

|CURIEUX|

---

ACADEMIC JOURNAL

**January Issue**

Issue 11

Editing Staff

**Chief-In-Editor**

Caroline Xue

**Assisting Editors:**

Anshal Vyas

George Hasnah

Olivia Li

Luzia Thomas

Madalyn Ramirez

Shefali Awasthi

Anshal Vyas

Soumya Rai

Sarah Strick

Soumya Rai

Table Of Contents

**Page 4: The Collapse of Weimar Germany: From Bismarck To Hitler by Jack Bleichmar**

**Page 16: Disability Insurance Recipients have Capacity to Work: A Review of Existing Research and a Discussion on how Policies can be Improved by Chak Yau Alex Lee**

**Page 26: Prevalent Customer Influences on Marketing Campaigns During and Post-Pandemic by Blake L. Tretter**

**Page 36: Gen Z and Mental Health: How Family Variables affect Adolescent Mental Health Outcomes by Sahana Balagali**

**Page 50: Why Mask Compliance Differs in the United States and Taiwan During the COVID-19 Pandemic: How Individualist vs. Collectivist Cultures Respond in Uncertain Times by Alena Powell**

**Page 71: Examining gene editing treatment methods for Down Syndrome and their ethical implications by Aran Viswanath**

**Page 78: Nei-Juan: Investigating Potential Inequality In Parent-Child Educational Expectations by Peter Liu**

**Page 87: Adaptive Study of CAPM in Chinese Stock Market Consider Pandemic Factor by Ning Ding**

**Page 100: Comparative Analysis of Two Carbon Capture and Storage Techniques by Kai-Yang Hsiao**

## **The Collapse of Weimar Germany: From Bismarck To Hitler by Jack Bleichmar**

### **Introduction**

In early 1919, the German National Assembly gathered in the town of Weimar with great pomp and circumstance to usher in a new era in the history of the young German nation. In November 1918, Kaiser Wilhelm II abdicated and following the January elections, a people's government was in charge. This National Assembly was tasked with writing a liberal, democratic constitution for Germany, one which safeguarded the rights of its citizens and laid out power derived from the people. Yet 14 years later, the constitution and Weimar Germany both lay in ruins, with Hitler and the Nazi Party in complete control. How did Weimar Germany collapse?

It is not possible to understand the problems of Weimar Germany without first situating it within the wider historical context from which it arose. The First World War for Germany was supposed to showcase its military prowess, yet in 1918, Germany was in domestic turmoil and its army, along with national pride, stood vanquished. Four years of war took their toll in the form of food shortages and unemployment. Workers' protests, energized by the Russian Revolution, threatened to further undermine an already fragile political climate. Amidst the chaos, Kaiser Wilhelm II abdicated, leaving a power vacuum in Germany. The hastily-built government that replaced the Kaiser surrendered two days later. The German army, loyal to the Kaiser, viewed this capitulation as a betrayal — a stab in the back — and came to find the civilian government as the perpetrator of this betrayal. The Weimar Republic was thus crippled from its inception by a “fatal lack of legitimacy” stemming from German defeat in World War I, the circumstances of the power transfer from the Kaiser to the civilian government, and the heavy reparations and war guilt imposed upon Germany by the victorious Allies.<sup>1</sup> In a wider sense, this lack of legitimacy stemmed from the unification of Germany and the particular nature of German nationalism created by Bismarck.

The German Revolution of 1848 was part of a wider mid-19th century revolutionary moment in Europe. Powered by ideas of liberalism, nationalism, and socialism which developed over the past several decades, this revolutionary period was heightened by the rapid spread of information brought about by technological shifts arising from the industrial revolution. Within the many German states, the revolutionaries sought to transform the authoritarian rule of disparate German states into a unified, liberal Germany based on popular suffrage.

The immediate catalyst for the revolution came from widespread harvest failures, combined with the financial crisis of 1845-47, which further impoverished a peasantry that now could not afford to pay its debts. Crop failures affected much of Europe and Germany was hit hard by these, both in rural and urban areas, as the price of food doubled in towns across Germany, resulting in severe food shortages. Peasants in Galicia rose in protest in 1846 and a year later bread riots spread through the country. The resulting increase in foreclosures caused greater hardship for the peasantry. Crop failures also doubled the price of food. In urban areas, normal high levels of underemployment lead to chronic unemployment on account of harvest failure.

These food shortages were accompanied by the economic crisis of 1845-1847, which led to business and industries going into bankruptcy and threatened the solvency of banks. Both the urban and rural populations were hit hard, yet had no voice in the autocratic governments that set policy and made decisions. The liberal ideas of the 1848 February Revolution in France, with its emphasis on nationalism, self-determination and universal male suffrage, appealed to the peasants, workers and the middle class alike in Germany. A revolutionary infection thus spread throughout Europe and to the German states, along with the accompanying street protests to effect this shift.<sup>1</sup>

In this revolutionary moment, the emboldened citizens of Germany demanded certain rights from the aristocracy: an end to censorship, the establishment of citizens' militias, a national parliament, and the removal of remaining feudal privileges. As a result of the demands, the Frankfurt Assembly was created in 1848 to discuss national elections, and by 1849 adopted a proposed constitution for Germany which, if ratified, would provide for universal male suffrage, a parliamentary government, and a hereditary emperor.<sup>2</sup> "Germany was to have a unified monetary and customs system but would maintain the internal autonomy of the constituent German states."<sup>3</sup>

While the Frankfurt assembly deliberated, however, events from the outside overtook the liberal revolutionaries; the radical left which demanded sweeping changes undermined the authority of the liberals, and the increasing voice of these radicals led to a conservative backlash and a rise in popular support for existing institutions such as the monarchy, the army and the church. The ruling conservatives saw the waning popular support for the revolutionaries and grew openly impatient with their demands. The revolutionary moment, which had offered the

possibility of liberal democratic change, was closing. In 1849, Frederick Wilhelm II refused the German crown, denying the authority of a parliament to affirm his right to rule. The Prussian Emperor Wilhelm IV, advised by his conservative ministers and the army, by unilateral decree imposed the new constitution of 1850 which retained the supreme authority of the Emperor and established parliament composed of two chambers: the upper chamber, the Herrenhaus, was composed of the nobility, land-owning aristocracy, and others appointed directly by the Emperor. Most of these appointments were either hereditary or for life, and maintained power in the hands of the ruling order of Prussia. The representatives to the Lower house were elected by all tax-paying Prussians, with a three-tier system of representation. The population within each electoral district was divided into three classes based on the payment of wealth taxes. The wealthiest minority received one-third of the votes; the moderately wealthy the next one third, and the large majority, who were amongst the poorest Germans also received a one-third share of the votes.<sup>4</sup>

The double effect of this system not only greatly disadvantaged the property-less masses, but also promoted the political position of the landowning Junker class... in comparison with the very much wealthier urban bourgeoisie. Dominating Prussian politics, the Junkers were then able to play a major role in the Prussian-dominant Reich. It was a role they were to exercise in the context of the autocratic political structure of the German Empire: real power lay... with the Emperor, his close circle of advisors, his Chancellor, and leaders of the Army and the civil service. Influence was exerted on these groups and individuals by the increasingly important pressure groups— many stridently nationalist— which circumvented parliamentary politics in pursuit of their aims.<sup>5</sup>

The Prussian Constitution and system, which eventually transitioned into the German constitution, thus maintained the power and status quo of the conservative German elite at the expense of the peasantry, the urban bourgeoisie and liberal elites. It was into this system that Bismarck was appointed Minister President of Prussia by Kaiser Wilhelm I.

In the era of unification, Bismarck was an intelligent and flexible conservative, keenly aware of liberal-nationalist demands and prepared to play with fire to preserve the essentials of the Prussian military monarchy. Bismarck operated with the authority of the Kaiser, and the ministers of government were not drawn from the Parliament, but rather were Imperial appointees. Bismarck sought to create a unified German state which had the Prussian Emperor at

its center. As the situation existed, there were multiple treaties between the separate states of Germany which kept Bismarck from unilaterally imposing his will upon greater Germany. Lacking the internal means of doing so, Bismarck used the pretext of external crisis, through three successive wars, to bring together the German states under Prussian dominance.

In 1863, following the death of King Frederick VI of Denmark, Bismarck seized upon the open question of the government of the duchies Schleswig and Holstein. The proposed new Danish Constitution attempted to bring the semi-autonomous duchies fully under Denmark's umbrella, and King Christian IX invaded Schleswig to forcibly bring it under Danish rule. Bismarck used this incident as the pretext to weaken Austria and eventually bring both Schleswig and Holstein under Prussian control. Austria agreed to act jointly with Prussia to counter Denmark, as it was wary of Prussian power, and the forces of the German Federation, led jointly by Prussia and Austria, defeated Denmark. The ensuing Treaty of Vienna ceded Schleswig and Holstein to Prussia and Austria. The North German Confederation had been united by the war, as Bismarck intended. The stage was set for the isolation of Austria over the next year.

Austria was long considered the leader of the German states despite the increasing strength of Prussia across the late 18th and early 19th centuries. Still, at the Congress of Vienna in 1815, the German states were organized into a confederation under Austrian leadership. In order to assure Prussian dominance over the future German state he envisioned, Bismarck had to dethrone Austria from its leadership. He systematically built alliances with Russia, France and Italy, ensuring Austria's isolation, and proceeded to pick a fight with Austria over the control of Schleswig and Holstein. This allowed Prussia, along with several north German states, to go to war with Austria. The decisive victory for Prussia became evident in the terms of the Treaty of Prague. Prussia kept all territories it won, including Schleswig and Holstein, and controlled the new North German Confederation, from which Austria was expelled. Bismarck had successfully united the northern German states under Prussian leadership.

Bismarck's aim was next to unite the southern German states with the northern ones. He believed that a common enemy would bring the south and the north together and for this purpose, he picked a conflict with France. He provoked the French by supporting Prince Leopold (who was related to the Prussian royal house) to become King of Spain in 1870. The French were alarmed by the coronation of Leopold because of the outsized power it would bestow upon

Prussia, and insisted that Wilhelm I withdraw his support of Leopold and remove him from the throne of Spain. In response, Bismarck wrote the Ems Telegram which was written to deliberately infuriate the French and start a war. Bismarck's letter succeeded in its objective, and Napoleon III declared war on Prussia in 1870. The French thought they would win the war because of their new machine-guns and advanced rifles, but the French were outmaneuvered, especially once—as Bismarck intended—the southern German states joined in to support the northern confederation. The French surrendered in January 1871. In the treaty of Frankfurt, Germany acquired Alsace and half of Lorraine, a French city on the border of Germany.

With the Northern and Southern confederation united under Prussian leadership, the German nation state came into existence. The northern and southern states were officially incorporated into a unified Germany under the Treaty of Versailles of 1871. This Germany was dominated by the Junkers, the conservative land-owning aristocracy of Prussia, through its wealth and influence in the military. German nationalism from its inception was thus tied to Prussian authoritarian militarism: the Germany that emerged from Bismarck's machinations drew its power from Prussia's military prowess and disproportionately benefited a conservative Prussian order. Wilhelm I of Prussia was crowned Kaiser of this unified Germany and Bismarck was appointed as its chancellor. The north German constitution became the constitution of the new Germany.

Under this constitution, the Reichstag was secondary to the Federal Council, the Bundesrat, which was composed of appointed representatives from individual states. The number of representatives each German state was allowed was specified by the constitution. It is important to note that as Prussia constituted 60 percent of the population of Germany it held effective veto power in the Bundesrat — the seat of power in the German parliamentary system where all laws were introduced — perpetuating Prussian dominance. There was no civilian control of the army, which reported directly to the Kaiser, which for all practical purposes meant his chancellor, Bismarck. Though there were many political parties, most notably the SPD, they never could garner sufficient support to be a major political force within this new federal Germany because the power resided in the Bundesrat. Political and military power was thus centralized in Prussia and in the hands of Bismarck, who used it to crush his democratically-elected political opponents.

Bismarck's system survived beyond his chancellorship and through World War I.

World War I led to even greater economic disparity within Germany, with wealth concentrated, more than ever, in the hands of the corporations. The war, rather than healing socio-economic divisions within Germany, exacerbated them.<sup>6</sup> The toll of a brutal war, the economic cost of “total war,” and severe food shortages resulted in domestic unrest and several general strikes in 1917. The civilian government resigned in 1917, effectively leaving the running of the country in the hands of Field Marshal Hindenburg and General Ludendorff. The Army and the Imperial leadership were wary of the domestic political unrest because they did not want to lose their power. Consequently, they persisted in searching for a non-existent military victory rather than suing for peace on good terms. When, by 1918, it became clear that Germany was headed towards defeat, the Army sought to transfer power to a civilian government, to avoid the burden of defeat being placed upon their shoulders. This allowed them to maintain a myth of military strength-- the German army did not lose the war, the civilians instead surrendered-- and also propagated the myth of “the stab in the back”: an undefeated Germany was sold out by enemies of the state living within its borders, namely the Bolsheviks and the Jews.

Following the abdication of the Kaiser, the leaders of the Reichstag declared a republic to maintain order amidst tremendous social and political unrest. At the same time the domestic situation in Germany rapidly worsened: the “German war effort had clearly collapsed, the authority of the regime was rapidly crumbling, the threat of strikes and civil war on the streets loomed even larger.”<sup>7</sup> Within this context, the civilian leaders of Germany felt it imperative to act rapidly to stabilize the situation. An armistice was signed with the Allied powers on November 11, 1918. This was followed by two sets of domestic agreements: one between the government and the Army, whereby the Army supported the government in maintaining law and order and suppressing revolution, and the other between employers and trade unions, with the creation of a Central Committee to ensure improved work conditions and wages for workers. The agreement with the army ensured the continuation of the power structures of Imperial Germany-- nothing changed other than the shape of the government. The second pact, with creation of the Central committee, however, came to be seen as a weakness for the elite, who sought to undermine the Weimar system to reverse the bargaining power conceded to the workers. These pacts thus contained the seeds of the problems that would unravel Weimar democracy.<sup>8</sup>

The make-shift government set up in November 1918 ruled until the following February when an SPD-led government came to power. Under the new government, democracy was born

in Germany in August 1919 with the adoption of the Weimar Constitution. However, this government was mistrusted across the political spectrum, as it was the same government that had signed the Armistice in 1918 and accepted the Treaty of Versailles in June 1919. The SPD-led Weimar government lost the confidence of its citizens from the beginning, because for the German people “democracy became synonymous with national humiliation and, increasingly, economic ruin.”<sup>2</sup>

Although the Weimar Constitution created a representative, democratic government, its structural flaws left it susceptible to authoritarianism. The structure of the republic created a strong office of the president, who was directly elected by the German people. The Constitution gave the president considerable power over the armed forces and foreign policy, to appoint and dismiss the Chancellor, to dissolve the Reichstag, and to call for new elections within sixty days. In addition, Article 48 of the Weimar Constitution gave special powers to the president in the event of an emergency: “If public security and order are seriously disturbed or endangered within the German Reich, the President of the Reich may take measures necessary for their restoration, intervening if need be with the assistance of the armed forces.<sup>10</sup>” The intent was to allow for the president to take decisive action and not have to navigate the slower legislative process. The unintended consequence of Article 48, however, was the fact that the power of naming a state of emergency lay with the president, and the dictatorial powers would then be assumed by him.

The Reichstag was based upon proportional representation, which allowed for several different parties to have seats in parliament. The number of parties also made it difficult to form a single-party majority and have one prominent group.<sup>11</sup> Proportional representation also allowed for small, extreme parties to have a louder voice than their share of the vote, making coalition governments difficult.<sup>12</sup> Prussian dominance and deadlock was therefore written into the electoral structure of the Reichstag. Both the Reichstag and the office of the president thus contained fundamental flaws, which left democratic rule precarious and open to subversion. In the early years of the republic, German democracy remained mostly functional with the Social Democrat Friedrich Ebert as president. His premature death in 1925 brought Paul von Hindenburg to the office of President, who over the next eight years used the powers given him by Article 48 to chip away at Weimar Democracy, leading to its final collapse in 1933.

As the first president of the Weimar Republic, Friedrich Ebert used Article 48 sixty-three times to deal with the economic crisis in 1923-1924, returning the dictatorial power after a short

period of time.<sup>13</sup> This respect for Weimar democracy did not carry over to Ebert's successor, however. After Ebert's death in 1925, "77-year-old right-wing monarchist Junker Field Marshal Paul von Hindenburg was elected... (who) was not in principle committed to upholding and strengthening the democratic system: on the contrary, he made little secret of his intention to replace it with a more authoritarian political system as soon as was practicable."<sup>14</sup> From the moment he took office, Hindenburg, who distrusted Weimar democracy, began to undermine it through his routine use of Article 48 for non-emergencies. Over time, this usage weakened the power of the Reichstag as well as public confidence in Weimar Democracy and strengthened the call for an authoritarian government.<sup>15</sup>

Although Germany managed to navigate the hyperinflation crisis and democracy functioned for another five years, the global economic meltdown of 1929 created instability from which it never recovered. Following the Dawes Plan of 1924, Germany was dependent on US loans for reparations payments, for its social welfare programs, for investment in domestic industry and business. The financial crisis led to the US to cease all loan payments to Germany, which left the German economy in freefall. Unemployment skyrocketed, businesses shut down, and food shortages grew. Average Germans came to fear for the safety of their businesses and for their lives. Unemployment skyrocketed, businesses shut down, and food shortages grew. Average Germans feared for the safety of their businesses and their lives. The economic crisis also strengthened the power of extreme parties both on the left and the right because they promised workers' rights, middle class security, safety, stability, law, and order.<sup>16</sup> Their ascent made parliamentary rule increasingly difficult, due to the presence of several strong, often opposing and contradictory opinions within the Reichstag.<sup>17</sup>

The crisis situation combined with parliamentary deadlock created the perfect opportunity for von Hindenburg and the chancellors he appointed to rule by Article 48 emergency decree. The already weakened credibility of Weimar democracy eroded even further, slowly being replaced by an authoritarian rule by presidential decree, through a chancellor and a cabinet lacking parliamentary support.<sup>18</sup> Heinrich Brüning was appointed chancellor in 1930, and despite being a supporter of parliament, in his goal of stabilizing the economy he accelerated the shift towards rightward dictatorship through bypassing parliament and ruling by presidential decree.<sup>19</sup> As a response to the economic crisis, he pursued deflationary policies that in the end led to more socioeconomic problems and skyrocketing unemployment.<sup>20</sup> These circumstances only

further destabilized German society, weakening centrist parties, and provided an opportunity for extreme parties, like the Nazis, to gain strength.

In the 1930 Reichstag election, the increase in Communist and Nazi representation heightened parliamentary deadlock, resulting in an exponential increase in the use of Article 48 by the President and Chancellor. Between 1930 and 1932, Brüning and Hindenburg ruled largely through exercise of presidential decree, “shifting the republic from democratic authority toward authoritarian democracy.”<sup>21</sup> The rule by presidential decree led to the “dismantling of democratic and civic freedoms” with the larger aim of a government shielded from popular opinion. Freedom of press and civil liberties were significantly curbed.<sup>22</sup> Presidential decree was also used to eliminate parliamentary authority over the president and the military.<sup>23</sup> Ultimately, rule by Article 48 was not successful in solving the economic and political crisis in Germany; the problems remained, and the extreme parties, such as the Nazis, capitalized on these to gain in strength. Rule by emergency decree did, however, succeed, as Hindenburg intended, in chipping away at Weimar democratic processes, making them vulnerable to the eventual Nazi takeover.

The Presidential election of 1932 reflected the instability within Germany and brought out the rightward shift in German politics. Adolf Hitler’s Nazi party, through its sustained outreach to the people based upon its anti-Versailles, nationalistic, anti-communist, pro safety of the people agenda, gained significantly in strength in the years following the economic crisis. Along with Ernest Thälmann, leader of the communist party, Hitler opposed Hindenburg in the 1932 election. Hindenburg fell short of a majority, forcing a runoff with Hitler.<sup>24</sup> Even though Hindenburg ended up winning, this election served a larger purpose: the Nazis proved to be very powerful, which meant their influence was beginning to spread. The political center parties stood eroded and the atmosphere within Germany was volatile. The leaders of Germany were facing large problems; there was a great deal of unemployment and an increase in public violence. The lack of prosperity, safety, and stability, and the Government’s inability to do anything about it made the Nazis and the Communists more appealing to the voters. Once Hindenburg was re-elected, he used Article 48 to appoint whom he wanted as chancellor. He replaced Brüning with Franz von Papen, who had trouble gaining parliamentary support for his government. The democratic structures of the Weimar Republic broke down further.

The next several months demonstrated this unstable state of both the German government and the electorate that contributed to the nearing end of Weimar Democracy. New Reichstag

elections were called for at the end of July 1932. The environment leading up to this election was chaotic and near civil war, with Nazis and Communists battling on the streets.<sup>25</sup> In the July election, the Nazis became the largest single party in the Reichstag, yet still not the majority. Papen tried to run parliament with a coalition without Hitler and the Nazis, which proved impossible.<sup>26</sup> elections were held in November, but by now the unrest had subsided and the Nazis seat count declined. Deadlock remained; Hindenburg, yet again using the emergency decree and bypassing parliament, forced Papen's resignation and appointed Kurt von Schleicher to take his place.<sup>27</sup> Schleicher proved ineffectual and unpopular, and the Nazis were just steps away from being part of the German government.

Hindenburg's undemocratic actions during this period of instability from 1930-32 had effectively taken decision making and coalition forming out of the hands of parliament. Repeatedly using the autocratic powers given to him under Article 48, Hindenburg made major decisions, including the appointment of chancellors, without parliamentary approval, and with few structural checks and balances.<sup>28</sup> Yet now, Hindenburg, the longtime appointer of chancellors, was running out of options. In late 1932, Hindenburg was persuaded by von Schleicher and others that for the government to be stable, functional, and have popular support, it was necessary to include the Nazis and offer Hitler the chancellorship.<sup>29</sup> The feeling was that if Hitler was included in a coalition cabinet, he "would be effectively hemmed in and could be 'tamed' and manipulated" in a cabinet dominated by non-Nazis.<sup>30</sup> On 28 January 1933, Hindenburg offered the chancellorship to Hitler. Yet Hindenburg's constant use of Article 48 had eroded Weimar democratic checks and balances, and he and his advisors fatally underestimated the political brilliance of Hitler.

Once Hitler was appointed chancellor, he used the legal powers of Article 48 to effectively invalidate Weimar democracy and take complete control of Germany. Three weeks after Hitler was appointed chancellor, the Reichstag building was set on fire. A communist, Marinus Van Lubbe, was found on the premise and said to have been the one who started this fire. Hitler used this to convince the government that Communists were a threat to Germany and called for action.<sup>31</sup> The Reichstag Fire Decree was enacted on 28 February 1933 as an Article 48 decree, suspending the civil liberties of the constitution, such as freedom of assembly, freedom of press, and habeas corpus. The decree severely restricted the communist party and put many of its leaders in jail, making it easier for the Nazis to gain more power. On 5 March 1933 new

Reichstag elections were held and though the Nazis were the largest party within the Reichstag, no single party gained the majority needed to form the government.<sup>32</sup> By jailing all the members of parliament who opposed him, Hitler got the Reichstag to pass the Enabling Act, which was a legal amendment to the Weimar constitution, allowing Hitler and his cabinet to make decisions without the approval of the Reichstag or the president. Hindenburg signed this act and in doing so, he signed the death warrant of Weimar Democracy.<sup>33</sup> Hitler now had absolute authority to enact laws, taking power out of the Reichstag and Hindenburg's hands, and definitively ending the Weimar democracy.

This collapse of Weimar Germany was rooted in the particular nature of German nationalism as created under Bismarck. A veteran of three wars — Franco-Prussian, Austro-Prussian, and World War I — Paul von Hindenburg oozed militaristic, authoritarian, German nationalism. A product of the German-Prussian order that dominated Bismarck's Germany, Hindenburg's presidency distrusted democracy and longed to restore the glory of Germany through blood and iron, leading him and his supporters to undermine Weimar democracy from its inception. Hindenburg wielded the power of Article 48 mercilessly to create an authoritarian system under the guise of the Weimar Constitution. As a result, despite its lofty liberal ambitions, the structure envisioned under this constitution never gained strength within Germany. The German people, smarting under the defeat in the First World War, longed both for internal stability and for a return to past glory through victory and conquest. Hindenburg's actions cleared the way for a legal and frighteningly quick takeover by Hitler.

