.[112]

In 1979, the last wild case of a polio infection in the United States was recorded. Subsequently, America's success in the eradication of polio inspired the Pan American Health Organization (PAHO) and the WHO to aim for the worldwide eradication of poliomyelitis.[113]

In most parts of the world, the only remaining cases of poliomyelitis are caused by the OPV. Paradoxically, high coverage of OPV is required to protect individuals from a polio

106 Oshinsky, Polio. An American Story, p. 262.
107 Ibid., p. 266.
108 Stuart Blume/Ingrid Geesink, A Brief History of Polio Vaccines, in: *Science* 288 (2000), Issue 5471, pp. 1593–1594.
109 J. L. Melnick, Advantages and Disadvantages of Killed and Live Poliomyelitis Vaccines, in: *Bulletin of the World Health Organization* 56 (1978), Issue 1, pp. 21–38, here p. 31.
110 Stephen H. Gehlbach, American Plagues. Lessons from Our Battles with Disease, Lanham 2016, p. 151.
111 Melnick, Advantages and Disadvantages of Killed and Live Poliomyelitis Vaccines, p. 31.
112 Circo A. De Quadros/J. K. Andrus/et al., Polio Eradication from the Western Hemisphere, in: *Annual Review of Public Health* 13 (1992), Issue 1, pp. 239–252, here p. 242.
113 Gehlbach, American Plagues, p. 151.

infection caused by the OPV. A true eradication of the poliovirus is only possible when the use of the OPV is discontinued.[114] This is the reason why the IPV was reintroduced in the United States in 1997.[115] As of the year 2000, the transition from OPV to IPV was complete and the inactivated polio vaccine became the sole polio vaccine recommended by the US Advisory Committee for Immunization Practices.[116]

5. Conclusion

By using the low COVID-19 vaccination rate in the US as a contrast, this paper has discussed how widespread polio immunization in the 1980s, and the eradication of the wild poliovirus from the American continent in 1990, were achieved without a vaccine mandate. The paper has argued that POTUS Franklin D. Roosevelt profoundly impacted the history of polio immunization in the United States as he gave a public face to the virus. When the fundraising efforts for vaccine development were extended to the American public, a process was set in motion that would unite Americans in the fight against polio. It was also shown that the virus was widely feared in the US which caused Americans to impatiently await a vaccine. It was pivotal that Salk's trials branded the development of a vaccine as an American war of good versus evil as this caused the vaccination trials to appeal to society's patriotism. In addition, a shift in the public perception of the sciences has given rise to the heroic image that surrounded researchers like Salk at the time. This caused Salk's personal image to contribute to the nationwide acceptance of his vaccine. The introduction of Sabins's OPV through the Sabin Sundays resulted in exceedingly positive media coverage and Sabin's personal dedication to promoting his vaccine advanced acceptance of the polio vaccination. The importance of the war rhetoric that surrounded the struggle against polio also must be highlighted. The fight against polio was an all-American war that was placed alongside the Cold War, as well as World War II.

This paper demonstrated that the fight against a viral pandemic is more successful if it is considered a joined, societal struggle. It should be considered that Sabin and Salk personified their respective vaccines and generated trust in their products, however, based on the comparison to the struggle against polio, it can be argued that the most salient issue in combating COVID-19 in America is a lack of solidarity as the struggle against Coronavirus is not perceived as a united, patriotic, American war.

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7. Table of Figures

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