## Works Cited

- Blackbourn, David. *History of Germany, 1780 — 1918: The Long 19th Century*. 2nd, ed. Blackwell Classic Histories of Europe. Oxford University Publishing, 1998.
- Britannica, T. Editors of Encyclopaedia. "Frankfurt National Assembly." Encyclopedia Britannica, May 19, 2014.  
<https://www.britannica.com/topic/Frankfurt-National-Assembly>.
- Evans, Richard J. *The Coming of the Third Reich*. Penguin Books, 2005.
- Fulbrook, Mary. *A History of Germany: 1918-2014: The Divided Nation*. Fourth ed., John Wiley & Sons Ltd., 2015.
- Herf, Jeffrey. "Emergency Powers Helped Hitler's Rise. Germany Has Avoided Them Ever Since." *The Washington Post*, <https://www.washingtonpost.com/outlook/2019/02/19/emergency-powers-helped-hitlers-rise-germany-has-avoided-them-ever-since/>, Accessed on August 27, 2021.
- Ullrich, Volker and Chase, Jefferson. *Hitler: Ascent, 1889-1945*. First American ed., Penguin Random House LLC. and Alfred A. Knopf, 2016.
- United States Holocaust Memorial Museum, "Article 48", *Holocaust Encyclopedia*, <https://encyclopedia.ushmm.org/content/en/article/article-48>, Accessed on August 27, 2021.

## **Disability Insurance Recipients have Capacity to Work: A Review of Existing Research and a Discussion on how Policies can be Improved** By Chak Yau Alex Lee

*I review existing research on Disability Insurance (DI) policies in order to explore how they can be improved. A key finding is that many DI recipients, especially those that are marginal cases, have the capacity to work and that there are benefits to the individuals and the program if they return to work. I also discuss policy implications based on these findings.*

### **Introduction**

A Disability Insurance (DI) program that is funded and administered by the government is now widely used around the world as an employment policy for both physically and mentally disabled people. However, from its early beginnings (which, in the United States, was not until 1956), there have been great concerns over the difficulty with determining the eligibility of applicants and with the financial costs for running and funding such a potentially vast program. Furthermore, many economists have serious concerns that DI programs can become disincentives to work. Most governments have tried different methods for encouraging DI recipients and applicants to return to work, including with provisions of publicly-funded rehabilitation programs.

The history of DI programs has been a balancing act between a clear societal need to help disabled persons and the difficulty to fund and operate such a DI program fairly and effectively. This difficult balance can be illustrated by the outrage over findings in 1980 that 20% of DI recipients in the US were no longer medically eligible (Kearney 2005), which resulted in the government conducting greater reviews of recipients, and by perhaps even greater subsequent outrage that many apparently disabled people were having their benefits removed. One infamous case involved a war veteran to whom Reagan had presented the Congressional Medal of Honor that Reagan had to personally intervene to restore his benefits (Berkowitz 1987, 129). The history of DI therefore has tended to swing between periods of rising rolls until the concerns grow over the huge costs to taxpayers (and indeed over potential program abuse), followed by periods of particularly strict administration of the system (e.g., additional reviews for applicants and high denial rates) until there is concern that many disabled people are being abandoned by the 'system'. In this context, it is easy to appreciate the importance of efforts to induce disabled

people to work: the ultimate goal of course being a situation where government expenses are reduced while disabled people's incomes-- and self-esteem-- improve.

Making sure the largest proportion of unemployed disabled people get back to work should therefore be the number one priority for everyone's benefit. In addition to being beneficial in an economic sense, going to work instead of staying home and receiving benefits would mean that disabled people are making the most of their skills and possibly developing them further, including their social skills that could be useful outside of work. The disabled person would also have much greater self-confidence and a more rewarding life in the long run.

The main purpose of this paper is to review the existing research on DI policies in order to assess whether disabled people actually have capacity to work. Different governments have tried various incentives to encourage disabled people (i.e., recipients of DI benefits) to engage in significant work, or what economists call taking part in substantial gainful activity (SGA). I will focus on the research done on the Norwegian and US DI policies through a critical analysis of a Norwegian study, *How Financial Incentives Induce Disability Insurance Recipients to Return to Work* by Andreas Ravndal Kostøl and Magne Mogstad (Ravndal and Mogstad 2014), and a US paper, *Does Disability Insurance Receipt Discourage Work? Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt* by Nicole Maestas, Kathleen J. Mullen, and Alexander Strand (Maestas, Mullen and Strand 2013).

I will discuss the general effectiveness of the DI policies in Norway and the US and how the authors of each paper estimated the extent to which DI recipients actually have the capacity to work. I will explore the importance of those cases that are considered marginal and the implications for encouraging these marginal cases to return to work.

I will also speculate on what the researchers may have overlooked or misunderstood about disability through the use of my personal experience with mentally disabled people given that my own brother is severely autistic and I have spent a lot of time around mentally disabled people. I will also explore potential policy implications of the key findings in the literature. Ultimately, I intend to come to a conclusion of what disability insurance has achieved so far and what could possibly be done in order to improve DI programs and the lives of the disabled.

The Norwegian and US Studies (Kostøl and Mogstad 2014, and Maestas, Mullen, and Strand 2013)

How Financial Incentives Induce Disability Insurance Recipients to Return to Work by Andreas Ravndal Kostøl and Magne Mogstad (2014).

In January 2005, the Norwegian government announced a return-to-work incentive program for DI recipients who were already receiving benefits before January 2004 (i.e., a full year before the announcement of the new program). These DI recipients would be allowed to keep about \$0.40 for every \$1 of earnings above the SGA (benefits would still be provided in full if earnings are below the SGA threshold). This sharp retroactive cut-off date allowed the authors to study the effects of this program more cleanly without the potential side effects often seen in studies with other incentive programs, including the possibility of recipients manipulating the program to ‘game’ the system. For example, by making the program retroactive, the Norwegian government did not have to worry about ‘marginally disabled’ people who might otherwise not have applied for DI benefits at all if they had not known about this return-to-work incentive.

The sharp cut-off date in DI policy was ideal for the authors to study the incentive program by using a local randomized design which is a regression discontinuity (RD) design comparing the recipients before and after January 1, 2004. Those just before the cut-off date were the treatment group and those after the cut-off date were the control group. Overall, the findings indicated that the incentive program had a significant positive effect on encouraging employment.

There were three general conclusions. First, many DI recipients have the capacity to work and that capacity can be induced by incentives (such as by the Norwegian return-to-work program). For example, three years after the program started, the labor force participation of those on DI benefits increased by 8.5 percentage points for those aged 18-49, vs. a 3.4% increase for the control group. Second, the incentive resulted in a large increase in earnings for DI recipients, accompanied by a substantial decrease in cost to the DI program (made up of a significant reduction in benefits paid and a slight increase in taxes paid by the recipients). Third, the authors found that there was heterogeneity in how each demographic group responded to the incentive. For older recipients (aged 50-61), there was generally little effect at all, while for the younger recipients (18-49) there was a large range of responses, with the greatest positive effect seen for men, individuals with higher education levels and more work experience, as well as those in areas with low unemployment.

The authors of the Norway paper made a comparison between the Norwegian DI program with the much larger US program and found them to be quite similar, with three key differences. First, the incidence of receipt of DI benefits is much lower in the US even though the trend of increase is similar. For example, from 1961 to 2005, the rate of receipt in the US increased from 0.8% to 4.2% while in Norway it increased from 2.2% to 10.4%. Second, the US program is less generous. Even though the SGA thresholds are similar (about \$1,000 per month), any earnings above the SGA threshold in the US would be taken as a sign of ability to work and made these candidates ineligible for DI, unlike in Norway. This would clearly have important implications for inducing marginal cases to return to work in the two countries. Third, the DI recipients in Norway tend to be older and with slightly higher earnings prior to receiving DI benefits. However, interestingly, both countries had a similarly high proportion of recipients with so-called ‘difficult-to-verify’ disorders such as mental disease and musculoskeletal disease (57.4% in US and 61.4% in Norway), implying that there are similarly high incidence of marginal cases that could in theory be induced to return to work.

The authors also applied their findings to the existing literature on the effects of financial incentives in encouraging DI recipients to return to work. To consider an ‘upper limit’ to work capacity and to study the elasticity of the labor supply, they used an approach proposed by Bound (1989), which was to look at the employment rate of rejected applicants for DI benefits (arguing that this subset of rejected applicants should form an upper limit because logically they should be more likely to have work capacity than successful applicants for DI), and found that the Norwegian data was consistent with US evidence. The general conclusion is that the response from the Norwegian incentive program confirms that the incentives are fairly effective in inducing DI recipients to return to work and that the labor supply is fairly elastic with respect to financial incentives. However, other studies have shown that depending on the stigma costs associated with DI (i.e., some disabled people are too ‘proud’ to apply for or receive disability benefits), the results can be mixed. For example, the ‘Ticket to Work’ program in the US did not appear to encourage many people to return to work (Autor and Duggan 2006), while a study on the ‘\$1 for \$2 offset’ policy showed that it may encourage some DI recipients to work but it could also induce others into entering the DI program who would otherwise not have (Benitez-Silva, Buchinsky and Rust 2010).

Overall though, the authors of the Norwegian paper found that financial incentives induce DI recipients to return to work and that many DI recipients indeed have considerable capacity to work. Importantly, there was a significant increase in disposable income for the recipients while program costs were reduced.

Does Disability Insurance Receipt Discourage Work? Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt by Nicole Maestas, Kathleen J. Mullen, and Alexander Strand (2013)

The US paper was written within the context of a US Social Security system with a long-term fiscal imbalance and an urgent need to encourage DI recipients to return to work. The authors tried to study whether Social Security Disability Insurance (SSDI) benefits discourage work, and to what degree they may discourage work, and also tried to determine what portion of the SSDI recipients are in fact ‘marginal’ cases and therefore most likely to have a capacity to work.

To achieve this, they exploited the benefits examiners’ individual propensity to approve or deny SSDI applications to estimate the effects of DI benefits on the labor supply. The study had a ‘judges design’: the DI applicants are randomly assigned to a judge, meaning that there is an element of personal subjectivity in deciding whether an applicant is accepted into the DI program. This is significant because the study found that among the 23% of applicants who are on the margin of program entry, employment would have been 28 percentage points higher had they not received benefits.

The background to this study was a sharp rise in SSDI caseload and a fall in disabled workers’ employment rate. In the previous two decades, caseload grew threefold while the relative employment rate of disabled workers dropped by half. This had happened despite new employment protections for disabled workers and jobs in general becoming less physically demanding (Autor, Levy and Murnane 2003). While most experts believed the SSDI program had a negative impact on employment, it was difficult to determine the magnitude of SSDI’s impact because of a lack of exogenous variation in SSDI receipt. In other words, it was difficult to separate the causal effect of SSDI on employment from other confounding factors such as trends in employment and earnings.

For the first time, the authors of the US paper provided a first causal estimate of the effect of SSDI benefits on employment using a dataset of all SSDI applicants in the system. The sample consisted of over 2.1 million applications and about 8,700 examiners. This was the first study to use a research design to estimate the causal effect of SSDI receipt on labor supply by comparing the subsequent labor supply of similar applicants who were approved or denied DI benefits only because of the examiners their applications were assigned to since each examiner had their own propensity for a stricter or more lenient tendency when reviewing DI applications. Because of the appeals process which could take two to four years, the authors studied the employment outcomes up to six years after the initial decision.

The authors found that about 23% of SSDI applicants were marginal cases in the sense that their success in obtaining SSDI benefits depended on which examiner their application was initially assigned to. This estimate has important policy implications because it is the applicants in these borderline cases that would most likely have some capacity to work. The study also estimated that about 57% of applicants were ‘always takers’ (i.e., virtually all examiners whether lenient or strict would approve their applications) and about 20% were ‘never takers’ (i.e., denied by all examiners).

The authors applied two regression techniques, ordinary least squares (OLS) and instrument variable (IV), to find a range of estimates of the direct effect of SSDI receipt on labor supply. Overall, the authors’ estimates imply SSDI benefits have very large labor supply effects. OLS estimates show a drop of 34-35 percentage points in employment two years after the initial decision, a 24-25 percentage point drop in the likelihood of participating in SGA and \$7,000 drop in annual earnings. The IV estimates suggest SSDI receipt causes a 28 percentage point drop in employment two years after the initial decision, an 18-19 percentage point drop in employment above SGA and a \$3,800 to \$4,600 drop in annual income. It also suggests a 16 percentage point drop in employment four years after the initial determination.

One key finding of the study was that the employment rate of these marginal cases would have been on average 28 percentage points higher two years later if they had never received SSDI benefits. Employment above SGA would have been 19 percentage points higher and earnings would have been \$3,781 higher. These findings showed that a significant subset of SSDI recipients still had some capacity for work. As with the Norwegian paper, the US study also found that the effect of DI receipt on employment is heterogeneous. For example,

employment capacity rises as high as 50 percentage points for marginal cases and as low as zero for those with serious disabilities.

Interestingly, the authors found that among the marginal cases, 16% of musculoskeletal cases were marginal cases while 32% of mental disorder cases were marginal cases. The study also estimated that marginal applicants were 43% more likely than average applicants to have a mental disability. The marginal case was also 43% more likely to be either quite young or old (under 29 or over 60). These findings would imply that the US government should try to induce the younger applicants, particularly those with mental impairments, to work. The other important factor from a policy point of view is that mental impairments tend to involve much higher medical costs, about three times higher costs than for people with relatively mild but common physical impairments such as back and joint problems (Foote and Hogan 2001). Prior studies have also concluded that people with mental impairments spend about 50 percent more time on DI rolls compared to those with musculoskeletal impairments (Rupp and Scott 1996). These findings suggest that the US government should spend more resources on the mentally disabled, especially given the importance of focusing on marginal cases for government policy purposes.

## **Conclusion**

Overall, the findings in both papers and in the existing literature in general provide evidence that a significant subset of DI recipients have some capacity to work and that programs to induce DI recipients to return to work can be successful. The effectiveness of the programs, however, depends on the design of such programs. There needs to be enough financial incentive to encourage DI recipients to work while not providing excessive incentives in which case more people may apply for DI benefits than would have otherwise in the absence of the incentive program. Both the Norway and US papers were important in that they were studying the behaviors of DI recipients regarding their attitudes towards returning to work in the absence of confounding factors.

The findings also show that a significant portion of all DI recipients are marginal cases, often with difficult-to-verify conditions, who in fact have significant capacity for work. This would suggest there is substantial potential for governments to reduce the costs to their DI programs by inducing the DI recipients in these marginal cases to return to work.

I think a particularly interesting point is that there is a higher incidence of mental disorders in these marginal cases. Since mental disabilities can incur much higher medical costs than the relatively mild physical impairments of the other marginal cases, there is additional motivation for governments to focus on these cases due to their important policy implications.

I believe that it is worth sharing my personal connection and experience with mental disabilities in order to fully understand my view of disability insurance policies and how they affect the people applying for them. My younger brother Andrew suffers from severe autistic spectrum disorder (ASD). Andrew is 14 and goes to a special needs school in HK. He is very kind at heart but can often be impatient and frustrated when he does not get what he wants or is denied something he wants to do. This makes it difficult for him to learn and develop the skills required to do daily tasks such as going to school by himself or brushing his teeth. He struggles to communicate and can only verbalise basic phrases such as asking for food when he is hungry, telling us when he wants to leave home to go somewhere to play and regular ‘good mornings’ and ‘good nights’.

Despite his not being particularly shy and often managing to communicate in some way to others through gestures, it is unlikely for people like Andrew to be employed in the future. This means that in all likelihood, he would be collecting disability insurance benefits (if available in the country that he will reside in). Also, financial incentives to work would not affect him and he would be an example of the group of severely disabled DI recipients who just receive the benefits regardless of likely changes in the scheme.

Andrew’s situation has influenced my thinking on this subject and I now believe it is even more important for disabled people to have some sort of work, however low their capacity for work may be (at least to begin with). This would not only improve their personal economic situation in the short run but also develop skills that can improve their quality of life in the long run. In addition, maintaining employment for a longer period of time has been linked to a slower decline of cognitive ability and reduced risk of dementia. According to Carole Dufouil, a scientist at INSERM, the French government’s health research agency, the risk of getting dementia is reduced by 3.2% for each additional year of work.

Despite social interaction often being challenging and an area that puts people with physical and mental disabilities in uncomfortable situations, most professions could provide jobs that encourage low-stress social interaction with colleagues and should help improve their

general job capacity over time. Thus potential DI recipients could gradually improve their social and work skills by participating in SGA instead of staying unemployed and living a lifestyle which would likely predominantly consist of staying home and interacting with the same few family members or caretakers.

One other general strategy for potential improvements to DI programs would be for governments to focus on the rapidly changing working environment and also appreciate how technology has transformed how work itself is done. The Covid-19 pandemic has also played a crucial role in making work-from-home and other virtual employment opportunities acceptable to employers in both the public and private sectors. Governments could encourage companies-- for example, through subsidies or tax breaks-- to allow disabled people to work from home in order to increase employment of DI recipients.

Many current DI recipients are capable of participating in SGA in terms of their skills but are still unemployed simply because they might not be able to commute to work or cannot handle being in a traditional office for long hours due to their medical conditions, including disorders such as ASD that make interacting with colleagues for prolonged periods particularly difficult. Working from home would allow more flexibility for working hours and also the benefit of being able to tailor one's working environment to be most suitable for the individual as this can often be a factor that prevents disabled people from participating in SGA.

The government could also provide subsidies for the private sector to provide training for remote jobs to be as effective and inclusive as possible. Although there would initially be a cost for the training, if done well, it would be rewarded in the long term by a higher proportion of DI recipients being employed and therefore decreasing the financial burden these individuals place on the program. Training for work from home jobs for the disabled is an example of a supply side policy which would increase productivity and efficiency in the economy as well as having the benefits of encouraging more disabled people to be employed as discussed earlier in the paper for reasons such as improving social skills and enabling participants to have a more rewarding life in the long run.

### Work Cited

- Autor, David H., and Mark G. Duggan. 2006. "The Growth in the Social Security Disability Rolls: A Fiscal Crisis Unfolding." *Journal of Economic Perspectives* 20 (3): 71-96.
- Benitez-Silva, Hugo, Moshe Buchinsky, and John Rust. 2010. "Induced Entry Effects of a \$1 for \$2 Offset in SSDI Benefits." Unpublished.
- Berkowitz, Edward D. 1987. *Disabled Policy: America's Programs for the Handicapped*. New York: Cambridge University Press.
- Bound, John. 1989. "The Health and Earnings of Rejected Disability Insurance Applicants." *American Economic Review* 79 (3): 482-503
- Kearney, John R. 2005/2006. "Social Security and the "D" in OASDI: The History of a Federal Program Insuring Earners Against Disability." *Social Security Bulletin* 66 (3)
- Kostol, Andreas Ravndal, and Magne Mogstad. 2014. "How Financial Incentives Induce Disability Insurance Recipients to Return to Work." *American Economic Review* 104 (2): 625-655
- Maestas, Nicole, Kathleen J. Mullen, and Alexander Strand. 2013. "Does Disability Insurance Receipt Discourage Work? Using Examiner Assignment to Estimate Causal Effects of SSDI Receipt." *American Economic Review* 103 (5): 1797-1829
- Rump, Kalman, and Charles G. Scott. 1996. "Trends in the Characteristics of DI and SSI Disability Awardees and Duration of Program Participation." *Social Security Bulletin* 59 (1): 3-21. getting dementia is reduced by 3.2% for each additional year of work.

# **Prevalent Customer Influences on Marketing Campaigns During and Post-Pandemic**

**By Blake L. Tretter**

## **Abstract**

The COVID-19 pandemic has had immense and long-lasting impacts on our society, both economically and socially. In particular, the pandemic has caused and accelerated several cultural shifts, and these in turn have affected the ways in which companies market their products. This paper discusses three major shifts in consumer mindsets that have emerged from the pandemic: a focus on social justice, group mentality, and environmental sustainability. For each new focus, companies have adapted their marketing to respond; but these opportunities come with associated risks and obstacles that make them difficult to capitalize upon. With the widespread Social Justice movements during the pandemic, an opportunity to tie company values to social justice movements is created, but they must avoid stereotypes and ensure the tie-in is seen as authentic. With heightened group mentality, companies may show support for local communities. However, large multinationals like Amazon and Walmart are driving struggling local companies out of business. Companies can demonstrate their support for environmental sustainability through eco-friendly initiatives and donations. However, they may be tempted to “green-wash” and simply hide the less eco-friendly aspects of the business, often by outsourcing or moving these operations to other geographic locations.

Keywords: marketing campaigns, COVID-19, consumer influence, Social Justice, Environment, Group Mentality, kinship, consumer behavior,

## **Introduction**

The COVID-19 pandemic has had immense and long-lasting impacts on our society, some of which we are not aware of yet, both economically and socially. In particular, the pandemic has caused and accelerated a number of cultural shifts, and these in turn have affected the ways in which companies market their products. With the increased prominence of social media, many people have become more aware of and active in drives for social justice. Many social justice movements have gained prominence during the pandemic thus creating an increase in activism and engagement surrounding these social issues. The pandemic has also made people more aware of their local communities as the effects of the COVID shutdown have been widespread and persistent. This enhanced group mentality has caused people to think more closely about the impact of their actions on the community as a whole and on ways they can strengthen their local community. The shutdown caused by the pandemic has had positive implications on the environment such as less air pollution from a stark decrease in car and air travel and certain ecosystems thriving due to less human activity. The pandemic and climate change are both global phenomena that highlight the need to band together to fight against economic destruction and threats to safety, which provides the opportunity to increase a sense of global community. Also, many of the root causes of climate change lead to an increased risk of global pandemics, so these issues are linked and can be addressed together (Bernstein, 2020). This increased visibility towards environmental protection during the pandemic coupled with the psychological similarities between the pandemic and climate change provides an opportunity for marketers to capitalize on these issues in their campaigns. The economic recession caused by the pandemic has exposed the vulnerabilities of many businesses. As these businesses look to bounce back, they are restrategizing their business models to be more robust, which is another reason why there is an increased focus on economic and environmental sustainability. Overall, the pandemic has caused and accelerated far-reaching changes in society's focus and values, and many companies are scrambling to update their marketing strategies in response to these changes, with varying degrees of success.

## **Impact of Social Justice Movements During the Pandemic**

The pandemic has reshaped many of our social interactions, moving many of our “normal” in-person interactions to an online interface. As a result, social media has gained even

more prominence in our daily lives. It is used for much of this new social interaction but has also evolved to become a hub of information in 2020. This has caused people to be online and on social media longer and more frequently (Molla, 2021). This new traffic and reliance on social media for information has given awareness to social justice movements (BLM, Stop Asian Hate, etc.). Social media has also provided a platform for a backlash to some of these movements. For example, Trump and others branding COVID as the “China Virus” led to a rise in Anti-Asian Hate Crimes. As a result, many consumers are much more aware and supportive of social justice movements and of efforts to address social inequities.

Companies have noticed their customers’ increased interest in social justice and have been trying to incorporate these issues into their marketing strategies. One way in which they try to emphasize their support of social justice initiatives is by diversifying the models in their ads to better represent the range of skin tones, gender, etc. of their customer base. One obstacle to this is that even when companies try to diversify the skin tones of models, they are often still scrutinized by some for being biased toward lighter-skinned models, especially for women. Critics have also flagged certain efforts in advertising as perpetuating stereotypes about groups being represented, which is an example of a term known as “tokenism”. For example, H&M and Brandy Melville have been criticized for promoting plus-sized models without carrying clothing in those sizes. In their efforts to be more inclusive, companies also have to be careful that ads don’t perpetuate stereotypes about the groups represented. For example, Volkswagen recently got criticized for a commercial in which they show male astronauts and athletes juxtaposed with a woman sitting on a park bench next to a stroller. They included both men and women in the ad, but the stereotypical settings and behaviors of the actors were seen as problematic (Chiu, 2019.) Companies can also tie their products more directly to social justice movements like BLM or MeToo. Some of these campaigns have been well received, while others have caused a backlash. The NBA’s decision to paint “Black Lives Matter” on their courts and release a PSA video in favor of the movement has generated numerous positive comments from the press and activists. Similarly, Nike’s “Play Like a Girl” campaign, which highlighted the power and accomplishments of women in athletics, was widely praised. The obstacle with this strategy is that if the ties are not seen as genuine, the efforts can backfire, like the Pepsi ad with Kendall Jenner. Another example of a socially controversial advertising campaign is McDonald’s’ series of BLM-supporting digital ads and social media posts. Many activists and organizations,

including the ACLU, which fights for civil liberties and justice, say that the company “doesn’t have the policies in place to back up the claim they support their Black workers”. In both of these examples, the ads are seen by many activists as largely self-serving and inauthentic, and the campaigns resulted in largely negative publicity for the companies involved (Regalado, 2020). Due to the pandemic, social media has been used as a platform to promote social justice movements, which companies have used to reassess their messages and engineer new marketing campaigns. Companies have the opportunity to respond with better representation and diversity; however, they may be criticized as inauthentic and not matching these businesses’ core values.

### **Group Mentality’s Influence on Consumer Mindsets**

In addition to consumers becoming more engaged with social justice during the pandemic, awareness of strong group bonds has formed. With the pandemic forcing isolation and the cancellation of many social activities, people have sought out new ways to build and maintain social relationships and a sense of connection with others. This has highlighted the necessity of social relationships and group mentality, for better or worse. In fact, research has shown that strong group membership and social identity have improved mental well-being during the pandemic-induced isolation and are used by some people as a coping mechanism (Alcover et al, 2020). The resulting group mentality has gotten many people to band together and support each other (support small businesses, local community, etc.). There has been an especially strong incentive for local communities to band together as this has been necessary to limit the spread of the virus. Many people have therefore begun to view their local community as a “village”. With this perspective, people have emphasized the support of local businesses and the wellbeing of their neighborhoods (Cox, 2020) (Nextdoor, 2020).

Targeting markets at a local level has been especially attractive to marketers, as the target audiences are easier to reach through advertisements. Many advertising vehicles such as television, newspapers, and radio, are local in nature. Companies are appealing to a greater group mentality by emphasizing local community involvement in their ads or supporting community groups through philanthropy. There is an opportunity for companies to provide real benefits to communities through their initiatives and donations, but the obstacle is that companies’ altruism is designed to fit a marketing agenda rather than meeting the most urgent needs of the community. In some cases, the initiatives may have hurt the communities they were trying to

help. For instance, TOMS shoes' buy-one-give-one campaign was criticized for hurting local footwear industries in some communities while not making a large impact on the recipients of the shoes (Hessekiel, 2021). Another obstacle is that large national or multinational companies will craft messages around their support of local communities while still driving small local companies out of business. For example, Walmart donates food to local food banks and collects donations for other charities, while at the same time using robots for their e-commerce warehouse distribution, taking away local jobs (Lee, 2021). Many companies are striving to adjust their marketing campaigns to emphasize their value to local communities, but these campaigns must be well thought out if they are to be effective with customers.

### **Increased Emphasis on Environmental Issues for Consumers and Companies**

Group mentality not only has implications for altruistic behavior towards local communities and businesses but also towards the environment. For consumers, a “village” mentality encourages pro-environment behavior. People are more likely to act in an eco-friendly way when they can see how their actions influence their community (van Vugt, et al, 2014). If the environment is suffering in local communities (i.e. wildfires, floods, etc.), individuals will be more likely to care about the issue. Similarly, if individuals' communities are directly impacted by the pandemic (i.e. a family member/friend gets infected), they will be much more likely to care about it (van Vugt, et al, Table 1). Concern about worldwide issues like climate change and the pandemic has caused a shift towards a global mindset, which has been intensified by social media, which serves as a source of global community awareness. This global mindset was also influenced by the visibility of the global impact of COVID, which has been highlighted online and in the news. COVID has also engendered a sense of urgency in many people, as they saw how rapidly a global threat could grow and impact their lives. Between a new more global mindset and a heightened sense of urgency, the perceived threat of climate change and environmental impacts has grown substantially as it is no longer considered to be in some irrelevant far-off location or the distant future (van Vugt, et al, 2014).

In addition to mindsets changing, the pandemic caused direct environmental effects due to the aggressive global response and rapid changing of consumer behaviors. With enforced isolation, the number of people working from home increased drastically, and longer trips were curtailed almost entirely. This greatly reduced the pollution from car and air travel, and many

people began to rethink for what purposes travel is necessary or desirable. Environmental issues like air pollution were even linked directly to pandemic vulnerability, where health issues caused by pollution could increase the risk of COVID deaths (Upton & Venton, 2020). The pandemic also caused people to rethink and re-engineer many of the underpinnings of our economy, incorporating environmental impact more deeply into proposed solutions. All of these factors together have resulted in a heightened awareness of environmental issues.

According to a study by the Economist Intelligence Unit, environmental sustainability has been ranked by customers as one of the top factors of corporate responsibility (Robins, 2017). Companies are recognizing that the priorities of their customers are changing, with environmental consciousness becoming more important to consumers. A 2020 global survey found that 60% of consumers reported making more environmentally friendly, sustainable, or ethical purchases since the start of the pandemic (Lathem, 2021). Thus, companies are emphasizing their eco-friendly actions to market to this growing segment of eco-conscious consumers. These actions include environmentally responsible manufacturing, support for environmental initiatives like zero carbon footprint office buildings, and philanthropic donations. One benefit of this is that companies are more likely to invest in environmental initiatives internally so they can include these in their ads and annual reports (i.e. using solar energy, implementing hybrid vehicles, etc). For example, Apple has pledged to be carbon neutral across its supply chain by 2030 (Apple, 2021) and Google claims to have used 100% renewable energy for 4 years straight (Hölzle, 2021). Other companies like Patagonia implement campaigns to donate funds/profit to the environment (Patagonia, 2021). Campaigns like Patagonia's that are aligned with company values can be perceived quite positively (Roberts & Mayo, 2021). However, critics are skeptical that certain companies are turning to a strategy termed "greenwashing", where they advertise and promote their eco-friendly initiatives without making a significant impact on the cause. More recently, this behavior is becoming more likely to result in consumer backlash, thus making these campaigns and ads ineffective (Timperley, 2021). This is especially common in the fashion industry, where the ads and initiatives are often misleading. For example, the fashion brand H&M has been widely accused of greenwashing (Petter, 2021). Also, companies will sometimes move the more environmentally questionable operations to third-party vendors, particularly outside the US, to "hide" these activities from the public while not actually addressing the ecological challenges. Many companies struggle to adapt their

business models to be more environmentally sensitive so they can authentically highlight these accomplishments to their customers.

## **Conclusion**

The COVID-19 pandemic has reshaped our society, changing the mindsets and priorities of consumers in far-reaching ways. As consumer attitudes and behaviors have evolved, companies have responded by adopting new marketing approaches and campaigns to appeal to their target markets. In this paper, we discussed three major shifts in consumer mindsets toward an increased emphasis on social justice issues, a group mentality that prioritizes their local community, and a heightened awareness of environmental issues. Companies have responded to all three of these cultural shifts with new marketing strategies and approaches that aim to take advantage of the changing priorities of consumers. These give companies an opportunity to better align with their customers, but they also encompass risks that can derail the effectiveness of the campaigns. While some of the campaigns have been successful both in terms of societal impact and marketing effectiveness, others have failed dramatically. If companies want to be successful in such marketing efforts, they need to carefully design their campaigns to be authentic, aligned with their corporate goals, and effective at meeting the expectations of their customers.

## Work Cited

- Alcover, C.-M., Rodríguez, F., Pastor, Y., Thomas, H., Rey, M., & del Barrio, J. L. (2020). Group membership and social and personal identities as psychosocial coping resources to psychological consequences of the COVID-19 confinement. *International Journal of Environmental Research and Public Health*, 17(20), 7413.  
<https://doi.org/10.3390/ijerph17207413>
- Apple PR (2021, August 6). Apple commits to be 100 percent carbon neutral for its supply chain and products by 2030. Apple Newsroom.  
<https://www.apple.com/newsroom/2020/07/apple-commits-to-be-100-percent-carbon-neutral-for-its-supply-chain-and-products-by-2030/>.
- Bernstein, A. (2020, July 6). Coronavirus and climate change. C-CHANGE | Harvard T.H. Chan School of Public Health.  
<https://www.hsph.harvard.edu/c-change/subtopics/coronavirus-and-climate-change/>.
- Chiu, B. (2019, September 25). Can the advertising industry stop perpetuating harmful gender stereotypes? *Forbes*.  
<https://www.forbes.com/sites/bonniechiu/2019/09/24/can-the-advertising-industry-stop-perpetuating-harmful-gender-stereotypes/?sh=33db9f29375f%29>.
- Cox Communications Staff (2020, June 18). Small business support shifts amid covid-19 as consumers and business adapt and Evolve. *Small Business Support Shifts Amid COVID-19 as Consumers and Business Adapt and Evolve*.  
<https://www.prnewswire.com/news-releases/small-business-support-shifts-amid-covid-19-as-consumers-and-business-adapt-and-evolve-301079544.html>.
- Hessekiel, D. (2021, April 28). The rise and fall of the buy-one-give-one model at Toms. *Forbes*.  
<https://www.forbes.com/sites/davidhessekiel/2021/04/28/the-rise-and-fall-of-the-buy-one-give-one-model-at-toms/?sh=3bbbc2c71c45>.
- Hölzle, U. (2021, April 20). Four consecutive years of 100% renewable energy—and what’s next. *Google cloud blog*.  
<https://cloud.google.com/blog/topics/sustainability/google-achieves-four-consecutive-years-of-100-percent-renewable-energy>.
- Latham, K. (2021, January 14). Has coronavirus made us more ethical consumers? *BBC News*.  
<https://www.bbc.com/news/business-55630144>.

- Lee, D. (2021, January 27). Walmart turns to robot-staffed warehouses to handle online orders. Financial Times. <https://www.ft.com/content/1b1b11c8-200c-4f7c-a431-6460f90bb95d>.
- Molla, R. (2021, March 1). Posting less, posting more, and tired of it all: How the pandemic has changed social media. Vox. <https://www.vox.com/recode/22295131/social-media-use-pandemic-covid-19-instagram-tiktok>.
- Nextdoor Editorial Team (2020, August 5). How covid-19 has changed the way we shop locally. Nextdoor for Businesses. <https://business.nextdoor.com/local/resources/how-covid-19-has-changed-the-way-we-shop-locally>.
- Patagonia Philanthropy (2021). Environmental campaigns. Patagonia Action Works. <https://www.patagonia.com/actionworks/en-gb/campaigns>.
- Petter, O. (2020, February 4). H&m accused of 'greenwashing' over plans to make clothes from sustainable fabric. The Independent. <https://www.independent.co.uk/climate-change/news/hm-greenwashing-sustainable-circulose-venetia-falconer-manna-a9312566.html>.
- Regalado, N. (2020, July 20). ACLU News & Commentary. American Civil Liberties Union. <https://www.aclu.org/news/racial-justice/mcdonalds-is-hiding-policies-that-perpetuate-systemic-racism-behind-woke-washing/>.
- Roberts, L. M., & Mayo, A. J. (2021, January 29). Toward a racially just workplace. Harvard Business Review. <https://hbr.org/2019/11/toward-a-rationally-just-workplace>.
- Robins, R. (2017, November 14). Does Corporate Social Responsibility increase profits? Business Ethics. <https://business-ethics.com/2015/05/05/does-corporate-social-responsibility-increase-profits/>.
- Timperley, J. (2021, July 26). The Truth Behind Corporate Climate Pledges. The Guardian. <https://www.theguardian.com/environment/2021/jul/26/climate-crisis-green-light>.
- Upton, J., & Venton, D. (2020, June 11). Tear gas, pollution, wildfire smoke: A triple threat to your lungs. Climate Central. <https://www.climatecentral.org/news/tear-gas-pollution-wildfire-smoke-a-triple-threat-to-your-lungs>.

Van Vugt, M., Griskevicius, V., & Schultz, P. W. (2014). Naturally green: Harnessing stone age psychological biases to foster environmental behavior. *Social Issues and Policy Review*, 8(1), 1-32.

## **Gen Z and Mental Health: How Family Variables affect Adolescent Mental Health Outcomes by Sahana Balagali**

### **Abstract**

The current quality of adolescent mental health, specific to Generation Z, is heavily influenced by family variables and the predetermined environments that they are born into. Building off of past research, this paper aims to discuss three specific family-focused factors and the potential effects they can have on child mental health. Family perpetuated and public mental health stigma, parent mental health, and parenting practices work together to produce both positive and negative child mental health outcomes. More often than not, these variables contribute to worsening mental health symptoms in adolescents based on the stigma associated with mental health itself, proving the lack of importance associated with mental health care. This established stigma combined with family perpetuated stigma can restrict adolescents from seeking professional mental health care which encourages internalizing problems such as anxiety, depressive, and somatic symptoms. Consistently, the quality of mental health displayed by parents and family members has the ability to influence child mental health, can lead to child neglect based on emotional unavailability, and can stimulate externalizing problems such as delinquency and aggression in children. With parent mental health determining parenting styles, the implementation of unhealthy habits in a family setting through parenting creates undesirable opportunities for a child to develop a mental illness and have low self-esteem. Acknowledging the ability for family variables and environments to be modifiable, initiating interventions that provide mental health support and offer informative resources can acclimate Gen Z to an improved quality of mental health.

## **Introduction**

Generational observations regarding topics including mental health, stigma, and social norms are commonly analyzed with intents to distinguish differences whereas recognizing similar experiences is disregarded. One such experience that can be considered to share a likeness throughout past and present generations is the period of adolescence. When most events or experiences are compared throughout generations, many of them share a predicted contrast whereas adolescence usually represents a time of similarity and relatability regardless of age. Adolescence can be the perfect time to explore important goals, interests, and relationships but can comparatively be very stressful and problematic due to constantly changing variables (“Adolescence”). Over generations and through the passing of time, problematic variables faced during adolescence have constantly changed based on relevant social and political events which can alter the experience in itself. One such factor currently affecting adolescents today and Generation Z (Gen Z) in particular is mental health.

With almost 70% of Gen Z teens reporting the physical and emotional signs of anxiety and depression as major problems among themselves and their peers, analyzing prominent variables that contribute to the influx in this statistic is crucial (“Generation Z’s Mental Health”). Several situational and external elements have directly shaped the increase in Gen Z’s stress levels and mental health issues. Some of these elements include gun violence, sexual harassment, political discussions especially those surrounding immigration and taxes, and climate change. Several other elements have caused more than nine in ten Gen Z adolescents to face at least one negative mental health symptom, such as feeling depressed or being unable to maintain interest, motivation, or energy throughout their everyday life (Bethune). Uniquely, Gen Z has often been referred to as the most clinically depressed and anxious generation to date with a generous number of studies exploring the variables that prompted this title (“Generation Z’s Mental Health”). Of the several tangible and intangible components that encourage mental health disparities within Gen Z youth, family variables and functioning often hold a heavy influence over these adolescents and their mental well-being.

Family functioning refers to the social and structural characteristics of a generalized family environment (Lewandowski et al.). In order for a family environment to be healthy, factors including mutual support, love and empathy, and open communication should be emphasized and balanced in a reassuring manner (“Normal Family Functioning”). Although

there is no “right” way to maintain a well functioning family, there are effective approaches and efforts that should be implemented into family environments to support Gen Z youth. However, when variables that contribute to a well-balanced family environment are negatively altered, parent-child relationships can be compromised which often stimulates an offset in the adolescent’s mental health (Lewandowski et al.). In several family settings, the factors that promote healthy family functioning are usually disregarded with parents failing to provide for their adolescent’s general and mental health needs. Based on similar observations, the mental health of Generation Z is often negatively impacted by the quality of family functioning through both internal and external variables.

Taking into consideration and assessing the family life and variables that can affect Gen Z’s mental health is something that deserves professional interventions and initiations through resources that can improve and help moderate the effect that negative family environments can have on adolescents and their mental health. The way that Gen Z’s mental health issues and concerns are treated today will eventually regulate the way that our society functions emotionally in the near future adding to the urgency of implementing these interventions while ensuring their easy access.

## **Discussion**

Considering the broad nature of family functioning, there are no specific practices or guidelines that can guarantee positive youth behavioral or emotional outcomes. Varying methods of displaying love and establishing boundaries in a family setting can correspondingly result in very diverse child outcomes. Conversely, establishing constructive parent-child relationships is one of the best ways to maintain a healthy family environment but the interference of mental health and emotional difficulties from either party can cause an imbalance in this relationship. In the presence of mental health issues, factors contributing to an ideal family environment are compromised which can lead to misdirected development during adolescence. Being exposed to similar circumstances during youth promotes mental health problems that can affect emotional behavior well into adulthood, emphasizing the impact that family functioning has on adolescence. Some family variables that often account towards these inadequate circumstances include family perpetuated and public mental health stigma, parent mental health, and parenting practices and styles.

Through analyzing these variables, the effect that they have on childhood development especially during the time of adolescence becomes prominent. In terms of mental health stigma, public stigma often plays a deciding role in determining whether or not individuals will seek professional help. However, the stigmatization of mental health by family members holds a heavier negative weight over seeking help especially in adolescents. Consistently, the lack of support and invalidation of mental health concerns based on perceived stigma by family and relatives can contribute to worsening mental health in Gen Z youth. Along with stigma, parent mental health can have a considerable effect on their children's mental health in both positive and negative ways. Research shows that parents with mental illnesses reported significantly worse interactions with their children and similarly maintained a more negative family environment when compared to parents without a mental illness (Van Loon et al.). Moreover, parent mental health creates a domino effect on parenting practices. This allows the conclusion that the quality of mental prosperity displayed by parents can distort their relationship with their children through their parenting styles. With regard to these variables, parent mental health and parenting practices usually only affect their children's mental health whereas the stigmatization of mental health by family members entirely restricts their children from receiving professional help.

### **Family Perpetuated and Public Mental Health Stigma**

Stigma refers to the disapproval associated with an undesirable trait, quality, or circumstance and is caused by the lack of knowledge or understanding about a certain demographic ("Overcoming Stigma"). Stigma can lead to both the direct and unintentional discrimination against communities and promotes stress, anxiety, low self-esteem, and mental health issues. It affects an array of people including people with disabilities, racial and ethnic minority groups, the LGBTQIA+ community, obese individuals through fatphobia, and many more. Specific to mental health, stigma can cause the general public to view those struggling with their mental health or receiving mental health support negatively through associating it with shame. Delaruelle et al. found that both the cultural and individual effects of stigma play a role in the utilization of help services and concluded that the cultural effects of stigma holds more weight as it can pose a barrier to contacting help services regardless of individual beliefs (3).

Alongside social stigma, technological growth especially in terms of social media platforms and their increase in popularity among Gen Z has created an opportunity for mental health to be further stigmatized and trivialized by the general public (Robinson et al.). With the easy access that comes with these platforms, being exposed to stigmatizing views and ideals at a young age can worsen the mental health of today's youth. Since the rise in social media usage is specific to Gen Z adolescents, it is a variable that carries a much heavier weight in Gen Z, specifically in terms of mental health, when compared to previous generations. Through its significance in a majority of Gen Z's everyday life, social media has allowed for platforms that consistently contribute to the stigmatization of mental health ultimately affecting the mental health of the user as well. Furthermore, the reasonable restrictions and control of access to social media by parents can regulate the negative effects that it may have on adolescent mental health leaving parents with the responsibility to implement healthy habits when it comes to the internet.

Focusing more towards stigma perpetuated by family members or parents, the source of parental support or opposition of their children's mental health concerns often stems from stigma which ultimately impacts an adolescent's ability to seek appropriate help. Supportive family members often get affected by stigma where they experience negative social situations. However, children struggling with mental health issues who have invalidating family members often end up experiencing those negative situations instead. Although parents hold an important role in providing for their mentally ill children in terms of involvement in care planning and emotional security, they can also worsen the mental conditions of their children by neglecting their concerns and blaming external factors for their anxieties (Lieghio 7). Through the perceived stigma displayed by parents that creates restrictions to professional help, both the mental health and motivation of adolescents can be compromised, affecting their performance in school, relationship with parents, and can stimulate an increased suicide risk.

Similarly, there are several barriers that restrict Gen Z youth from seeking professional help other than family perpetuated mental health stigma. Some of the most common facilitators that contribute to this are social factors, specifically social stigma and the embarrassment that most adolescents may experience when opening up to their families about their mental health struggles. Radez et al. analyzed several qualitative and quantitative studies using Gen Z adolescents as a demographic to discuss these barriers and limitations (25). They found that the second most commonly reported barrier to seeking professional help was public stigma and

feelings of discomfort associated with reaching out for help. This observation emphasizes the negative impact that mental health stigma can have on adolescents and their comfort levels with accessing professional help without viewing it as humiliating or degrading.

### **Parent Mental Health**

The quality of an individual's mental health has the ability to shape their habits, goals, motivation, relationships, and lifestyle (Velten 2). Mental health often defines the comfort levels of one's personal and professional life in terms of satisfaction and success which can be used to infer the negative impact that poor mental health can have on an individual's lifestyle. If poor mental health has the ability to distort an individual's lifestyle rather drastically, the effect that their mental health may have on their children should also be taken into consideration. Specific to Gen Z, 1 in 14 adolescents have a parent or guardian struggling with poor mental health which can negatively affect an integral period of childhood development ("Children's Mental Health"). The children who reported having a parent with poor mental health are also more likely to have a mental, emotional, or developmental disability and are more likely to face adverse childhood experiences. Dealing with mental health challenges as a parent can act as an obstacle in terms of parent-child relationships especially if the parent doesn't have access to helpful resources and support systems. In family situations like these, the mental health and general well-being of both the parent and child are put at risk.

In most family environments, although there are exceptions, when parental figures are struggling with their mental health, it often affects how they treat their children while negatively affecting their mental and physical health. The implementation of habits within a family setting is often shaped by the mental prosperity displayed by the parents which also gives them the capability to implement unhealthy and obstructive habits. Van Loon et al. conducted a questionnaire study involving 124 families with a mentally ill parent and 127 families without a mentally ill parent who had Gen Z children (4). The study analyzed multiple components contributing to a family environment including parental monitoring, parental support, family cohesion, expressiveness, conflict, as well as adolescent internalizing and externalizing problems. It explored whether or not parent-child interactions and family environments explained the association between parent mental illness and problem behavior in adolescents. Results showed that parents with mental illnesses were generally observed to be less emotionally

available which takes away from the protection and care that their children would otherwise receive, often resulting in more externalizing problems such as aggression and delinquency in children. Furthermore, families with a mentally ill parent displayed less coherence and generally experienced more conflicts. This indicates that having a mentally ill parent may not only have a negative impact on adolescent behavioral outcomes but can also promote an uncooperative family environment.

Overall, the disparities experienced by parents in terms of the quality of their mental health has the ability to influence their children's mental health in the process. The transgenerational relaying of mental health illnesses contributes to the instigation of psychological disorders especially in family settings. Consistently, children with mentally ill parents are at a high risk for developing these disorders and without specialized initiations and efforts to better support these parent-child dyads, the risk factor for the development of generational psychological disorders will not be reduced. Initiatives including preventative group interventions, support groups, online informational resources, affordable and accessible mental health care, psycho-education programs, and increased treatment encouragement would help work towards supporting families being affected by mental illness in general (Christiansen et al.).

### **Parenting Practices and Styles**

Parenting practices refers to the way that parents raise their children in terms of the values and habits they choose to emphasize while supporting their social, emotional, and intellectual development from childhood to early adulthood ("Parenting"). The different ways that an adolescent is brought up has the potential to shape their general mindset, outlook on life, mental and physical health, as well as other factors integral to maintaining a positive and sustainable lifestyle. Parenting does not limit itself to how an individual raises their children but also expands into the quality of parent-child relationships and the ease of communication maintained in a family environment which heavily contributes to positive child outcomes. Parenting styles range from authoritative (high level of parental warmth and control) to uninvolved (low level of parental warmth and control) with a diverse combination of the two inbetween. Each style of parenting leads to varying child outcomes especially with regard to mental health since some may be more emotionally beneficial whereas others may be more harmful.

To start off, Authoritative parenting includes both a high level of parental warmth and control which has been observed to be the most effective at nurturing an adolescent's mental health (Sanvictores and Mendez). Authoritative parenting, which is described as a balance between the two major care factors, parental warmth and control, is discerned to have the healthiest mental and physical outcomes for children (Niaraki and Rahimi). Although this parenting style takes a lot of effort and involvement from both parties, it revolves around open communication and supportive discipline rather than blind obedience and harsh punishments. The implementation of authoritative parenting creates a foundation for confident and responsible children allowing them to be independent and overall healthier. Romero-Acosta et al. conducted an analysis regarding the associations between parenting styles and symptoms of depression and anxiety in Gen Z teenagers. The results of the analysis both support and dispute the mental health outcomes that authoritative parenting is generally related to. The study found that adolescents whose parents used neglectful parenting styles reported higher depressive symptoms compared to adolescents whose parents used authoritative parenting. Conversely, adolescents who reported noticeably lower generalized anxiety symptoms were those with a neglectful parenting style whereas adolescents whose parents used authoritative parenting reported significantly higher generalized anxiety symptoms. Although authoritative parenting is most commonly associated with kids having healthy physical and mental prosperity, the study's conclusion that kids with authoritative parenting styles reported higher anxiety symptoms contradicts that generalization. This observation best supports the idea that parenting styles often lead to varying child outcomes especially in terms of mental health based on the presence of factors other than parenting. Conversely, uninvolved parenting is based around ignorance where there is a very low amount of parental warmth and control which often leads to child neglect (Sanvictores and Mendez). While uninvolved parents do provide basic necessities for their children, they do not make efforts to discipline or communicate with their children and have little to no expectations for them. Uninvolved parenting can also cause children to be less emotionally confident and may make it difficult to maintain and establish personal relationships. Despite this, children with uninvolved parents may be more resilient and self-reliant when compared to other children but those characteristics may be developed out of necessity rather than through healthy encouragement. Romero-Acosta et al. reviewed the relationship between uninvolved parenting, child mental health and self-esteem and concluded that adolescents with uninvolved parents are more prone to

exhibit externalizing behaviors (substance abuse, aggression, impulsivity, etc.), are at a higher risk for developing psychological disorders, and tend to have a low self-esteem. This aligns with the child outcomes that are most commonly associated with uninvolved parenting but family environments can be very diverse and much more impactful variables have the ability to determine an adolescent's quality of mental health.

One such variable is children's perception of parenting which can often hold more weight and influence over their mental illness symptoms when compared to parental reports of their parenting. Huang et al. conducted a study with Gen Z youth tackling this idea while emphasizing how parenting is directly correlated with child mental health outcomes. The study suggested that future research should take into consideration children's reports in order to assess the effects of parenting on child mental health outcomes based on the study's results that reinforced the influential role that children's perceptions can have on their mental health status. While parenting is mostly based on parental actions and decisions, it is important to evaluate the effects that different parenting styles can have on child mental health from a child's perspective in efforts to create healthier and more inclusive family environments.

## **Conclusion**

Considering the presence of several variables that have the ability to orchestrate adolescent mental health in a family setting, the effect that family perpetuated mental health stigma, parent mental health, and parenting practices have on child mental health outcomes become significant. When focusing on how these variables affect Gen Z, it is important to acknowledge their diverse experiences as a part of a socially ambiguous time period and how those experiences may alter their relationships with their guardians and affect their mental health. For example, the easy access that Gen Z adolescents have to online informational resources and social media gives them the opportunity to research about interventions and initiations that advocate for mental health awareness which is something that past generations may not have experienced at a similar age. However, the ways that these adolescents choose to access the internet can interfere with the quality of their mental health through their exposure to unhealthy stigma.

As the only generation so far that has grown up with this effortless access to technology and information, Gen Z's experiences with family variables and interactions is bound to be

unique with both positive and negative aspects compared to previous generations. One such instance is the methods that parents may use to implement restrictions regarding the internet with their children. These restrictions can display how parental roles and responsibilities reflect the parent's mental health and parenting practices which have a domino effect on the child's mental health outcomes. The same variables that contribute to decisions regarding the internet can contribute to other restrictive decisions that have the potential to distort parent-child relationships especially in terms of child mental health.

The three variables discussed in this paper include family perpetuated mental health stigma (social stigma included), parent mental health, and parenting practices, all of which contribute to determining parental decisions that have the ability to affect child mental health. Mental health stigma displayed by family members, especially parents, can cause worsening mental health symptoms in children because of the lack of support and inability to access professional help. In these situations, parental decisions based off of perceived stigma most commonly end up negatively affecting the child who is looking to seek help. Similarly, parent mental health has the ability to transgenerationally pass on to their children increasing the risk of mental illness. The mental health of a parent can also be displayed through their parenting practices and styles (authoritative, uninvolved, etc.) which heavily influences the communication in and quality of parent-child relationships. With parenting practices being the controlling factor to dictate the quality of parent-child relationships, parents who choose to implement unhealthy habits in their family environments may cause adolescents to have increased mental illness symptoms. Although the maintenance of balance between these three variables can help establish healthy and positive family environments, the neglect of these variables and the inability to maintain a balance between them will end up negatively affecting the mental health of the child in that situation.

With family variables and environments having such a drastic effect on adolescent mental health, supporting appropriate efforts that are being made towards providing mental health guidance to both parents and children who need it is crucial. These efforts can range from initiating small-scale support groups to making mental health care more accessible to the general public. Along with supporting interventions, working towards eliminating public stigma and increasing the importance of mental health awareness will benefit the professional care industry, individuals looking to access professional care, and the attitudes towards seeking professional

care. Specific to adolescents, informative initiatives regarding mental health in a family setting can expose them to important resources and people who should be able to offer help and guidance if requested. Recognizing the impact that negative family environments can have on children is the first step in establishing a system where these adolescents can comfortably access relevant information while seeking appropriate help.

## Works Cited

- “Adolescence.” Psychology Today. [www.psychologytoday.com/us/basics/adolescence](http://www.psychologytoday.com/us/basics/adolescence). Accessed 2 Nov. 2021.
- Bethune, Sophie. “Gen Z more likely to report mental health concerns.” American Psychological Association, Jan. 2019, [www.apa.org/monitor/2019/01/gen-z](http://www.apa.org/monitor/2019/01/gen-z). Accessed 2 November 2021.
- Brakce, Piet, Delaruelle, Katrijn, Verhaeghe, Mieke. “Dominant Cultural and Personal Stigma Beliefs and the Utilization of Mental Health Services: A Cross-National Comparison.” *Frontiers in Sociology*, vol. 4, 2019. <https://doi.org/10.3389/fsoc.2019.00040>
- Christiansen, Hanna, Anding, Jana, Schrott, Bastian, Röhrle, Bernd. “Children of mentally ill parents—a pilot study of a group intervention program.” *Front. Psychol*, vol. 6, 2015. <https://doi.org/10.3389/fpsyg.2015.01494>
- “Generation Z's mental health issues.” The Annie E. Casey Foundation, 3 March 2021. [www.aecf.org/blog/generation-z-and-mental-health](http://www.aecf.org/blog/generation-z-and-mental-health). Accessed 4 Nov. 2021
- Girma, Eshetu, Möller-Leimkühler, Anne M., Müller, Norbert, Dehning, Sandra, Froeschl, Guenter, Tesfaye, Markos. “Public stigma against family members of people with mental illness: findings from the Gilgel Gibe Field Research Center (GGFRC), Southwest Ethiopia.” *BMC Int Health Hum Rights*, vol. 14, no. 1, 2014. <https://doi.org/10.1186/1472-698X-14-2>
- Lewandowski, Amy S., Palermo, Tonya M., Stinson, Jennifer, Handley, Susannah, Chambers, Christine T. “Systematic review of family functioning in families of children and adolescents with chronic pain.” *The journal of pain*, vol. 11, no. 11, 2010, pp. 1027-38. <https://doi.org/10.1016/j.jpain.2010.04.005>
- Liegghio, Maria. “‘Not a good person’: family stigma of mental illness from the perspectives of young siblings.” *Child and Family Social Work*, vol. 22, no. 3, 2017. <https://doi.org/10.1111/cfs.12340>
- “Mental health of children and parents —a strong connection.” Centers for Disease Control and Prevention, 23 April 2021. [www.cdc.gov/childrensmentalhealth/features/mental-health-children-and-parents.html](http://www.cdc.gov/childrensmentalhealth/features/mental-health-children-and-parents.html). Accessed 2 Nov. 2021.

- “Mental health: Overcoming the stigma of mental illness.” Mayo Clinic.  
[www.mayoclinic.org/diseases-conditions/mental-illness/in-depth/mental-health/art-20046477](http://www.mayoclinic.org/diseases-conditions/mental-illness/in-depth/mental-health/art-20046477). Accessed 4 Nov. 2021.
- “Normal functioning family.” HealthyChildren.org, 21 Nov. 2015.  
[www.healthychildren.org/English/family-life/family-dynamics/Pages/Normal-Family-Functioning.aspx](http://www.healthychildren.org/English/family-life/family-dynamics/Pages/Normal-Family-Functioning.aspx). Accessed 4 Nov. 2021.
- “Parenting.” American Psychological Association. [www.apa.org/topics/parenting](http://www.apa.org/topics/parenting). Accessed 4 November 2021.
- Radez, Jerica, Reardon, Tessa, Creswell, Cathay, Lawrence, Peter J., Evdoka-Burton, Georgina, Waite, Polly. “Why do children and adolescents (not) seek and access professional help for their mental health problems? A systematic review of quantitative and qualitative studies.” *Eur Child Adolesc Psychiatry*, vol. 30, no. 2, 2021, pp. 183-211.  
<https://doi.org/10.1007/s00787-019-01469-4>
- Robinson, Patrick, Turk, Daniel, Jilka, Sagar, Cella, Matteo. “Measuring attitudes towards mental health using social media: investigating stigma and trivialisation.” *Social psychiatry and psychiatric epidemiology*, vol. 54, no. 1, 2018, pp. 51-58.  
<https://doi.org/10.1007/s00127-018-1571-5>
- Romero-Acosta, Kelly, Gómez-de-Regil, Lizzette, Lowe, Gillian A., Lipps, Garth E., Gibson, Roger C. “Parenting Styles, Anxiety and Depressive Symptoms in Child/Adolescent.” *International Journal of Psychological Research*, vol. 14, no. 1. 2021, pp. 12-32.  
<https://doi.org/10.21500/20112084.4704>
- Sanvictores, T., Mendez, M.D. (2021, March 6). Types of Parenting Styles and Effects On Children. National Center for Biotechnology Information.  
[/www.ncbi.nlm.nih.gov/books/NBK568743/](http://www.ncbi.nlm.nih.gov/books/NBK568743/)
- Van Loon, Linda, Van de Ven, Monique, Van Doesum, Karin, Witteman, Cilia, Hosman, Clemens. “The Relation Between Parental Mental Illness and Adolescent Mental Health: The Role of Family Factors.” *J Child Fam Stud*, vol. 23, 2014, pp. 1201-14.  
<https://doi.org/10.1007/s10826-013-9781-7>
- Velten, Julia, Bieda, Angela, Scholten, Saskia, Wannemüller, André, Margraf, Jürgen. “Lifestyle choices and mental health: a longitudinal survey with German and Chinese students.” *BMC Public Health*, 2018. <https://doi.org/10.1186/s12889-018-5526-2>

Wolicki, Sarah Beth, Bitsko, Rebecca, Cree, Robyn, Danielson, Melissa, Ko, Jean, Warner, Lee, Robinson, Lara. "Mental Health of Parents and Primary Caregivers by Sex and Associated Child Health Indicators." *ADV RES SCI*, vol. 2, 2021, pp. 125-39.  
<https://doi.org/10.1007/s42844-021-00037-7>

# **Why Mask Compliance Differed in the United States and Taiwan During the COVID-19 Pandemic: How Individualist vs. Collectivist Cultures Respond in Uncertain Times by**

**Alena Powell**

## **Abstract**

This paper investigates why the mask compliance rates were significantly higher in Taiwan than in the United States during the COVID-19 pandemic. This distinction can primarily be represented by an individualist vs. collectivist mindset, associated with Western and Eastern countries, respectively. Mask wearing was influenced by collectivism; Taiwan's proximity to the 2003 Severe Acute Respiratory Syndrome (SARS) epidemic and the subsequent policies implemented; cultural norms; psychological factors including higher risk attitude, sensitivity to social norms, and compliance with personal surveillance; and demographics including race, political ideology, and social class. Mask wearing is negatively associated with infection rates but is not fact based or logical: multiple psychological and cultural factors contribute to this compliance variability. Therefore, those that don't comply are not purely defiant; individualists and collectivists just have a different belief system in what they value and how they behave. As a paper that explores reasons for noncompliance, from a public policy perspective, the message in compliance requests must be tailored to a specific belief system that serves an individual and group's best interest while respecting personal values.

Keywords: COVID-19, mask-wearing, culture, individualist vs. collectivist, psychological factors

## Introduction

COVID-19, a disease caused from SARS-CoV-2 virus, first detected in Wuhan, China, in December 2019, has been a test of responding to health regulations. Common symptoms include cough, fever, chills, loss of taste and smell, just to name a few. Most cases are mild, with symptoms persisting a few days, but some cases are very severe, requiring hospitalization. The virus has ravaged through borders and taken the lives of millions worldwide. Even though the severity of the pandemic varied by country and demographics, the COVID-19 pandemic was an experience that everyone dealt with. However, the responses, attitudes, and behaviors of the citizens of different countries shed light on how people deal during times of uncertainty. Two contrasting examples include the United States and Taiwan. These two countries have significant differences in mask wearing compliance, defined as wearing a mask when in close contact (within 6 feet) of non household members (Key, 2021).

In a literature search of studies on the mask compliance rates between Eastern and Western cultures, there were multiple studies on the compliance rates and reasoning behind this behavior in Western countries, but limited studies in Eastern countries. This would suggest that because the compliance rates are so high in Eastern countries, researchers aren't conducting studies on why people complied or how to get people to comply, instead they're more interested in why people DON'T comply.

According to a study conducted by the University of Southern California's Dornsife Center for Economic and Social Research, approximately 83% of Americans agree that masks are an effective way to protect themselves from contracting COVID-19, but only 51% of Americans report actually wearing masks when in public places or in close contact with members not of the same household (Key, 2021). Another study found that 64% of Americans that report not wearing a mask responded, "It is my right as an American to not wear a mask" or "It is uncomfortable." (Vargas & Sanchez, 2020).

The Taiwanese government, on the other hand, instituted a mask mandate with a fine between \$100-500 USD for noncompliance (Ministry of Health and Welfare, n.d.; Ministry of Health and Welfare, n.d.). However, there were some reports of non-compliance in some cities in Taiwan. For instance, 604 fines were given in Kaohsiung within 1.5 days (Zheng, 2021) and 848 fines given in Taichung within 2 months (Hong, T. & Lü, Z., 2021). Both cities have a population of around 2.7 million, so based on this statistic it can be speculated that the

non-compliance rate in Kaohsiung and Taichung is about 0.02% which is still significantly lower than the approximately 50% noncompliance rate in the United States. This finding raises questions on why there is such a big disparity.

The United States has over 330 million people with diverse backgrounds, socioeconomic levels, and beliefs. When the pandemic hit, those outside of the United States saw how a high-income country like the United States dealt with unprecedented circumstances. As of October 2021, the US has over 43 million confirmed cases and 688,000 deaths (World Health Organization, 2021).

Conversely, Taiwan is a densely populated island off the coast of Mainland China with over 23 million people. Due to its proximity to China, where the virus originated, and constant air travel to and from, Taiwan was expected to have the 2nd highest number of cases. However, this was proved to be incorrect. Taiwan along with other countries like Singapore and New Zealand were able to implement policies and community-based preventative measures to slow the rate of transmission and infection rates. By April 2020, the local transmission was at zero (The Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, 2021). It stayed that way for about a year. When comparing infection and mortality rates, as of October 2, 2021, the confirmed cases per million people in Taiwan and the United States is 680 and 131,020, respectively. The confirmed number of deaths per million people in Taiwan and the United States in 35 and 2,103, respectively (Ritchie et al., 2020). These statistics illustrate the significant contrast in the severity of the pandemic in these two countries with the US infection rate about 200 times that of Taiwan and the US mortality rate about 60 times that of Taiwan. Why is there such a major difference? How did this happen? What lessons can other countries learn and what do the actions by Taiwan tell us about their attitudes and cultural norms? Specific factors that can explain why the Taiwanese and Americans responded differently to the pandemic lie mainly in cultural differences. These distinctions include Taiwan's past experience with SARS, established social norms, different healthcare systems and access to resources, an individualist vs. collectivist mindset that serves as the foundation for psychological factors, and diversity in the population.

### **Past Experience with SARS: Proximal vs. Distal Threat**

Taiwan had a greater proximal distance than the United States did to the SARS epidemic in 2003. General psychological principles suggest that first-hand experience has a greater impact on someone than watching from far away. From Taiwan's experience with SARS, the government put policies in place for controlling another global health crisis, such as universal mask-wearing, quarantine requirements instituted in February 2020, closing down borders to foreigners in March 2020, and contact tracing systems after the first identified case in China (Taiwan Centers for Disease Control, 2020). However, Americans had no prior experience with a pandemic to this level. Given Taiwan's past experience in dealing with a health care crisis, the Taiwanese were more familiar than Americans were with healthcare recommendations when these preventative measures were put in place to curb the spread of COVID-19. Additionally, in the beginning of the pandemic, Americans were not directly involved or affected by the pandemic because of its origin in China. This feeling was bolstered by Trump's rhetoric calling COVID-19 the China virus, resulting in some Americans believing that they could not get the virus because they had limited a relationship with China. For instance, they weren't Chinese or planning on visiting China soon.

### **Differences in the Governmental Leadership**

Another reason is the difference in access to health care services. In the United States, there is no universal health care. Universal health care ensures that all citizens have access to health care services when they need it without financial burden. About 8% of the US population is uninsured (Keisler-Starkey & Bunch, 2020). Given the dozens of insurance companies, including in the public and private sectors, Americans pay different fees, resulting in the fragmented health care system that provides them varying degrees of access to certain medical services. The average annual health insurance in the United States is \$5,940. This number fluctuates given location and different insurance tiers. Some plans can reach an upward annual cost of \$8000 (Price, 2021).

Taiwan, on the other hand, has the National Health Insurance (NHI) System which provides universal health care to 99% of the population. The NHI provides citizens with "SMART" cards, which store a patient's medical history and records.

After the first confirmed COVID case was identified in China, Taiwan took strict actions to prevent the transmission to its island, given the frequent flights between Mainland China and Taiwan. Taiwan already had a public health agency, the Central Epidemic Command Center (CECC), instituted after Taiwan's experience with SARS in 2003. The CECC responded to the COVID-19 outbreak and followed pre-established protocols to control a pandemic and had access to other data from various government agencies.

On January 20, 2020, when the CECC was activated, patients' medical history from the "SMART" cards was integrated with their travel history and data. From there, a system categorized each citizen into high risk or low risk for contracting the virus. High-risk individuals were those who had traveled to high-risk areas, such as Wuhan, and low-risk individuals included those who had not traveled abroad and had no preexisting health condition. After this integrated information was stored on a citizen's "SMART" card, low-risk individuals were ordered to buy a week's worth of masks and could live normal lives. High-risk individuals, on the other hand, were sent into a two-week quarantine after which they could join everyone else (Wang et al., 2020; Vox, 2021). Quarantines as such were effective because it controlled the spread and didn't rely on quarantining only symptomatic individuals, as asymptomatic individuals have a high chance of transmitting the virus before developing symptoms, if they develop symptoms (Summers et al, 2020).

Taiwan also banned foreigners from entering and in March 2020, the CECC categorized everyone flying into Taiwan to be considered high risk so they all had to undergo isolation quarantine. To make sure no citizens left their quarantine facility, the CECC tracked people's location using cell phone data. There were also daily phone call check-ins to monitor any possible symptoms as well as occasional in-person check-ins (Vox, 2021). Taiwan also instituted a fine between NT \$200,000 and NT \$1,000,000 (approximately \$7000 USD and \$36,0000 USD) for breaking quarantine rules (Ministry of Health and Welfare, 2020).

However, studies have shown that only relying on case-based preventative measures such as quarantine and contact tracing wouldn't have been sufficient for controlling the pandemic. Instead, population-based measures, such as wearing masks and social distancing, were useful in the initial containment of the virus (Ng et al., 2020). Taiwanese attitudes towards wearing masks and having a collectivist mindset, discussed later in the paper, also helped enforce these measures. Additionally, the then Vice President of Taiwan, epidemiologist Chen Chein-Jen, had

broadcast announcements to assist citizens in population based measures such as mask wearing, frequent hand washing, and preventing mask hoarding. Similarly, the CECC set a fixed price for masks and used funds and the military to increase mask production. By January 20, 2020, when the CECC was activated, the government had 44 million surgical masks and 1.9 million N95 masks (Wang et al., 2020). With an integrated health insurance system, quarantine requirements, and resource allocation for mask production, Taiwan was organized and prepared to contain the virus.

### **U.S. Response to COVID-19**

Compared to Taiwan's approach, the United States' response to the pandemic was completely different. To start off, the federal government put the responsibility of controlling the pandemic onto the state and local governments. This led to a divided nation, with different states instituting different policies, resulting largely from political ideology (Lewis, 2021). Additionally, during the beginning of the pandemic, there was limited testing and even so, testing criteria was too high, mainly for symptomatic individuals admitted to hospitals, likely to have COVID-19 (Lewis, 2021). The Centers for Disease Control and Prevention (CDC) also released a flawed test, reporting that it could fail 33% of the time (Temple-Raston, 2020). Furthermore, the CDC reported that the spread of COVID-19 likely started in January/February 2020. However, the surveillance systems for detecting the virus and reports of flu-like symptoms were insufficient allowing the virus to spread undetected for more than a month (Jordan et al., 2020). There was also mixed information from then-President Trump, government agencies including the CDC and the World Health Organization (WHO), and the behaviors from local officials. Examples include Trump's denial of the seriousness of the virus as well as government agencies changing their message for mask guidance in part due to medical supply shortages for hospitals and health care workers (Molteni & Rogers, 2020; World Health Organization, 2020). The mask guidance during the beginning of the pandemic sent confusing messages for further encouragement of mask-wearing. Until April 2020 for the CDC and June 2020 for the WHO, these agencies only recommended masks for those experiencing symptoms, but it has now been established that the virus can also spread from asymptomatic individuals. Consequently, it creates confusing mask guidance as well as making it hard to know who and which government agency to trust.

Lastly, the US had insufficient contact tracing and quarantine policies put in place, which seen from other countries, such as Taiwan and New Zealand, had a role in attenuating the transmission (Lewis, 2021).

### **Individualist vs. Collectivist**

One way to further understand the striking difference between these two countries is by looking at contrasting social and cultural norms. These perspectives can differ broadly and are learned distinctions in behavior imposed by cultures, through family, friends, classmates, and more. Psychologists that study cultural differences have found a distinction between Eastern and Western culture which provides insight into the difference in pandemic responses. This distinction can be represented by an individualist vs. collectivist mindset, ideas put forth by Markus and Kitayama. An individualist mindset, associated with many Western countries, puts the individual or self above the group. These individuals value and have personal independence. Collectivists, on the other hand, associated with many Eastern countries, have strong social ties and a sense of belonging to their group. Collectivists are more likely to agree that they are willing to sacrifice their own self-interests for the well-being of the group and that their happiness depends largely on the happiness of those around them. Individualists are more likely to agree that they often do their own thing and that whatever happens to them is their own doing, emphasizing the responsibility for personal well-being (Lu et al., 2021).

To illustrate the prevalence of individualist vs. collectivist cultures, in collectivist cultures, it's more normal to see families of multiple generations living together. In the United States, a record-breaking 64 million Americans live in multi-generational households, including sizeable immigrant collectivist populations. Asian and Hispanic populations, many of which are considered collectivist countries, are rapidly increasing in the US. Asians and Hispanics are more likely than whites to live in a multi-generational household, with approximately 29% of Asians and 27% of Hispanics doing so (Cohn & Passel, 2018). This sense of belonging and community from collectivist beliefs, carried over into the United States, include taking care of edlery and putting others' interests before theirs, such as potentially sacrificing personal health, commitments, or time to help out. Research suggests that collectivists are more likely to care for elderly family members as a means to strengthen family ties whereas individualists are more

likely to limit caregiving and use formal social services as a means of support (Pyke & Bengtson, 1996).

This individualist and collectivist mindset can be used to understand how individual and group rights and responsibilities influenced behavior during the pandemic. For example, individual rights include the personal freedom of choosing whether or not to wear a mask and take the vaccine. To further illustrate, an individualist is more likely to say that they don't want to wear a mask because it's uncomfortable whereas a collectivist is more likely to agree that discomfort is not a valid excuse for going against group norms. Individual responsibility entails taking care of one's health, through social distancing and wearing a mask. For instance, an individual wearing a mask for their personal health and not contracting COVID.

Group rights mean that being part of a collective gives access to specific privileges: a right to health care and access to masks and vaccines. Being a member of a group also implies specific behavior expectations. This can include taking the vaccine and following policies such as travel restrictions, quarantine, social distancing, mask mandates, to prevent others from possibly contracting the virus. These important distinctions highlight the different reasons individuals give in mask behavior, with individualists more likely to put themselves before the group and collectivists prioritizing group needs.

### **Cultural Norms**

Even before policies for stopping the spread of the virus were implemented, Taiwan and many other Eastern countries had a norm for wearing surgical masks when experiencing the common cold or similar viruses to protect others and for taking care of the elderly or groups that were at higher risk (Jennings, 2021). So during a pandemic, it seemed normal if not obvious to be wearing masks in public places, on public transportation, and walking around. This mindset and behavior echoes a collectivist mindset present in many Eastern cultures.

For Americans, on the other hand, the preventative measures seemed unusual and unprecedented, since they've never experienced a global health crisis to this scale before. Consequently, the pandemic was an anxiety-provoking experience with changes in daily routine, with economic, financial, and health threats, as well as immense uncertainty: lots of unknowns from long-term COVID-19 effects, how to deal with variants, and confusing guidance on preventative measures from government officials and agencies. As a result, the link between

behavior and curbing COVID-19 transmission might not have been as straightforward for Americans as it was for the Taiwanese based on different experiences and how the pandemic was handled. Along with the diverse backgrounds of its citizens, the United States found itself divided. As policies such as mask mandates and isolation requirements slowly rolled in, some Americans refused to follow these rules.

### **Collectivism Predicts Mask-Wearing**

It has been well established that masks are an effective way to slow the transmission of COVID-19. Studies have also shown that there is a negative correlation between mask wearing and infection rates. As stated earlier, a USC study reported an approximate 50% mask noncompliance rate in the United States and reports of noncompliance in Taiwan predict an approximate 0.02% noncompliance rate (Key, 2021; Zheng, 2021; Hong, T. & Lü, Z., 2021). Furthermore, studies have also shown that collectivism is positively correlated with mask-wearing. This holds true not only to illustrate the Taiwan vs. United States distinction, but also amongst many individualist and collectivist countries. Countries that scored higher on a reverse-coded scale of Hofstede's individualism index (represented as a collectivism scale) such as the Philippines, Indonesia, and Thailand, had higher mask compliance rates than individualist countries that scored lower on the scale such as Sweden, The Netherlands, and Finland. These results are after controlling for other factors (e.g., political affiliation and government stringency) (Lu et al., 2021).

This is true not only when comparing the United States to other countries but stays consistent in the United States, with people in more collectivist regions (states and counties) more likely to wear a mask. For instance, states such as New Jersey, California, and Maryland scored higher on the state-level collectivism scale sourced from Vandello and Cohen (1999) and in mask compliance compared to states such as Arizona, Ohio, and Wisconsin, which scored lower on both the state-level collectivism scale and in mask compliance (Lu et al., 2021). Masks can create physical inconvenience and be uncomfortable. As said earlier, one study found that 64% of Americans that report not wearing a mask responded, "It is my right as an American to not wear a mask" or "It is uncomfortable." (Vargas & Sanchez, 2020). These actions follow an individualist mindset of protecting personal choice and freedom, but disregard that their

actions can affect others (Stewart, 2020). Conversely, collectivists are more willing to put aside their personal inconvenience for the collective welfare and well-being (Biddlestone et al., 2020). As mentioned previously, there is a \$100-500 USD fine for not complying with mask mandates in Taiwan, along with limited reports of noncompliance (Ministry of Health and Welfare, n.d.; Ministry of Health and Welfare, n.d.). In collectivist cultures, the rules are more strict, with hefty consequences for non compliance, because the norm is an expectation to follow the policies implemented. In individualist cultures, on the other hand, the mandates are less strict and more complex and ambiguous because individualists are less likely to comply with rules that sacrifice personal freedom for the well-being and welfare of others. Cultural and personal beliefs can influence how rules are put into place and how people respond.

Additionally, in the US, there is a large divide between democrats and republicans based on their political ideology. Republicans can be seen as more individualist because they value personal freedom and limited government interference in daily personal matters whereas democrats can be seen as more collectivist because they value greater government intervention in economics affairs and a balance between orderly society and liberty. When looking at the difference between mask compliance in democrats and republicans, a striking difference is revealed. Democratically leaning Americans, aligned with collectivist values, have a higher mask-compliance rate than republican leaning counterparts, aligned with more individualist values, have a lower rate of mask compliance (Xu & Cheng, 2020).

To conclude, it is crucial to note that lower mask compliance rates in the United States is not because of Americans being defiant against preventative behaviors, but because of contrasting belief systems and pandemic unpredictability. These findings do not suggest that Americans are associated with various personality traits but instead shed light on the distinct cultural norms affecting behavior.

### **Psychological Factors**

Psychological factors, supported by an individualist and collectivist mindset, can also influence mask wearing behavior. The first factor is the idea of personal surveillance. Collectivists are more likely to agree that groups can intrude on an individual's privacy, especially if it's for the greater good, since collectivists are more likely to sacrifice their personal freedom for the collective (Bellman et al., 2004). Individualist cultures are more likely to put

themselves before the collective to protect their personal freedom, a value that the nation was founded on. This can be seen through the reactions that Americans had towards tracking devices. Before the pandemic, tech companies shared consumer location data with the government to make it easier to track the location of Americans. According to results from a survey in December 2020 conducted on American adults, 42% of the men who responded and 52% of women who responded were very uncomfortable with this (Johnson, 2020). During the pandemic, other companies, such as Google and Apple, used consumer data to track potential exposure to COVID-19. Over 60% of US adults found this COVID-19 exposure tracking tool to be very or somewhat concerning for their privacy (Johnson, 2020).

In South Korea, a collectivist country, government surveillance and tracking has been implemented even before the pandemic. For example, the government has access to credit and bank transaction records to prevent fraud. This system was then repurposed during the pandemic to track where people went, from restaurants to subways. Additionally, because 95% of adults own a smartphone, data location, which was originally used in criminal investigations, is now used for contact tracing. Surveillance footage utilized for investigative purposes and can now provide real time, to the minute, tracking of someone's location. Koreans can also get sent text messages for outbreak updates. The use of South Korea's established government surveillance network made it easier to ensure public health safety. Even though there was some talk about privacy concerns, there are limited reports on noncompliance, emphasizing the collectivist tendency to allow personal surveillance for public health purposes (Fendos, 2020).

### **Risk Attitude**

Risk attitude is another psychological factor that affects mask wearing and can be explained through the individualist vs. collectivist mindset. Recent studies show that risk aversion, defined as less likely to engage in risky behaviors, was correlated with compliance to engage in protective behaviors during the pandemic. This was not only true in a pandemic setting but in general, with individuals that have higher levels of risk aversion less likely to smoke or engage in heavy drinking. (Xu & Cheng, 2021).

During a study conducted on Italians, results revealed that emerging adults were more concerned with their relatives and other individuals/community members contracting COVID-19, potentially through them being an asymptomatic carrier, than testing positive for

COVID-19 themselves. This collectivist mindset was correlated with a higher perceived risk of infection (Germani et al., 2020). This perceived risk was positively associated with engaging in protective behaviors such as mask wearing and social distancing, a US study found (Duong et al., 2021).

Mask-wearing behavior has similarly been observed and studied in many Asian countries, including Taiwan's long-standing cultural norm of wearing surgical masks when experiencing symptoms, such as a sore throat and runny nose, as a means to protect others, mentioned earlier (Jennings, 2021). The collectivist mindset and risk perception associated with mask-wearing in different regions can help to support the reasoning behind the Taiwanese mask compliance. Additionally, as said earlier, amongst the Americans that report not wearing masks, 64% of those Americans said that they didn't wear a mask because it was uncomfortable or that it's their right as an American to choose not to wear a mask (Vargas & Sanchez, 2020). An individualist mindset provides reason for these attitudes and behaviors present in some individuals.

### **Sensitivity Towards Social Norms**

The Taiwanese have strong responsiveness to social norms. There is a sense of pressure for wearing masks in subways and public areas. The community will also shame those for non-compliance. For instance, this mentality towards social norms is epitomized in what one Taiwanese said in a CNBC article, "We have this phrase in Taiwan that roughly translates to, 'This is your country, and it's up to you to save it'" (Farr, 2020). The government policies also add to this, with hefty fines, up to \$500, for non-compliance (Ministry of Health and Welfare, n.d.; Ministry of Health and Welfare, n.d.).

These distinctions can again be supported by an individualist vs. collectivist mindset, in terms of emotional reactions. For example, one study conducted by Matsumoto, Kudoh, Scherer, and Wallbott (1988) found that Americans and Japanese experienced similar emotional reactions but Americans experienced emotions longer, with greater intensity and more bodily symptoms such as verbal reactions, lumps in the throat, breath changes. To conclude the study, more Japanese agreed that acting on these events when coping with these emotional situations was unnecessary, showing a weaker association between emotion and behavior (Scherer, Matsumoto, Wallbot, & Kudoh, 1988). The findings can be expanded out and offer an explanation to how individualists vs. collectivists in the US and Taiwan behaved in mask compliance. The

Taiwanese held each other accountable and were less likely to act on their emotions if they didn't fully agree/want to wear a mask. Americans were more likely to act and go against these mandates, as can be seen through countless protests across many states, even if they had felt similar levels of emotion towards masks as some Taiwanese did.

One of the possible explanations for this is that many of the emotions experienced are ego-focused emotions, meaning they mainly concern the individual's internal attributes or characteristics. Some examples include anger, frustration, and pride. Therefore, it is logical that individualists are more likely to attend to and act on these emotions than collectivists are, say if they feel their personal freedom is being violated, because these ego-focused emotions are at the heart of an independent self (Markus & Kitayama, 1991). Through the exploration of how psychological factors influenced mask compliance, the prevalence of an individualist vs. collectivist mindset underscores the application to attitudes and behaviors.

### **Differences in Diversity Among Populations**

The United States has great diversity with Americans having their own distinct identity, from various demographics, gender, race, ethnicity, and social groups. The United States is rapidly becoming more complex, with data estimates from the US Census Bureau showing that nearly 4 of 10 Americans identify with a race or ethnic group other than white (Frey, 2020; US Census Bureau, 2021). Some Americans then form subgroups with those of similar demographic identities, and base social behavior off of their beliefs and backgrounds.

One way of measuring ethnic diversity is based on an analysis of ethnic fractionalization, the probability that two random individuals from the same country are not from the same group (race, ethnicity, or other criteria). This can be done through Fearon's analysis in which ethnic fractionalization is on a scale from 0 to 1, with 1 being the most ethnically diverse. When comparing the numbers on Fearon's analysis, the United States is 0.49 and Taiwan is 0.274 (Alesina et al., 2002; Fisher, 2019).

Diversity is a descriptive factor in the individualist vs. collectivist mindset, with individualism associated with more heterogeneous cultures and collectivism associated with more homogeneous cultures. This diversity in mindset can explain why some states have higher mask compliance rates, as mentioned in the "Collectivism Predicts Mask Wearing" section (Lu et al., 2021).

From a racial perspective, in a study conducted by USC, the group that was least likely to consistently wear a mask when in close contact with non-household members were whites, with a compliance rate of 46%. Compared to whites, other races including latinos, blacks, and others had higher compliance rates with 63%, 67%, and 65%, respectively (Key, 2021). Diversity in all demographics, from race, locale, and ethnicity, had significant contributions the way individualists and collectivists engaged in mask wearing. This emphasizes the dynamic intricacies of various societies in which no single factor can predict mask wearing.

## **Conclusion**

Culture is an important factor in behavior that has intrigued me as someone who is mixed and spends time with those of various ethnicities, races, and social groups. When the pandemic hit, I spoke to many family and friends that had completely different views on how the virus affected them and what appropriate measures they believed should be taken. At times it was overwhelming and I sought to understand if there was an underlying cultural factor at the root of different attitudes and behaviors. I found that my relatives in Taiwan had one of the most striking contrasts compared to my relatives in the United States in the way they viewed how the government and our societies should be responding.

Since the onset of the pandemic, the infection and mortality rates have been significantly higher in the United States: the US infection rate is about 200 times that of Taiwan and the US mortality rate is about 60 times that of Taiwan (Ritchie et al., 2020). I chose mask wearing as my control factor because it is a universal way to lower the rate of transmission. From talking with my family and friends, I observed that mask-wearing was one of the most heavily debated topics.

The mask compliance rates are significantly higher in Taiwan than in the United States. Through my literature search, I found multiple demographic, cultural, and psychological factors, influenced by an individualist vs. collectivist mindset, that predicted mask wearing. Taiwan's proximal distance to SARS in 2003 resulted in public health regulations that gave public health agencies access to patient medical and travel records for contact tracing and testing. Along with this, Eastern countries have norms for wearing masks to protect others. Race, locale, and political ideology was associated with mask wearing. Psychological factors involving higher risk attitude, sensitivity to social norms, and personal surveillance compliance were affected by a collectivist mindset. As a caveat, individualism tends to be correlated with Western countries but there is still

a large percentage of Americans that do not associate with an individualist mindset. This results in greater diversity within the United States and Americans having differing views of cultural beliefs. Further, Taiwan's cultural norms and policy preparedness proved to be significant in

At the heart of a collectivist is having compassion and taking in another perspective by wearing a mask to protect others. On the other hand, a reason individualists are not complying with mask mandates is not because of pure defiance but because they have a different belief system. For instance, for some individualists, it may be harder to conceptualize that they're part of a collective and that their individual behavior is affecting the group.

These findings are important because it provides insights into how people react to governmental health regulations during times of uncertainty. Neither individualists nor collectivists are "better" than the other. There are specific attributes of each that may better serve during specific circumstances, such as a global health crisis, but I am not stereotyping individualists or collectivists with specific personality traits. I am not here to convince anyone to change their belief system but in global health crises it may be useful to adopt more collectivist actions while also taking steps to protect themselves. This can be achieved without taking away key components of identity and protecting personal values. One big question is how can we get people to comply without making them change their belief systems?

This paper explores the reasons behind noncompliance, so we can get insight into how to frame compliance requests for individualists and collectivists in different manners with the goal of showing that mask-wearing benefits the health of the public. For collectivists, explaining how mask-wearing benefits the group. Ironically, individualists that are not complying with mask mandates are presenting potential health risks to themselves and the group; these individuals are more likely valuing personal freedom over health. When framing compliance requests for individualists, it may help to emphasize that wearing masks acts in their own interests as well as establish the link between individual behavior and group health. These changes in reframing requests appeal to the individualist and collectivist belief systems while respecting personal values.

It is also important to note that extreme collectivism and extreme individualism can also harm self-interest. To further illustrate, extreme collectivism is primarily not taking into account individual needs and extreme individualism is solely focused on personal desires. Neither of

these extremes act in one's best interest because it fails to take into account other perspectives and people.

To conclude, in everyday experiences, it's good to find some common ground. That way different perspectives can be acknowledged to create a more informed and dynamic view of the world. Sometimes it's better to be an individual, sometimes it's better to be a collectivist. In general, it's hard to change belief systems to adopt other views but being able to empathize and understand why people are the way they are is beneficial not only in a pandemic, but in daily life.

## Work Cited

- Alesina, A.F., Easterly, W., Devleeschauwer, A., Kurlat, S., & Wacziarg, R.T. Fractionalization (June 2002). <http://dx.doi.org/10.2139/ssrn.319762>
- Bellman, S., Johnson, E., Kobrin, S. J., & Lohse, G. L. (2004). "International Differences in Information Privacy Concerns: A Global Survey of Consumers." *Information Society* 20, no. 5: 313-24. <https://www8.gsb.columbia.edu/researcharchive/articles/1172>
- Biddlestone, M., Green, R., & Douglas, K. M. (2020). Cultural orientation, power, belief in conspiracy theories, and intentions to reduce the spread of COVID-19. *The British journal of social psychology*, 59(3), 663–673. <https://doi.org/10.1111/bjso.12397>
- Cohn, D. V., & Passel, J. S. (2018, April 5). Record 64 million Americans live in multigenerational households. Pew Research Center. <https://www.pewresearch.org/fact-tank/2018/04/05/a-record-64-million-americans-live-in-multigenerational-households/>
- Center for Systems Science and Engineering at Johns Hopkins University. COVID-19: Novel Coronavirus (COVID-19) cases. GitHub. <https://github.com/CSSEGISandData/COVID-19>
- Duong, H. T., Nguyen, H. T., McFarlane, S. J., & Van Nguyen, L. T. V. (2021) Risk perception and COVID-19 preventive behaviors: application of the integrative model of behavioral prediction, *The Social Science Journal*, DOI: 10.1080/03623319.2021.1874176
- Farr, C. & Gao, M. (2020, July 16). How Taiwan beat the coronavirus. CNBC. <https://www.cnbc.com/2020/07/15/how-taiwan-beat-the-coronavirus.html>
- Fendos, J. (2020, April 30). How surveillance technology powered South Korea's COVID-19 response. Brookings. <https://www.brookings.edu/techstream/how-surveillance-technology-powered-south-korea-as-covid-19-response/>
- Fisher, M. (2019, April 29). A revealing map of the world's most and least ethnically diverse countries. *The Washington Post*. <https://www.washingtonpost.com/news/worldviews/wp/2013/05/16/a-revealing-map-of-the-worlds-most-and-least-ethnically-diverse-countries/>
- Frey, W. H. (2020, July 16). The nation is diversifying even faster than predicted, according to new census data. Brookings.

<https://www.brookings.edu/research/new-census-data-shows-the-nation-is-diversifying-even-faster-than-predicted/>

- Germani, A., Buratta, L., Delvecchio, E., & Mazzeschi, C. (2020). Emerging Adults and COVID-19: The Role of Individualism-Collectivism on Perceived Risks and Psychological Maladjustment. *International Journal of Environmental Research and Public Health*, 17(10), 3497. doi: 10.3390/ijerph17103497
- Hong, T. & Lü, Z. (2021, July 18). 3級防疫違規！台中開罰千萬元 未戴口罩最多 [COVID-19 Level 3 Prevention Violation! Taichung City Issued the Most Face-Mask Non Compliance Fines in the Country] Yahoo! News.  
<https://tw.news.yahoo.com/3%E7%B4%9A%E9%98%B2%E7%96%AB%E9%81%95%E8%A6%8F-%E5%8F%B0%E4%B8%AD%E9%96%8B%E7%BD%B0%E5%8D%83%E8%90%AC%E5%85%83-%E6%9C%AA%E6%88%B4%E5%8F%A3%E7%BD%A9%E6%9C%80%E5%A4%9A-120511534.html>
- Jennings, R. (2021, September 2). Not just coronavirus: Asians have worn face masks for decades. VOA.  
<https://www.voanews.com/science-health/coronavirus-outbreak/not-just-coronavirus-asians-have-worn-face-masks-decades>
- Jorden, M.A., Rudman, S.L., et al. (2020, June 5). Evidence for Limited Early Spread of COVID-19 Within the United States, January–February 2020. *MMWR Morbidity and Mortality Weekly Report* 2020;69:680–684. DOI:  
<http://dx.doi.org/10.15585/mmwr.mm6922e1>
- Johnson, J. (2021, January 25). U.S. concern on coronavirus exposure tracing tool 2020. Statista.  
<https://www.statista.com/statistics/1116302/us-adults-concern-coronavirus-exposure-tracing-tool/>
- Keisler-Starkey & Bunch. (2020, September 15). “Health Insurance Coverage in the United States: 2019.” The United States Census Bureau.  
<https://www.census.gov/library/publications/2020/demo/p60-271.html>
- Key, J. (2021, January 21). Half of U.S. Adults Don't Wear Masks When in Close Contact with Non-Household Members. USC Dornsife.  
<https://dornsife.usc.edu/news/stories/3388/understanding-coronavirus-in-america-mask-use-among-us-adults/>

- Lewis, T. (2021, March 11). How the U.S. Pandemic response went Wrong—and What Went Right—during a Year of COVID. *Scientific American*.  
<https://www.scientificamerican.com/article/how-the-u-s-pandemic-response-went-wrong-and-what-went-right-during-a-year-of-covid/>
- Lu, J. G., Jin, P., English, A. S. (2018). Collectivism predicts mask use during COVID-19. *Proceedings of the National Academy of Sciences*. Jun 2021, 118 (23) e2021793118; DOI: 10.1073/pnas.2021793118
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98(2), 224–253.  
<https://doi.org/10.1037/0033-295X.98.2.224>
- Ministry of Health and Welfare. (2020). 嚴重特殊傳染性肺炎防治及紓困振興特別條例 [Special Regulations for the Prevention and Relief of Severe Special Infectious Pneumonia]. Laws and Regulation Database of the Republic of China. Retrieved October 3, 2021 from <https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=L0050039>
- Ministry of Health and Welfare. (n.d.). 傳染病防治法 [Article 37 of the Infectious Disease Prevention and Control Act]. Laws & Regulations Database of the Republic of China. Retrieved October 3, 2021, from <https://law.moj.gov.tw/LawClass/LawSingle.aspx?pcode=L0050001&flno=37>
- Ministry of Health and Welfare. (n.d.). 傳染病防治法§70-全國法規資料庫 [Article 70 of the Infectious Disease Prevention and Control Act]. Laws & Regulations Database of the Republic of China. Retrieved October 3, 2021, from <https://law.moj.gov.tw/LawClass/LawSingle.aspx?pcode=L0050001&flno=70>
- Molteni, M. (2020, July 2). How masks went from don't-wear to must-have during the coronavirus pandemic. *Wired*.  
<https://www.wired.com/story/how-masks-went-from-dont-wear-to-must-have/?sa=D&scrybrkr=08bed2e4>
- Ng, T., Cheng, H., Chang, H., Liu, C., Yang, C., Jian, S., Liu, D., ... Lin, H. (2020, January 1). “Effects of Case- and Population-Based Covid-19 Interventions in Taiwan.” medRxiv. Cold Spring Harbor Laboratory Press.  
<https://www.medrxiv.org/content/10.1101/2020.08.17.20176255v1>

- Pyke, K. D., & Bengtson, V. L. (1996). Caring More or Less: Individualistic and Collectivist Systems of Family Eldercare. *Journal of Marriage and Family*, 58(2), 379–392.  
<https://doi.org/10.2307/353503>
- Price, Sterling (2021, March 5). “Average Cost of Health Insurance (2021).” ValuePenguin. ValuePenguin, <https://www.valuepenguin.com/average-cost-of-health-insurance>
- Ritchie, H., Mathieu, E., Rodés-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., ... Roser, M. (2020, March 5). Taiwan: Coronavirus pandemic country profile. Our World in Data. <https://ourworldindata.org/coronavirus/country/taiwan#citation>
- Scherer, K. R., Matsumoto, D., Wallbott, H. G., & Kudoh, T. (1988). Emotional experience in cultural context: A comparison between Europe, Japan, and the United States. In K. R. Scherer (Ed.), *Facets of emotion: Recent research* (pp. 5–30). Lawrence Erlbaum Associates, Inc. <https://psycnet.apa.org/record/1988-97860-001>
- Stewart, E. (2020, August 7). Anti-maskers explain themselves. Vox. <https://www.vox.com/the-goods/2020/8/7/21357400/anti-mask-protest-rallies-donald-trump-covid-19>
- Summers, J., Baker, M. G., Wilson, N., Kvalsvig, A., Barnard, L. T., Lin, H., & Cheng, H. (2020, October 21). “Potential Lessons from the Taiwan and New Zealand Health Responses to the COVID-19 Pandemic.” *The Lancet Regional Health Western Pacific*. Elsevier Ltd. [https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065\(20\)30044-4/fulltext](https://www.thelancet.com/journals/lanwpc/article/PIIS2666-6065(20)30044-4/fulltext)
- Taiwan Centers for Disease Control. (2020). Prevention and control of COVID-19 in Taiwan. 衛生福利部疾病管制署 [Taiwan Centers for Disease Control]. Retrieved October 3, 2021, from [https://www.cdc.gov.tw/en/category/page/0vq8rsAob\\_9HCi5GQ5jH1Q](https://www.cdc.gov.tw/en/category/page/0vq8rsAob_9HCi5GQ5jH1Q).
- Temple-Raston, D. (2020, November 6). CDC report: Officials Knew Coronavirus test was flawed but released it anyway. NPR. <https://www.npr.org/2020/11/06/929078678/cdc-report-officials-knew-coronavirus-test-was-flawed-but-released-it-anyway>
- US Census Bureau. (2021, April 20). National population by characteristics: 2010-2019. The United States Census Bureau. <https://www.census.gov/data/tables/time-series/demo/pepopt/2010s-national-detail.html>
- Vargas, E. & Sanchez, G. (2020). American individualism is an obstacle to wider mask wearing in the US. Brookings.

- <https://www.brookings.edu/blog/up-front/2020/08/31/american-individualism-is-an-obstacle-to-wider-mask-wearing-in-the-us/>
- Vox. (2021, July 6). How Taiwan Held Off Covid-19, Until it Didn't. [Video]. Youtube.  
<https://www.youtube.com/watch?v=0fhaEIIgux4>
- Wang, C.J., Ng, C.Y., Brook, R.H. (2020, March 3). Response to COVID-19 in Taiwan: Big Data Analytics, New Technology, and Proactive Testing. *JAMA*. 2020;323(14):1341–1342.  
doi:10.1001/jama.2020.3151
- World Health Organization. (2020). Shortage of personal protective equipment endangering health workers worldwide. World Health Organization.  
<https://www.who.int/news/item/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide>
- World Health Organization (2020). WHO coronavirus (COVID-19) Dashboard. World Health Organization. Retrieved October 3, 2021 from <https://covid19.who.int/>
- Xu, P., & Cheng, J. (2020, August 14). Individual Differences in Social Distancing and Mask-Wearing in the Pandemic of COVID-19: The Role of Need for Cognition, Self-control, and Risk Attitude. <https://doi.org/10.31234/osf.io/5k4ve>
- Zheng, T. (2021, May 20). 沒戴口罩就開罰 高雄一天半開出604張罰單: 要聞. [Kaohsiung City Government Issued 604 Fines in 1.5 Days for Not Wearing a Mask]. 今日新聞 [NOW News]. <https://www.nownews.com/news/5272963>

## **Examining Gene Editing Treatment Methods for Down Syndrome and Their Ethical Implications by Aran Viswanath**

### **Abstract**

Is there a cure for Down Syndrome? Is a cure possible? Is gene editing ethical? These questions will be explored in this review paper. Genome editing is a relatively new scientific field involving the modification of the DNA in living organisms. Although gene editing is a controversial subject due to current methods having a lack of success and the potential unethical uses, it can be used for the benefit of society. This paper reviews different methods including XIST chromosome silencing and CRISPR-Cas9. This paper also looks at the ethical concerns stemming from the potential application of these treatment methods. Because there haven't been any in vivo human trials, most of the experiments reviewed in this article will take place in cell colonies or mice. Further trials will need to be completed in order for more definite data and results to be gathered.

Keywords: Genome editing, Down Syndrome, DNA, organisms, cell colonies, XIST, CRISPR-Cas9.

## **Introduction**

600 live births in the United States carry the genetic disorder, Down Syndrome (DS). The most common cause, the triplication of chromosome 21, accounts for 95% of all DS cases. Normally during meiosis, the chromosomes split into two separate chromatids and move towards opposite poles for anaphase, the phase in which cells divide. In DS patients, chromosome 21 does not split during anaphase, producing a haploid cell with 24 chromosomes rather than the normal 23. Because there is an extra chromosome, more DNA is being transcribed, therefore an excess of chromosome 21 specific proteins are produced, causing the symptoms seen in DS. Symptoms include cognitive disabilities, congenital heart disease, and early onset Alzheimer's Disease (AD). Although DS was identified over 150 years ago, there has been little progress towards a cure, as there are many practical and ethical problems related to this topic. This review paper will discuss current genetic editing treatment methods for DS and the ethical implications relating to them.

## **Results**

### *Genetic silencing with XIST*

One potential therapy for Down Syndrome is to inactivate the extra chromosome 21. If successful, this method would prevent the extra chromosome from producing the excess proteins that cause the Symptoms of Down Syndrome. Chromosome inactivation is a method that occurs naturally in females. Females have the sex chromosome pair XX, while males have XY. The normal dosage, or the number of X-chromosome copies in a genome for mammals is one. To avoid complications involving overexpression, one of the female X-chromosomes must be inactivated. This is done through X-inactive specific transcript (XIST). One of the female X-chromosomes contains DNA coding for XIST. When transcribed, the XIST condenses the chromosome, turning it into heterochromatin. Because the chromosome is condensed, transcription factors are unable to attach to the promoter regions of genes, thus silencing the transcription of the allele.

This method was applied in a human-induced pluripotent stem (iPS) cell line derived from a male DS patient. The strategy was to inactivate the third chromosome 21 in each cell by inserting DNA that codes for XIST ( XIST cDNA) into the DYRK1A locus. Zinc finger nucleases (ZFN) are enzymes used to cut the chromosome and insert the XIST gene. Once

inserted, XIST RNA would be produced, inactivating the extra chromosome 21. To analyze the results, DNA fluorescence in situ hybridization (DNA-FISH), a method that binds fluorescent probes with their targeted cDNA in a chromosome was used to highlight the region of chromosome 21 in which the XIST gene was inserted. In the experiment, the researchers found the efficiency of inserting the DNA coding for XIST to be 46-47%, and of the 245 successful colonies, 98.5% contained XIST at the targeted DYRK1A locus.

To measure the efficacy rate of chromosome-wide silencing due to this insertion, five DS related alleles, APP, ITSN1, USP25, CXADR, and COL18A1, were tested through DNA-FISH analysis. The fluorescent probes targeted the transcription foci of those alleles to determine their presence in the chromosome. The APP allele was assayed in two different clones, both showing approximately 70% silencing five days after the XIST insertion and approximately 100% silencing after 20 days. The other alleles were tested with and without doxycycline (dox), a medication that activates XIST. In the presence of dox, the cells silenced the remaining four alleles with approximately 95% efficiency. When the chromosome as a whole was tested, there was approximately a 19% reduction in the overall transcription.( Jiang1 , et al, 2013)

#### *Genetic deletion using CRISPR-Cas9*

Another method is to use the CRISPR-Cas9 system to delete the third copy of chromosome 21. CRISPR-Cas9 uses single guide RNAs (sgRNA) to guide the Cas nuclease to the cleavage site, where the protein makes a cut in the DNA. This induces cuts which eliminate the chromosome.

This method was tested in mouse embryonic stem cells (mESC) and human induced pluripotent stem cells (iPS cells) containing human chromosome 21 (hc21). The mESC contained one hc21 chromosome and was tested in both a control where no cuts were made, and an experimental condition where two cuts were made at specific loci on the chromosome. Using Fluorescence-activated cell sorting (FACS), researchers were able to sort the cells with active hc21 from cells with a deleted hc21. The results of this method were approximately 1.7% elimination in the control group and about 7% elimination in the experimental conditions. The human iPS cells derived from Down Syndrome patients were also assayed using DNA-FISH. However, the success rate was higher, with approximately 15% elimination of the chromosome.

### *Ethical concerns involving gene editing treatment for Down Syndrome*

One important question that needs to be asked is whether treatment for DS is necessary. In one survey given to 532 parents of people with DS, the results showed that parents tended to look at DS as a positive force rather than a burden. These parents were also informed about five hypothetical treatments, and were asked to say “yes” or “no” in response. The first treatment was prenatal physical intervention. The second involved chromosome silencing through prenatal injections. The third method involved heart surgery after birth. The fourth hypothetical was a pill that could aid cognitive ability but may change personality. And the final scenario involved vaccinating adults to prevent AD. All hypothetical scenarios received majority approval. The most supported option was heart surgery after birth with a 94.5% approval rate, while the least supported one was chromosome silencing. This indicated that parents tended to be in favor of lessening physical health conditions, but did not want to change their child’s personality (Michie, Allyse, 2018). Some parents, however, acknowledged that they might have made a different decision during pregnancy.

Another important topic to consider is genetic diversity. Many people with DS continue to lead happy lives, and many parents do not believe that their child with DS needs to be “cured”. One parent said “Children with Trisomy 21 are not broken so they don’t need science to fix them.” (Michie, Allyse, 2018). This quote exemplifies that having a disorder does not make someone less human or “broken”. In fact, other characteristics of DS patients include openness and affection. These traits are seen by many parents of people with DS as positive forces, and as an example of genetic diversity.

In a congressional hearing regarding additional federal funding for DS research, Frank Stephens, a man with Down Syndrome, said “I completely understand that the people pushing this particular ‘final solution’ are saying that people like me should not exist. That view is deeply prejudiced by an outdated idea of life with Down Syndrome...Let's be America, not Iceland or Denmark. Let's pursue answers, not "final solutions." Let's make our goal to be Alzheimer's free, not Down Syndrome free.” (Friedersdorf, 2017). In summary, Stephens is saying that as a society we shouldn’t get rid of people with DS, but instead fund more research in developing treatments for the mental and physical health symptoms related to DS

Eugenics, meaning “good birth” is a belief that argues against genetic diversity. Eugenicists believe that the human race can evolve through the understanding of genetics. However, there have been many unethical practices of this belief, including selective breeding programs and exterminations conducted by the Nazi party and the laws mandating sterilization of people with intellectual disabilities in the United States. Although the elimination of genetic disorders from society would be beneficial, the history of malpractice involving human control of the gene pool must also be taken into consideration.(Goering, 2014).

### **Treatment of Specific Symptoms**

One possible way to circumvent these ethical concerns is by following Frank Stephens’ words and becoming Alzheimer’s free rather than DS free. Not only does Alzheimer’s have to be cured, but other symptoms that This method allows for certain features of DS such as personality to be maintained, but health conditions such as early onset Alzheimer’s disease (AD) and heart defects could be cured. This could increase the lifespan and/or the quality of life as a DS patient ages.

Amyloid precursor protein (APP) is a protein found in the cell membranes of various cells including neural precursor cells (NPCs). This protein is cleaved by either  $\alpha$ -secretase or  $\beta$ -secretase, respectively releasing either  $\alpha$ APP $\alpha$  or  $\alpha$ APP $\beta$  into the extracellular region. The remaining peptide in the membrane is further cleaved by  $\gamma$ -secretase to release Amyloid precursor protein intracellular domain (AICD) into the nucleus. AICD binds to the PTCH1 receptor, enhancing the expression of the PTCH1 gene. PTCH1 inhibits the Sonic Hedgehog (SHH) pathway, leading to neurogenesis reduction. Because neurogenesis, the production of new nerve cells, is reduced, resulting in intellectual disabilities relating to DS.

One method, silencing the transcription of the PTCH1 allele, was tested in a Ts65Dn mouse model and showed promising results. However it is unfeasible in vivo. An alternative solution is to inhibit  $\gamma$ -secretase, thus reducing AICD formation. ELND006, a selective inhibitor of  $\gamma$ -secretase, was used to treat mice containing DS. After experimenting with dosages of this inhibitor, the researchers found 20mg/kg of ELND006 to be safe and effective for the mice.(Guidi, et al., 2017).

Congenital heart disease is another common symptom of Down Syndrome and is found in 40% of DS births. Depending on the infant’s condition they may need to get surgery for their

heart. The conditions which cause this heart disease are Patent Ductus Arteriosus (PDA), Ventricular Septal Defect (VSD), Partial Atrioventricular Septal Defect (PAVSD) and Common Atrioventricular Septal Defect (CAVSD). However, with current technology these can be treated through surgery. In fact all conditions have 96 -99% success rates in terms of their surgery procedures (wood, 2015).

## **Discussion**

Gene editing is still a relatively new field with a plethora of opportunities to explore, and these methods are still far from being used as a treatment for humans. Using gene editing to cure Down Syndrome has only shown potential, but not the proper assurance needed to perform gene editing on humans. More research needs to be done in this field to reach a viable efficacy rate for human trials.

In addition to more research being done, people should have conversations with each other and discuss this topic. Gene editing is a very controversial topic and goes against many beliefs, but could be used for good, for example reducing the intellectual disability involved with the triplicated APP gene. Treating symptoms individually is a great way to circumvent those concerns, by only treating the harmful elements of DS.

It is also very important to remember that one life is more valuable than another. Having a genetic disorder doesn't make a person less human. We must get input from more DS patients in order to hear their side about living with DS and their quality of life. Understanding other's opinions on the topic will lower the tension between beliefs. In the previously mentioned survey, many parents said that they wouldn't change a thing about their children with DS. This choice may be very different however while the mother is pregnant. If the parents only talk to a doctor, they don't see the whole picture of having a child with Down Syndrome.

## **Conclusion**

This paper reviewed multiple articles on the ethicality of gene editing and its treatment methods. The statistics showed that parents who had children with DS tended to see it as a positive force. In addition the chromosome silencing and deletion methods have below 20% efficacy rates, so humans aren't close to a gene editing cure for DS, nevertheless progress and new understanding is taking place, so a cure for DS in a couple decades is very feasible.

## Work Cited

- Akutsu, Silvia Natsuko, et al. "Applications of Genome Editing Technology in Research on Chromosome Aneuploidy Disorders." *Cells*, vol. 9, no. 1, 2020, p. 239. [Database Name], <https://doi.org/10.3390/cells9010239>.
- "Down Syndrome and Heart Surgery." 17 Mar. 2015, [frontline-ireland.com/syndrome-heart-surgery/](http://frontline-ireland.com/syndrome-heart-surgery/)
- Friedersdorf, Conor. "I Am a Man with Down Syndrome and My Life Is worth Living." *The Atlantic*, [www.theatlantic.com/politics/archive/2017/10/i-am-a-man-with-down-syndrome-and-my-life-is-worth-living/544325/](http://www.theatlantic.com/politics/archive/2017/10/i-am-a-man-with-down-syndrome-and-my-life-is-worth-living/544325/). Accessed 9 Nov. 2021.
- Goering, Sara. "Eugenics." *Stanford Encyclopedia of Philosophy*, 2 July 2014, [plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=eugenics](http://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=eugenics). Accessed 11 Nov. 2021.
- Guidi, Sandra, et al. "Targeting App/aicd in down Syndrome." *Oncotarget*, vol. 8, no. 31, 2017, pp.50333-34. [Database Name], <https://doi.org/10.18632/oncotarget.18860>.
- Jiang, Jun, et al. "Translating Dosage Compensation to Trisomy 21." *Nature*, vol. 500, no. 7462, 2013, pp. 296-300. [Database Name], <https://doi.org/10.1038/nature12394>.
- Li, Li b., et al. "Trisomy Correction in down Syndrome Induced Pluripotent Stem Cells." *Cell StemCell*, vol. 11, no. 5, 2012, pp. 615-19. [Database Name], <https://doi.org/10.1016/j.stem.2012.08.004>.
- Michie, M., & Allyse, M. (2019). Gene modification therapies: views of parents of people with syndrome. *Genetics in medicine : official journal of the American College of Medical Genetics*, 21(2), 487–492. <https://doi.org/10.1038/s41436-018-0077-6>
- Rondal, Jean A. "From the Lab to the People: Major Challenges in the Biological Treatment of downSyndrome." *AIMS Neuroscience*, vol. 8, no. 2, 2021, pp. 284-94. [Database Name], <https://doi.org/0.3934/Neuroscience.2021015>.

**Nei-Juan: Investigating Potential Inequality In Parent-Child Educational Expectations by  
Peter Liu**

**Abstract**

As Chinese society undergoes rapid changes and becomes more competitive, parents are increasingly attentive to their children's education. Teenagers are put under higher levels of stress than ever. This paper examines the relationship between parents' views and students' views on academic stress and parent-child communication. The study collected self-report questionnaire data from 38 dyads of students (between ages 12-18) and their parents. The students and parents reported on Educational Stress Scale for Adolescents, Perceived Stress Scale, and Parent-Child Communication Scale. Students reported through self-reflection, and parents reported under the perception of their children. After data collection, the data were analyzed using paired sample t-tests to compare students' educational stress level, daily stress level, and parent-child communication between students and parents.

Keywords: Competition, Academic Stress, Chinese adolescents, Parents-child relationship

## Introduction

Parents' and children's different expectations on children's academic experience has recently become a source of stress for young students. Usually, parents have a high expectation of their children and have much faith in them; however, young students who personally navigate the educational experience may sometimes have different opinions from their parents. The students can think that parents' expectation is unattainable or very hard to achieve. Nevertheless, due to the fear of letting their parents down, students often work excessively to reach their parents' expectations. Over time, a vicious cycle may be formed. Every time students reach an academic target (e.g., A grade on an exam), parents will have an even higher expectation and set a higher target (e.g., A+ grade on the next exam), and then, the burden on students becomes heavier and heavier. Students end up spending more and more time reaching the academic target set by parents till they feel entirely exhausted or collapsed, either mentally or physically. According to a national survey from China Youth Social Service Center, 66.7% of adolescents considered academic pressure as the most significant stress in life. Academic-related factors, such as underachievement, pressure from transitional examinations, and study workload are associated with poor mental health among Chinese adolescents (Li & Zhang,; Liu & Tein; Zhang, Tao, & Zeng). Among all these factors, parents' expectation plays a key role. If students do not reach a target set by their parents, the failure will be considered an underachievement, and sometimes students are punished by their parents, either verbally or physically. Even if students reach their parents' expectations, they also have to face the pressure from their teachers and classmates because their teachers' expectations of them often increase as higher achievements are obtained.

Nei-Juan is a Chinese network buzzword developed in 2021, but the phenomenon of this proper noun has long existed. Basically, Nei-Juan is when the internal competition becomes overly intense while the resources are still limited, essentially leading to the decline of returns of efforts. In other words, under the circumstance of Nei-Juan, people have to put more effort to attain something that would originally require much less effort. This proper noun was first used for the rat race of Chinese high school students, but parents are also experiencing Nei-Juan within their own group. Unlike students who personally compete for academic achievements, parents compare their children's academic achievements among themselves. It is not unusual to see parents show off how good their children are in the parents' meetings or in WeChat groups

(i.e., social media circles created by parents). In order to be able to feel proud and/or tell other parents that their children are better off, some parents will impose some unreasonable expectations on their children, leading to excessive pressure on students.

My interest and experience inspire the current study. I saw many examples in my school and the people around me, such as the one described above: Parents have high expectations while their children suffer from this, leading to anxieties, depressions, self-abasement, etc. This study compares parents' and students' perception of academic stress and parent-child communication.

## **Methods**

This study consists of two questionnaire surveys targeted at specific groups of people. One is for students mostly in high school and the other is for parents. The questionnaire contains three different sets of surveys with good reliability and validity: Educational Stress Scale for Adolescents (ESSA) for examining the current teenagers' education stress level, Perceived Stress Scale (PSS) for examining their own perception of their stress level and Parent-Child Communication Scale (PCC) for examining parent-child relationship. Parents and students received a different version of the questionnaire so that it is clear that parents responded based on their perception of their children, and students responded according to self-reflection.

## **Participant**

There are totally 111 students (ages 12-18) in the sample. 39.14% of them are in high school, Grade 11; 80.18% of the students are from the first-tier cities in China; and 39.64% of them are male. There are 49 parents (ages 20-60) participating in the survey. 65.31% of them are aged between 41 and 50; and 34.69% of them are male. Among the students and parents who completed the questionnaires, 38 parent-student pairs came from one family. Data contributed by the 38 dyads were analyzed in the current study.

## **Procedure**

All surveys were conducted online with a link and a QR code attached to the questionnaires on the social media platform WeChat. There is detailed instruction with the purpose to guide on how to fill out the questionnaires. There is also a brief introduction on the questionnaires to ensure that participants understand how and what they should do.

## **Measures**

The ESSA contains 30 items derived from an extensive review of both the English and Chinese literature and discussions with professionals in both public health and education in China. ESSA (Sun et al.) Six domains of stress consisting of five items each were predefined, including attitudes toward study and grades (such as “I am very dissatisfied with my academic grades”), perceived pressure (such as “I feel a lot of pressure in my daily studying”), perceived burden (such as “I feel that there is too much schoolwork”), expectations from others (such as “I feel that I have disappointed my parents when my test/exam results are poor”), and self-expectation (such as “I feel stressed when I do not live up to my own standards”). For each of the responses, there is a 5-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree with each higher score feedbacked indicating greater stress on academic level. Though comparing parents and children’s feedback, we can easily see the differences in the understanding of academic stress of children between these two groups.

## **Parent-Child Communication**

PCC contains the following four items: “How often do you talk to your parents about what’s on your mind?”; “How often do you ask your parents for advice?”; “How often do you tell your parents your secrets?” and “If you had a problem, would you be able to talk to your parents about it?” (Pokhrel et al.) There is also a 5-point scale ranging from 1 = Never to 5 = Very often. A comparison of parents and children’s questionnaire will also present to show whether there is a different view on the level of parent-child communication.

## **Perceived Stress Scale**

PSS is a classic stress assessment instrument contains 10 items which ask about participants feelings and thoughts during the last month. (Kanter Agliata and Renk) In each case, participant will be asked to indicate how often they felt or thought a certain way. For each of the responses, there is a 5-point scale ranging from 1 = Never to 5 = Very often with each higher score feedbacked indicating greater stress in daily life. The results of parents and children will be compared to see whether there is a difference on the understanding of children’s perceived stress between the two groups.

## Data Analysis

Bivariate correlations were calculated between all the variables. Paired sample t-tests were used to compare responses between students' and parents' dyads. Analysis was conducted using SPSS for Mac 26.0.

## Results

Bivariate correlation shows students' ESSA has a positive relationship with their PSS ( $r = .426, p = .008$ ), parents' ESSA has a positive relationship their PSS ( $r = .558, p = .000$ ), and parents' PCC has a positive relationship with students' PCC ( $r = .355, p = .029$ ) and a negative relationship with parents' ESSA ( $r = -.374, p = .021$ ). Interestingly, students' PCC is not significantly correlated with any of the perceived stress measures. See Table 1 for bivariate correlation between all the variables.

Three paired-sample t-tests were conducted to compare parents' perception of their children and children's own perception of their academic stress and parent-child communication. The first paired-sample t-test was conducted to compare parents' and students' ESSA scores. Parents' ESSA scores ( $M = 3.0872, SD = .61$ ) and students' ESSA scores ( $M = 3.22, SD = .63$ ) were not statistically significantly different ( $t(37) = 1.06, p = .029, 95\% CI = [-.12, .38]$ ). The second paired-sample t-test was conducted to compare parents' and students' PSS scores. Parents' PSS scores ( $M = 3.10, SD = .43$ ) and students' PSS score ( $M = 3.24, SD = .39$ ) were not statistically significantly different ( $t(37) = 1.71, p = .096, 95\% CI = [-.03, .31]$ ). The third paired-sample t-test was conducted to compare parents' and students' PCC scores. Parents' PCC scores ( $M = 3.32, SD = .70$ ) were stronger than students' PCC scores ( $M = 2.97, SD = .73$ ) at a statistically significant level ( $t(37) = -2.60, p = .013, 95\% CI = [-.61, -.76]$ ).

## Discussion

The results from the questionnaires and the comparison between the data of parents and students are fascinating. Students' and parents' perception of their communication quality are associated. When parents perceive high-quality communication with their children, children tend to perceive good communication with their parents as well. Nevertheless, though the relationship is positive, there is a gap between the scores of parents and students. While parents attain an

average score of 3.32, children only reach 2.97, which shows that the difference between parents' and students' perception of communication quality does exist. Parents are more willing to believe that their children prefer to talk to them about everything while, in fact, children are less willing. I think this phenomenon itself is a kind of embodiment of the lack of parent-child communication. Obviously, there is also a lack of understanding between the two groups of people. Parents overestimate how much their children trust them, while children do not expect their parents to think in this way. This is what will happen when a communication failure exists. If the two groups of people understand each other very well, I should expect the final result to be the same, or at least a bit closer which shows smaller variation. Communication is the key to understanding. For example, if you meet a stranger on the street, would you be able to recognize his or her name, his or her hobbies, or anything else? Of course, it is impossible. In order to know him or her better, the only and the most effective way is to talk to him/her directly, making a friend or communicate with him/her. An alternative solution could be to talk to somebody who knows him/her, but communication is required. Without communication, it would be in no way that parents and children can know each other better, and therefore it is impossible to alleviate the inequality existing among parent-child expectation. There seems to be another vicious cycle as well: without communication, parents and children could never understand each other better, and without this understanding, the inequality existing among parent-child expectation could only aggravate. Perhaps the best way to mitigate this problem is to demonstrate all the data and results directly to the public, bringing the phenomenon onto the table, and letting people notice how significant this issue is. Once people notice how critical the problem is and will be, they may then start to remedy their behaviors.

Besides, it's noticeable that most children chose "sometimes" in the Parent-Child Communication Scale. It proves that children instead of indicating they "seldom" or "frequently" talk to their parents tend to pick the middle option, which makes them feel better, and that is why they chose "sometimes", and it is the same with parents. These are just some random thoughts, but it is difficult for us to know what participants thought when they did the survey.

Furthermore, there manifests a strong association between the self-perceived stress and the academic stress of students. Parents' perception of their children's perceived stress and their academic stress is strongly associated as well. The data sets seem to be relatively normal since we all know that academic stress plays a significant role in our perceived stress. However, what

surprises me is that parents' correlation within these two factors are stronger than students', which means that compared with students, parents are more likely to consider academic stress as a primary source for students. Can we analyze this data in this way: parents are more inclined towards believing that most stress facing their children comes from the academic level, which shows their great concern about their children's academic performance. However, with more attention paid to help their children tackle academic stress, namely, playing the role of a catalyzer in alleviating their children's study pressure, they are less likely to perceive stress from other sources, such as children's interpersonal relationships in school. The misjudge or the neglect of other sources of stress could further increase the misunderstanding between the two groups and could eventually lead to a collapse of the relationship.

However, there are also some limitations for this study. Firstly, the paired-sample size is far from enough. Thirty-eight samples are not representative enough to reflect the actual situation in society, and this is why we do not get a significance below 0.5 for the comparison between the ESSA questionnaire for students and parents and the PSS questionnaire for students and parents. One of the causes is the design of the questionnaires. We first thought that using a verification code to connect the two questionnaires would be a great idea, but it turned out to be below our expectation. Some people failed to follow our instructions in the questionnaires, which made it difficult to pair up the samples; this is a major cause of the loss of valid samples. Besides, we noticed that such a complicated process would influence participants' willingness to do the questionnaires. When they noticed they needed to create a verification code and hand it to their parents or children, they would simply quit. This can be directly reflected in the sample size of the students' questionnaire (110) and the parents' questionnaire (49). Also, the process of translating the questionnaires into Chinese could be more elaborated in order to reduce possible misunderstanding of the questions and thus increase the validity of the questionnaires.

Nevertheless, the survey reveals some major problems, or potential inequality existing among parent-child educational expectation, which can be considered a significant success for such a small sample size.

### Work Cited

- Abouserie, Reda. "Sources and Levels of Stress in Relation to Locus of Control and Self Esteem in University Students." *Educational Psychology*, vol. 14, no. 3, 1994, pp. 323–330., <https://doi.org/10.1080/0144341940140306>.
- Ang, Rebecca P., and Vivien S. Huan. "Academic Expectations Stress Inventory." *Educational and Psychological Measurement*, vol. 66, no. 3, 2006, pp. 522–539., <https://doi.org/10.1177/0013164405282461>.
- Ang, Rebecca P., and Vivien S. Huan. "Relationship between Academic Stress and Suicidal Ideation: Testing for Depression as a Mediator Using Multiple Regression." *Child Psychiatry and Human Development*, vol. 37, no. 2, 2006, pp. 133–143., <https://doi.org/10.1007/s10578-006-0023-8>.
- Chui, Wing Hong, and Mathew Y. Wong. "Avoiding Disappointment or Fulfilling Expectation: A Study of Gender, Academic Achievement, and Family Functioning among Hong Kong Adolescents." *Journal of Child and Family Studies*, vol. 26, no. 1, 2016, pp. 48–56., <https://doi.org/10.1007/s10826-016-0550-2>.
- Pokhrel, Pallav, et al. "Effects of Parental Monitoring, Parent–Child Communication, and Parents' Expectation of the Child's Acculturation on the Substance Use Behaviors of Urban, Hispanic Adolescents." *Journal of Ethnicity in Substance Abuse*, vol. 7, no. 2, 2008, pp. 200–213., <https://doi.org/10.1080/15332640802055665>.
- Sun, Jiandong, et al. "Educational Stress Scale for Adolescents." *Journal of Psychoeducational Assessment*, vol. 29, no. 6, 2011, pp. 534–546., <https://doi.org/10.1177/0734282910394976>.
- Kanter Agliata, Allison, and Kimberly Renk. "College Students' Affective Distress: The Role of Expectation Discrepancies and Communication." *Journal of Child and Family Studies*, vol. 18, no. 4, 2008, pp. 396–411., <https://doi.org/10.1007/s10826-008-9244-8>.
- Cohen, Sheldon, et al. "Perceived Stress Scale." *PsycTESTS Dataset*, 1983, <https://doi.org/10.1037/t02889-000>.

Cheung, Cecilia S., and Catherine. McBride-Chang. "Relations of Perceived Maternal Parenting Style, Practices, and Learning Motivation to Academic Competence in Chinese Children." *Merrill-Palmer Quarterly*, vol. 54, no. 1, 2008, pp. 1–22., <https://doi.org/10.1353/mpq.2008.0011>.

Costigan, Catherine L., et al. "Living up to Expectations: The Strengths and Challenges Experienced by Chinese Canadian Students." *Canadian Journal of School Psychology*, vol. 25, no. 3, 2010, pp. 223–245., <https://doi.org/10.1177/0829573510368941>.

# **Adaptive Study of CAPM in Chinese Stock Market Consider Pandemic Factor by Ning Ding**

## **Abstract**

Regarding the pandemic as a structural break happened in 2020, this study tested the adaption of CAPM before and after the pandemic by collecting three different data sets over three different time intervals before and after the pandemic. The study uses regression analysis to determine the accuracy of the CAPM with 20 Chinese stocks. The study proves that the CAPM has a high adaptability in the Chinese stock market if the environmental factor is stable in the short-term, while in the long-term, the consequences of the pandemic lead to statistical error which impact the accuracy of the CAPM.

*Key words:* pricing, CAPM, Chinese stocks, financial economics, regression analysis

## **Introduction**

The Capital Asset Pricing Model (CAPM) is a model used for estimating the prices of assets. This model defines the relationship between risks and returns of assets. However, the CAPM model has several limitations which may restrain its applicability to stock markets in China's economy. In this paper, the CAPM model was tested by checking the estimated results of a market portfolio containing 20 stocks from the SSE (Shanghai Stock Exchange) Composite Index. Given that a global pandemic happened in 2020, the influences of the pandemic on Chinese stocks and the accuracy of the CAPM are also considered in this paper.

This study includes three different time intervals: one year of pre-pandemic data (June 2018 – June 2019), one year of pandemic data (June 2020 – June 2021), and all three years of data (June 2018 – June 2021). The results from the study show that the CAPM model is applicable and can produce accurate results in asset pricing in the Chinese stock market.

## **The CAPM Model**

The capital asset pricing model (CAPM) is a financial model developed by William Sharpe, Jack Treynor, John Lintner, and Jan Mossin in the early 1960s. According to the CAPM model, the expected return to stock depends on a measure of risk known as beta; this reflects the degree to which the stock returns are correlated with all other assets in the economy.<sup>1</sup> The CAPM model is based on several important assumptions which are:

1. All investors in the market have identical expectations on expected returns, variance and covariance on all assets.
2. All investors intend to optimize their profit and will choose to invest on the efficient frontier.
3. Investors may borrow or lend unlimited amounts at the risk-free rate of interest, and there is no restriction on sale of any assets.
4. There are no taxes or transaction costs.

---

<sup>1</sup> Wang, Fan (2013). A Test of CAPM in China's Stock Market. St. Mary's University, Halifax, Nova Scotia.

5. Investors cannot not affect the prices of assets with their trades.
6. All investors have an identical investment horizon<sup>2</sup> (Wang, 2013, p. 1).

With these assumptions, the relationship between the risk and return of financial assets can be simplified and a linear relationship between risk and return of financial assets can be achieved.

According to the CAPM model, the expected return of an asset follows the equation:

$$E(r_i) = r_f + \beta_i[E(r_M) - r_f]$$

$r_f$ : risk-free rate of return

$\beta_i$ : the beta value of an asset

$E(r_i)$ : the expected return of an asset

$E(r_M)$ : the expected return to the market portfolio

From the CAPM equation, there are two parts of the expected return of an asset: the risk-free rate and the extra return which is compensation for bearing the risk of the stock, known as a “risk premium.”  $\beta$  represents a stock’s sensitivity to the market portfolio,<sup>3</sup> it is defined as:

$$\beta_i = \frac{Cov(r_i, r_M)}{Var(r_M)}$$

$Cov(r_i, r_M)$  represents the covariance between the excess returns to the specific stock with the whole market portfolio.

$Var(r_M)$  represents the variance of the excess returns to the market portfolio, which measures the risk associated with the return of the market portfolio.

The market portfolio is a collection of all assets in the economy weighted by their market capitalization. For American stocks, the Standard and Poor’s 500 is often used as a proxy for the market portfolio. For this study of Chinese stocks, the SSE (Shanghai Stock Exchange)

---

<sup>2</sup> Wang, Fan (2013). A Test of CAPM in China’s Stock Market. St. Mary’s University, Halifax, Nova Scotia.

<sup>3</sup> Wei-qun, L. I. (2005). Sample Analysis of CAPM Model in Chinese Capital Market. Journal of Xi’an United University, 4.

Composite Index is used.<sup>4</sup>

### **Empirical study of CAPM**

This study was conducted in three parts: three years of daily returns were used of which roughly half occurred before the pandemic and half during the pandemic. The three sets of data that were used to test the CAPM were:

First Period: one year of pandemic data (June 2020 – June 2021)

Second Period: one year of pre-pandemic data (June 2018 – June 2019)

Third Period: all three years (June 2018 – June 2021)

### **Risk-Free Rate ( $r_f$ )**

The risk-free rate of a stock market is the rate of return of an investment with no risk of experiencing financial loss. In this study, the risk-free rate for the Chinese stock market is the China 10-Year Government Bond Yield (Ticker: AMBMKRM-10Y.)<sup>5</sup>. In this paper, the risk-free rate is the average rate of return from daily China 10-Year Government Bond Yield. Repeated the same sentence twice

### **Market Portfolio**

For the market portfolio, SSE Composite Index (0.00001.SS) is used.<sup>6</sup> The expected rate of return for the market portfolio is calculated as:

$E(r_M) = (\text{current adjusted closing price} - \text{yesterday's adjusted closing price}) / \text{yesterday's adjusted closing price}$

---

<sup>4</sup> Fama, E. F., & French, K. R. (2004). The capital asset pricing model: Theory and evidence. *Journal of economic perspectives*, 18(3), 25-46.

<sup>5</sup> Fusion Media Limited, "China 10-Year Yield Bond", historical data.

<https://www.investing.com/rates-bonds/china-10-year-bond-yield-historical-data>

<sup>6</sup>

For a single asset, the expected rate of return is presented as:

$$E(r_i) = (\text{current adjusted closing price} - \text{yesterday's adjusted closing price}) / \text{yesterday's adjusted closing price}$$

The stocks used in the study and their betas are given in the following table, including the stock code and name for the 20 representative stocks that are randomly chosen from SSE, and their beta in each period:

**Table 1**

Stock Code	Name	Beta		
		First Period (6/22/2020-6/21/2021)	Second Period (6/22/2018-6/24/2019)	Third Period (6/22/2018-6/21/2021)
601857.SS	Petro-China Co.	0.49	0.60	0.59
600028.SS	China Petroleum & Chemical Corp.	0.47	0.73	0.60
601628.SS	China Life Insurance Co.	1.83	1.27	1.42
600519.SS	Kweichow Moutai Co.	1.13	1.04	1.04
600104.SS	SAIC Motor Corp.	0.90	0.86	0.97
000858.SZ	Wuliangye Yibin Co.	1.42	1.45	1.40
002594.SZ	BYD	1.62	1.03	1.27

600018.SS	Shanghai International Port Group	0.76	0.96	0.93
600150.SS	China CSSC Holdings	0.83	0.97	0.92
600100.SS	Tsinghuatongfang Co	0.82	0.95	1.04
600585.SS	Anhui Conch Cement Company	0.85	1.10	1.01
000157.SZ	Zoomlion Heavy Industry Science and Technology Co	1.51	0.93	1.18
000338.SZ	Weichai Power Co.	1.18	1.49	1.26
002202.SZ	Xinjiang Goldwind Science & Technology Co	1.29	0.96	1.38
600089.SS	TEBIAN ELECTRIC APPARATUS	1.31	0.78	1.07
600857.SS	Ningbo Zhongbai Co.	0.35	1.23	0.65
600048.SS	Poly Developments and Holdings Group Co	0.81	1.10	1.03
600208.SS	XINHU ZHONGBAO CO.	0.97	1.10	1.12

600500.SS	Sinochem International Corp.	0.76	1.19	1.06
600690.SS	Haier Smart Home	1.25	1.04	1.22

## Results

The following tables represent the regression results for the three time periods:

### First Period (6/22/2020-6/21/2021)

Table 2

Results of regression of CAPM from the Period 1 (6/22/2020-6/21/2021)

Regression Statistics	
Multiple R	0.930301076
R Square	0.865460092
Adjusted R Square	0.864899509
Standard Error	0.004525662
Observations	242

					Significance
	df	SS	MS	F	F
Regression	1	0.031620697	0.031620697	1543.857326	1.6018E-106
Residual	240	0.004915588	2.04816E-05		

Total 241 0.036536286

	Standard			
	Coefficients	Error	t Stat	P-value
Intercept	0.000493874	0.000291483	1.694349666	0.09149604
Market Portfolio (X)	1.02796939	0.026162341	39.29194988	1.6018E-10

**Second Period (6/22/2018-6/24/2019)**

Table 3

Results of regression of CAPM from Period 2 (6/22/2018-6/24/2019)

Regression Statistics	
Multiple R	0.959080607
R Square	0.919835611
Adjusted R Square	0.919501593
Standard Error	0.004359056
Observations	242

	df	SS	MS	F	Significance F
Regression	1	0.052326894	0.052326894	2753.848071	1.6112E-133
Residual	240	0.004560329	1.90014E-05		

Total            241            0.056887223

---

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.000511134	0.000280237	1.823935761	0.06940536
Market Portfolio (X)	1.044636951	0.019906522	52.4771195	1.6112E-133

---

**Third Period (6/22/2018-6/21/2021)**

Table 4

Results of regression of CAPM from Period 3 (6/22/2018-6/21/2021)

---

Regression Statistics	
Multiple R	0.950552809
R Square	0.903550642
Adjusted R Square	0.90341724
Standard Error	0.004218051
Observations	725

---



---

	df	SS	MS	F	Significance F
Regression	1	0.120507768	0.12050777	6773.161871	0
Residual	723	0.012863581	0.000017792		

---

Total            724    0.133371349

---

	Coefficients	Standard Error	t Stat	P-value
Intercept	0.000370909	0.000156691	2.36713702	0.018188731
Market				
Portfolio (X)	1.058579674	0.012862572	82.2992216	0

---

### Analysis

For the First Period, which is a one-year interval during the pandemic, the R-Square is 0.8655, which means all the data fit well to the fitted regression line. This shows that the model explains the variability of the response data around its mean. The P-value of the intercept is 0.091496, which means the intercept coefficient (alpha) is not statistically significant at the 5% or 1% level. Therefore, it can be concluded that the intercept coefficient approaches zero, which means the CAPM model is valid in explaining the relationship between risk and return for the stocks in SSE in the First Period.<sup>7</sup>

For the Second Period, which is a pre-pandemic one-year interval, the R-Square is 0.9198 which is the strongest of the three cases. The slope coefficient ( $\beta$ ) is 1.044 and is statistically significant. The intercept coefficient (alpha) is not statistically significant at the 5% or 1% level since the P-value of the intercept is 0.069.

For the Third Period, which is the three-year interval combining both pre-pandemic data and pandemic data, the R-Square is 0.9036 and the slope coefficient ( $\beta$ ) is 1.059 and is statistically significant. However, the intercept coefficient (alpha) is statistically insignificant at the 1% level but not for the 5% level. At the 5% level of significance, the alpha is different from zero which is evidence indicating that in the three year interval, the CAPM model are is able to produce results that are accurate enough for actual use. Regarding the significant accuracy of

---

<sup>7</sup> Bajpai, S., & Sharma, A. K. (2015). An empirical testing of capital asset pricing model in India. *Procedia-Social and Behavioral Sciences*, 189, 259-265.

CAPM in the first two pre and post-pandemic data sets and the errors yielded by CAPM in the three-years interval, it can speculated that the pandemic, as a structural break, had a great impact on the overall economic environment, results in the failure of CAPM in the selected three-year data set. (1% level of significance, the alpha is not different from zero. which is supportive evidence of the CAPM model. )

## **Conclusion**

This study samples 20 stocks from SSE (Shanghai Stock Exchange) Composite Index and tests the CAPM model in three intervals: one-year interval during the pandemic, one-year pre-pandemic interval, and three-year interval spanned from June of 2018 to June of 2021. The CAPM model works well with just one year of pandemic data, and one year of pre-pandemic data, but it does not work as well with a mixture of both types of data in the three-year data set. This indicates that the pandemic acts as a “structural break” in the data, which likely accounts for the fact that the CAPM does not work as well with both types of data when they are included in the same data set. However, in each one-year data set, the statistically significant  $\beta$  and R-Square values both indicate the CAPM model can produce valid results in explaining the relationship between risk and return in the Chinese stock market.<sup>8</sup> According to the results produced by regression analysis, the parameters of the estimation model presented are statistically significant, and the correlation between risk and return of the portfolio is relatively stable and strong. Therefore, the linear relationship between risk and return of Chinese stocks indicates the fact that the CAPM model can be applied to Chinese stocks and produce valid results.

---

<sup>8</sup> Lin, J. L. (2001). The Study of CAPM in China' s Stock Market [J]. Journal of Finance, 7.

## **Acknowledgments**

My deepest gratitude goes first and foremost to Professor Alan Anderson, my supervisor, for his constant encouragement and guidance. He has walked me through all the stages of the writing of this thesis and provides me with instructive advice and useful suggestions. Without his consistent and illuminating instruction, this thesis could not have reached its present form. Second, I would like to express my heartfelt gratitude to Ms. Kim, who led me into the world of economics. Lastly, my thanks would go to my beloved family for their loving consideration and support. I also owe my sincere gratitude to my friend Ms Joy, who listened to me and helped me work out my problems during the difficult process of the thesis.

### Work Cited

- Bajpai, S and A K. Sharma. "An empirical testing of capital asset pricing models in India." *Procedia-Social and Behavioral Sciences* (2015): 259-265.
- Wang, Fan. "A Test of CAPM in China's Stock Market." St. Mary's University (2013).
- 王向荣."CAPM模型的适应性研究——基于深市A股30只房地产股票的实证分析." *中国集体经济*.20(2020):70-71. doi:CNKI:SUN:ZJTG.0.2020-20-035.
- 范世铖."基于CAPM模型在中医药行业的实证研究." *中国集体经济*.17(2021):66-68. doi:CNKI:SUN:ZJTG.0.2021-17-031.include english names of articles
- Wei-qun, L I. "Sample Analysis of CAPM Model in Chinese Capital Market." *Journal of Xi'an United University* (2005).

## **Comparative Analysis of Two Carbon Capture and Storage Techniques by Kai-Yang Hsiao**

### **Abstract**

In a time where humans live in the most complicated societies with the most advanced technologies, we also brought forward the crisis of climate change that puts the future of our entire planet in jeopardy. In the devastating cycle of the greenhouse effect, carbon dioxide repeatedly damages our atmosphere and warms our planet. However, Carbon Capture and Storage technology was developed to combat this cycle and mitigate global warming. It revolves around the process of capturing carbon in a variety of ways, specifically in this article: a geological process and direct air capture. It also includes the process of transporting and storing carbon safely. The article will analyze the main criteria that impacts the possibility of two specific CCS technology: carbon basalt mineralization and soil carbon sequestration being employed, including the method analysis, cost, and applicability comparison. The ladder of these two technologies will ultimately be chosen after evaluation of the criteria as a recommended option for assisting in combating climate change.

Keywords: Climate change; Carbon Capture and Storage; Soil Carbon Sequestration; Carbon Mineralization; Method comparison; Basalt

## **Introduction**

With the existence and rise of upcoming carbon capture and storage technology in order to combat the seemingly irreversible global warming, more innovative research has been done in recent years. Two specific cases of these methods, soil carbon sequestration and carbon basaltic mineralization, will be evaluated in this paper. The contemporary discovery of storing carbon dioxide to form solid minerals is called carbon mineralization, and its largest strength is its storage security of carbon since it has virtually no possibility of escaping through its millennia of storage (Cartier, 2020). On the other hand, soil carbon sequestration has numerous benefits by enhancing soil qualities, including storing and cycling more nutrients, reducing erosion, water filtration, all due to the improved quality of soil (Ontl & Schulte, 2012). Throughout this paper, these two CCS techniques will be analyzed regarding their method, cost in general, and the applicability with its potential and challenges. As a conclusion, one of the two methods will be selected as a personal preference.

## **Method**

A research collaboration in Iceland called Carbfix has recently started their pursuit of a new CCS method by turning carbon into rock (Cartier, 2020).

The process involves injecting captured carbon deep into basalt formations so they can create new minerals and lock the carbon underground (Cartier, 2020). The three main steps of this method are carbon capture, dissolution, and lastly mineral carbonation (Cartier, 2020).

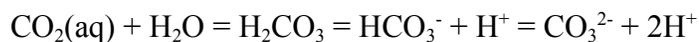
Obviously, carbon dioxide needs to be captured first. Carbfix does this by capturing carbon pollution from power plants. Tied with Hellisheiði Power Station, the third largest geothermal power plant in the world, Carbfix has little trouble acquiring carbon (Madson, 2020). However, the scale can still be increased and capture can improve in more efficient ways. This is why Carbfix are looking to cooperate with companies such as Carbon Engineering and Climeworks with their direct air capture technology (Showstack, 2019). The direct air capture system captures carbon dioxide directly from atmospheric air, and through a series of chemical reactions, turns it into captured carbon ready for use (Carbon Engineering, 2021). First, carbon dioxide will

bond with potassium hydroxide solution, yielding potassium bicarbonate salts (Carbon Engineering, 2021). Then, the concentration of carbonate salt needs to be increased using a pellet reactor (Carbon Engineering, 2021). After a series of purification and compression, carbon can be delivered in gas form (Carbon Engineering, 2021).

After obtaining carbon in captured form, it needs to be dissolved in pure water. Here, carbonic acid is created, which can be injected into aquifers to react (Matter et al., 2011). In the United States, the law requires a Class VI well for the use of carbon injection, and many requirements are set to address the buoyancy, corrosivity, and subsurface mobility of injected carbon (United States, Environmental Protection Agency).

It is due to the acid property which creates the acid-base reaction (Matter et al., 2011). This acid-base reaction is the basis for mineral carbonation, thus being the most crucial part of this CCS method (Carbon Engineering, 2021). From numerous types of porous rocks in an aquifer, basalt is the most fitting because minerals found in basalt such as serpentine, pyroxene and plagioclase contain high concentrations of calcium and magnesium which makes basalt basic (Matter et al., 2011). When carbonic acid acidifies the basalt to reach equilibrium, it dissociates and forms carbonate and bicarbonate ions (Matter et al., 2011). Through petrification, carbon is stored in pore rock space (Matter et al., 2011). This can be optimized with rock's buffering capacity or high alkalinity as they alter pH levels, thus changing chemical reaction rates (Matter et al., 2011).

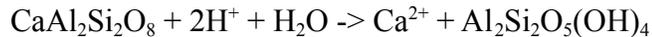
More specifically, the chemical reactions of carbon sequestration under the ground can be separated into three main parts: dissolution, carbonation and the reduction of pH from previous reactions. The injection of carbon into rocks will acidify the formation of water and dissociate, as shown below. This dissolution reaction can be affected by several factors including temperature, pressure, salinity, and buffering pH.



After the acidification, the carbonation and precipitation reactions occur. This is also where dissolved carbon dioxide may react with ions in basaltic or perioditic rocks such as calcium, magnesium, or iron.

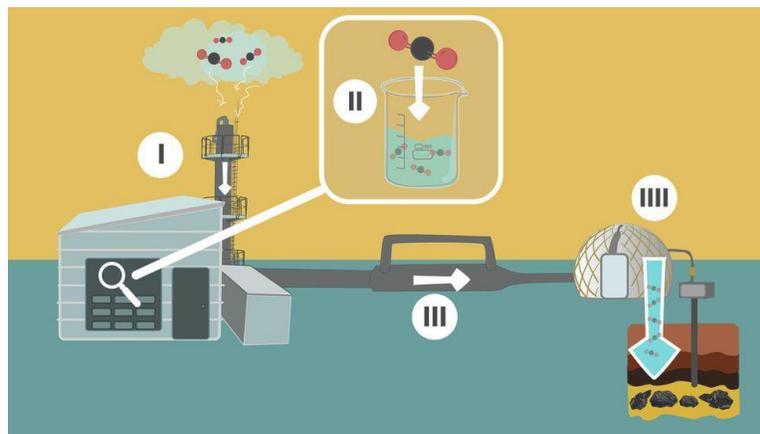


Lastly, the hydrogen ions need to be consumed and pH levels need to be neutralized. This is done through several chemical reactions, where hydrogen ions are being used as reactants in forward processes shown below. Some products of these reactions include the precipitate of carbonate minerals.



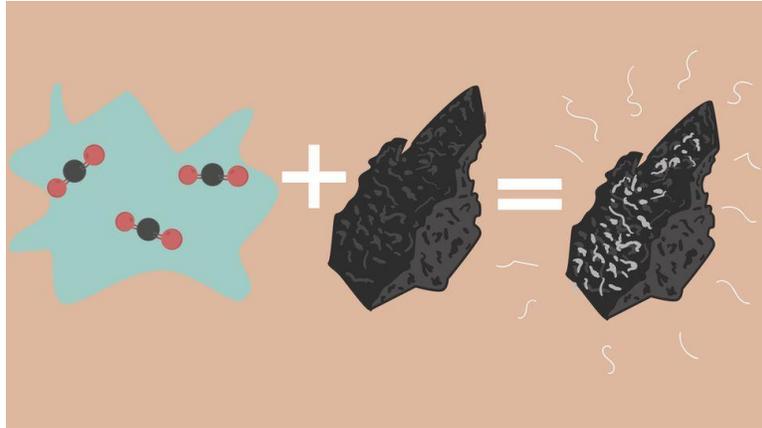
Other chemical reactions can also occur during the carbonation process, but these are the fundamental reactions for mineral carbonation *in situ*.

Whilst in storage, it takes about two years to absorb 90% of carbon based on past experiments (United States, Environmental Protection Agency). The decreased buoyancy by dissolving carbon in water increases the storage security since it won't rise up and be in contact with groundwater (Matter et al., 2011).



[Figure I. An infographic that illustrates the carbon-to-rock process. In step I, waste CO<sub>2</sub> captured from the atmosphere is sent to the gas separation station, where CO<sub>2</sub> is dissolved in pure water (step II). Then, the dissolved CO<sub>2</sub> is piped to the injection site (step III), where it's pumped underground and mineralized into rock (stepIV).

Source:<https://www.bbc.com/news/world-43789527>]



[Figure II. The dissolved CO<sub>2</sub> is pumped underground and contacts the basalt, which turn into white, chalky calcites (carbonate ions) that fill the pores of the rock.

Source: <https://www.bbc.com/news/world-43789527>]



[Figure III. The picture shows the porous basalt before injecting CO<sub>2</sub> on the left. On the right, it shows basalt with mineralized CO<sub>2</sub>, filling the pores of basalt.

Source: <https://www.bbc.com/news/world-43789527>]

### **Soil Carbon Sequestration**

Soil carbon sequestration is one of the main terrestrial approaches to decrease carbon dioxide. It is a process in which carbon dioxide is transformed and then stored in the carbon pool by ecosystem processes by plants explained later (Amundson et al., 2018). This is predominantly done through management of land, especially farmland, to

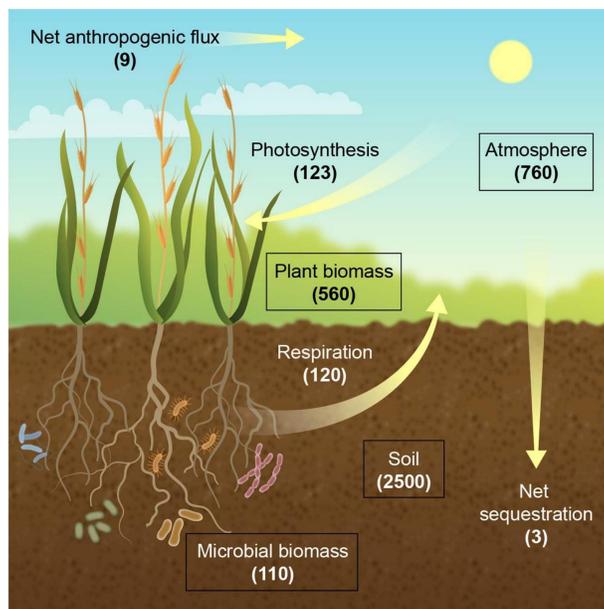
increase the carbon storage (United States, Department of Primary Industries and Regional Development).

Soil carbon storage is a vital ecosystem. Soil carbon is simply the carbon stored in soils, including both organic carbon and inorganic carbon (Ontl & Schulte, 2012). Soil carbon heavily involves the global carbon cycle, since plants play an important role in it. Inorganic carbon, mostly CO<sub>2</sub>, enters soil via carbon fixation from photosynthesis and decomposition of organic matter that makes up soil organic matter (Ontl & Schulte, 2012). Carbon input rate with photosynthesis depends on the root biomass and carbon fixation amount (Ontl & Schulte, 2012). Carbon then is respired by microbes in the rhizosphere when they feed on the root exudates, thus resulting in a loss of carbon (Pregitzer et al., 2007). However, amounts of the original carbon are retained in the soil to form humus, the organic component of soil which is present in carbon-rich soils (Pregitzer et al., 2007). Leaching and soil erosion can also lead to carbon output (Pregitzer et al., 2007). When carbon inputs (photosynthesis or carbon fixation) are larger than carbon output, the levels of carbon in soil organic matter increases. This will lead to an increase of soil organic matter, resulting in healthier soil structure, decline in erosion, improved water quality, increased food security, and ultimately lower negative impacts in ecosystems (United States, Department of Primary Industries and Regional Development).

One of the main ways of soil carbon sequestration is through improved management of farmlands with existing crops. Many practices exist within the agricultural industry that either increase carbon inputs, reduce carbon outputs, or both. Some practices include improved crop rotations, manure addition, tillage reduction or abolishment, and improved grazing of livestock (American University). All of these practices have reasonable purposes that increase soil carbon which brings numerous benefits.

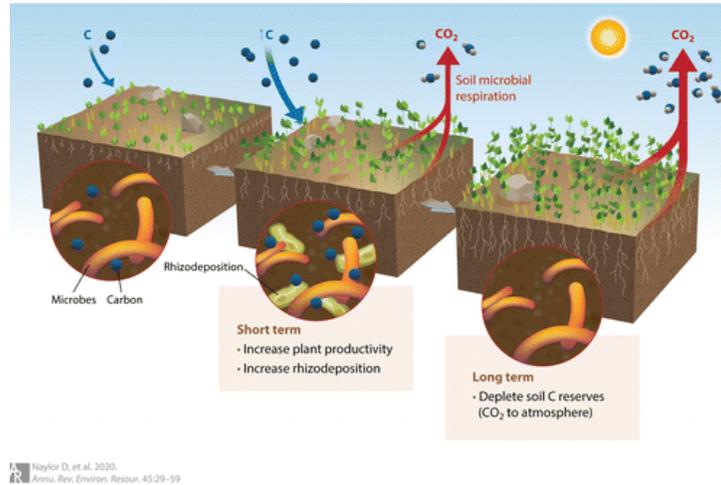
Improved crop rotations include conservation of soil moisture in dry climates, and the addition of perennial hay to crop rotations to crop rotations which both increase average annual carbon inputs from fine roots (Paustian et al., 2019). Manure or other organic matter additions improve soil physical attributes and nutrients, mainly nitrogen, availability which then increases plant productivity of carbon (Paustian et al., 2019).

Tillage, a controversial practice, brings benefits but causes fractures and disturbance of soil structure [14]. It also accelerates soil erosion and surface runoff (United States, Department of Primary Industries and Regional Development). Lastly, grazing can enhance carbon inputs by removing plant biomass since grazing lands are generally not tilled. Animal stocking rates, the amount of animals on a piece of land over a certain period of time, can have adjustments that increase carbon stocks (Paustian et al., 2019). This is usually done through intensive grazing, employing high animal stocking rates then letting the vegetation rest (Paustian et al., 2019).



[Figure IV. A carbon flow chart or cycle of carbon in the land which also displays soil carbon within one of the processes. Shows both carbon inputs and outputs.

Source: <https://www.frontiersin.org/articles/10.3389/fpls.2021.636709/full>



[Figure V. Picture that shows the process of carbon after input, and interaction with plant respiration alongside long-term carbon location or actions.

Source:

<https://www.annualreviews.org/doi/full/10.1146/annurev-environ-012320-082720>

There exists a great amount of difference between these two technologies compared to its similarities. The chemically based carbon into rock differs from soil carbon sequestration reliant on biological processes. Not only do they differ through their scientific approach to capture and store carbon, the technologies also vary. Soil carbon sequestration is a terrestrial process, and it mainly involves maintenance or modification of existing crop lands or farmlands instead of creating artificial carbonate ions in the basalt.

The main difference between these methods is the amount of interference by human technology in the natural area. For soil carbon sequestration, carbon sink is a natural and spontaneous process that does not require artificial assistance to operate. However, the assistance and maintenance of soil quality and land does improve this process, to say the least. Geological sequestration, on the other hand, doesn't require artificial assistance to occur. In fact, the injection of carbon rarely occurs naturally; thus, the success relies heavily on technological capability.

Another large difference between the two methods is the capture of carbon. Regarding soil carbon sequestration, capture relies on a natural process of plant and microbial respiration. However, carbon mineralization captures carbon and through the use of direct air capture, which relies on artificial technology. After capture, the storage

of carbon contrasts less. Both methods store carbon in a carbon pool, which has the characteristic of having less carbon output than input. This contrasting strategy results in cost, safety, and applicability differences among other factors which separate these two carbon capture technologies.

### **Cost Comparison between Soil Soil Carbon Sequestration and Mineralization**

One of the most critical factors in determining the feasibility of all carbon capture technologies and products in general is the cost. Generally, the cost of a carbon capture technology revolves around its capture, transportation, and storage costs. For capture, the separation of carbon from the atmosphere using specific technologies all have a variety of costs due to their maintenance, operation, and energy costs (Lewandrowski et al., 2004). After, the compression of carbon into a preferable pressure for transportation is also required, not to mention additional capital requirements (Lewandrowski et al., 2004). For transportation, the major factors are construction, operation, and maintenance costs (Lewandrowski et al., 2004). Within each of these contains fees such as material, labor, design, monitor, insurance, and more. Different land conditions or landscapes also vary the cost of transportation. Lastly, storage will be individually explained later.

Financially, soil carbon sequestration through management practices is able to store permanently sequestered carbon for the lowest of about ten dollars per metric ton but only up to ten million metric tons (MMT) [16]. However, the adoption of conservation tillage on US cropland has the possibility to sequester as much as 107 MMT in the 20 to 30 year span [16]. More financial costs are required though, up to 125 dollars per ton [16]. If enough farmers are willing to, a maximum of 160 MMT could be sequestered, around three percent of US greenhouse gas emissions in 2019 [16]. Previously unmentioned, afforestation is in fact a more durable soil carbon sequestration method; and in optimal conditions, it may last for many more decades [16]. Lastly, an important point to note is that costs for this carbon sequestration may exceed their value if soil is not continuous or sustainable enough for carbon storage.

As for carbon mineralization, the range varies depending on several factors: well location, reservoir depth, or general geological characteristics [17]. The total capacity for on-land basalt sequestration is from a thousand to 250 thousand gigatonnes of carbon

[18]. For each ton of carbon, basalt sequestration on land costs about twenty to thirty dollars [18]. This sequestration method is relatively cheaper than other geological sequestration such as off-shore and peridotite sequestration that includes additional heating and transportation costs [17]. Another type of cost is the energy consumption from the process. The origins of the energy required for these chemical reactions, injections, mining, waste disposal, and mine reclamation, are uncertain currently [17]. However, a large amount of costs fall to the energy consumption [18]. In the future, there are hopes to increase permeance, impact, and reduce environmental harm and costs.

### **Applicability Comparison between Soil Carbon Sequestration and Mineralization**

As interest towards carbon capture technology grows due to increasing concerns in the global climate, more and more research and studies have been dedicated to estimate the potential and applicability of these technologies. Regarding soil carbon sequestration, interest grows of its potential to be both an excellent food production and a climate mitigation device [19]. On the other hand, basaltic carbon mineralization provides a permanent and large volume of storage for carbon[20].

For carbon mineralization, the depth of injection should be at least 300 meters and yield 30 bar pressure in order for the solubility of CO<sub>2</sub> to be considerable [20]. However, CarbFix has shown its experience on land that 200 meters in depth is more than enough [20]. In offshore Iceland, the basalt plateau is formed with volcanism and the combination of mantle plume with rifting divergents [20]. In offshore Iceland, the most feasible formations for mineral storage are found in igneous crustal layers, or cooled and solidified magma that have steep velocity gradients, or the rate of change in velocity between two rock layers when a crustal layer is fixed [20]. The most obvious advantage for offshore storage, of course, is still the virtually unlimited water reservoir for the required water. Basalts on shore, on the other hand, mostly exist in the bedrock. In the US, it is estimated that the Columbia River has basalt that covers more than 164 thousand square kilometers, which would have the capacity to store over 100 gigatonnes of carbon [20]. Other conservative estimations take into consideration that CO<sub>2</sub> leakage is a possibility with more shallow wells alongside lower mineralization rate due to prior dissolution of CO<sub>2</sub> in water [20]. Also, the risk of over pressure is included for both

onshore and offshore storage [20]. Taken all into consideration, however, carbon mineralization is still a strong, viable option.

As for soil carbon sequestration, its technical potential is significant due to many variables, including the loss of pre-cultivation of soil organic carbon which may represent a large sink to reabsorb carbon with alternative land management practices [22]. In the world, most soil carbon is stored at northern latitudes, especially frozen land and northern regions [22]. As for different types of land and land use, there are five main types of carbon sinks around the world [21]. In order of most net carbon emission to the least, the carbon sinks are forestland, settlements, crop land, grassland, and wetlands [21]. The distribution of soil carbon is strongly influenced by temperature and precipitation, with lower levels where it is hotter and/or dryer [21]. Currently, North America, Eurasia, and Europe store the greatest amount of carbon on crop land [22]. North America showed the highest potential for carbon storage, with between 0.17 to 0.35 petagrams stored per year [22]. However, there exists a possibility of a lack of biomass and other inputs. In addition, there are requirements of political and socioeconomic contexts, and also significant understanding of land potential [22]. Practical implementation of soil management and farming practices do offer a strategy for a successful mitigation [22].

## **Conclusion**

Through the three criteria, we gain insights of the possibilities of the two carbon capture and storage methods being deployed. Regarding the technique, soil carbon sequestration has a method dependent on natural processes. Thus, it provides more benefits for the environment in addition to carbon capture. On the other hand, carbon mineralization is an artificial process that is ratherly forced; because it does not occur spontaneously or naturally. As for cost, soil carbon sequestration has a more attractive cost of about ten dollars per metric ton stored in simple terms while carbon mineralization ranges from twenty to thirty dollars per ton of carbon stored (on shore estimation). While carbon mineralization shows the potential of virtually permanent secured storage, it faces obstacles in well construction and maintenance, site selection, and risks of unstable maintenance. However, the biggest challenge for soil carbon sequestration is human variables, which is relatively simpler. Although carbon

mineralization shows promising potential for mitigating climate change, soil carbon sequestration takes larger leaps to solving our changing climate with appealing costs and manageable challenges.

## Work Cited

Cartier, Kimberly M. S. "Basalts Turn Carbon into Stone for Permanent Storage." *Eos*, 10 Oct. 2021,

<https://eos.org/articles/basalts-turn-carbon-into-stone-for-permanent-storage>

*Nature News*, Nature Publishing Group,

<https://www.nature.com/scitable/knowledge/library/soil-carbon-storage-84223790/>

Madson, Diana. "Researchers Turn Carbon Dioxide into Minerals " Yale Climate Connections." *Yale Climate Connections*, 31 Oct. 2020,

<https://yaleclimateconnections.org/2020/06/researchers-turn-carbon-dioxide-into-minerals/>

Showstack, Randy. "Direct Air Capture Offers Some Promise in Reducing Emissions." *Eos*, 10 Dec. 2019,

<https://eos.org/articles/direct-air-capture-offers-some-promise-in-reducing-emissions>

"Direct Air Capture Technology." *Carbon Engineering*, 1 Feb. 2021,

<https://carbonengineering.com/our-technology/>

Matter, Juerg M., et al. "The Carbfix Pilot Project—Storing Carbon Dioxide in Basalt."

*Energy Procedia*, Elsevier, 1 Apr. 2011,

<https://www.sciencedirect.com/science/article/pii/S1876610211008253>

"Class VI - Wells Used for Geologic Sequestration of CO<sub>2</sub>." EPA, Environmental Protection Agency,

<https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-co2>

Amundson, Ronald, and Léopold Biardeau. "Opinion: Soil Carbon Sequestration Is an Elusive Climate Mitigation Tool." *PNAS*, National Academy of Sciences, 13 Nov.

2018, <https://www.pnas.org/content/115/46/11652#ref-2>

“Soil Organic Carbon and Carbon Sequestration in Western Australia.” *Agriculture and Food*,  
<https://www.agric.wa.gov.au/climate-change/soil-organic-carbon-and-carbon-sequestration-western-australia>

Pregitzer, Kurt S., et al. “The Contribution of Root – Rhizosphere Interactions to Biogeochemical Cycles in a Changing World.” *The Rhizosphere*, Academic Press, 28 Sept. 2007,  
<https://www.sciencedirect.com/science/article/pii/B9780120887750500094>

“What Is Soil Organic Carbon?” *Agriculture and Food*,  
<https://www.agric.wa.gov.au/measuring-and-assessing-soils/what-soil-organic-carbon>

“Fact Sheet: Soil Carbon Sequestration.” *American University*,  
<https://www.american.edu/sis/centers/carbon-removal/fact-sheet-soil-carbon-sequestration.cfm>

Paustian, Keith, et al. “Soil C Sequestration as a Biological Negative Emission Strategy.” *Frontiers*, Frontiers, 1 Jan. 1AD,  
<https://www.frontiersin.org/articles/10.3389/fclim.2019.00008/full#T1>

Authors: Mahdi Al-Kaisi Mark Hanna Michael Tidman. “Frequent Tillage and Its Impact on Soil Quality.” *Frequent Tillage and Its Impact on Soil Quality | Integrated Crop Management*,  
<https://crops.extension.iastate.edu/encyclopedia/frequent-tillage-and-its-impact-soil-quality>

Lewandrowski, Jan, et al. “Economics of Sequestering Carbon in the U.S. Agricultural Sector.” Apr. 2004,  
[https://www.ers.usda.gov/webdocs/publications/47467/17110\\_tb1909\\_researchbrief\\_1\\_.pdf?v=0](https://www.ers.usda.gov/webdocs/publications/47467/17110_tb1909_researchbrief_1_.pdf?v=0)

Herzog, Howard, and Koen Smekens. “Cost and economic potential.”

[https://www.ipcc.ch/site/assets/uploads/2018/03/srcs\\_chapter8-1.pdf](https://www.ipcc.ch/site/assets/uploads/2018/03/srcs_chapter8-1.pdf)

Neeraj, Shashikant. “Carbon Storage by Mineral Carbonation and Industrial Applications of CO<sub>2</sub>.” *Materials Science for Energy Technologies*, Elsevier, 20 Apr. 2020,

<https://www.sciencedirect.com/science/article/pii/S2589299120300227>

Kelemen, Peter, et al. “An Overview of the Status and Challenges of CO<sub>2</sub> Storage in Minerals and Geological Formations.” *Frontiers*, Frontiers, 1 Jan. 1AD,

<https://www.frontiersin.org/articles/10.3389/fclim.2019.00009/full#h5>

Dynarski, Katherine A., et al. “Dynamic Stability of Soil Carbon: Reassessing the ‘Permanence’ of Soil Carbon Sequestration.” *Frontiers*, Frontiers, 1 Jan. 1AD,

<https://www.frontiersin.org/articles/10.3389/fenvs.2020.514701/full>

Snæbjörnsdóttir, Sandra Ó., and Sigurdur R. Gislason. “CO<sub>2</sub> Storage Potential of Basaltic Rocks Offshore Iceland.” *Energy Procedia*, Elsevier, 4 Feb. 2016,

<https://www.sciencedirect.com/science/article/pii/S1876610216000400>

Zomer, Robert J., et al. “Global Sequestration Potential of Increased Organic Carbon in Cropland Soils.” *Nature News*, Nature Publishing Group, 14 Nov. 2017,

<https://www.nature.com/articles/s41598-017-15794-8>

“Reviewing U.S. Carbon Sequestration.” *American Farm Bureau Federation - The Voice of Agriculture*, 11 Feb. 2021,

<https://www.fb.org/market-intel/reviewing-u.s.-carbon-sequestration>