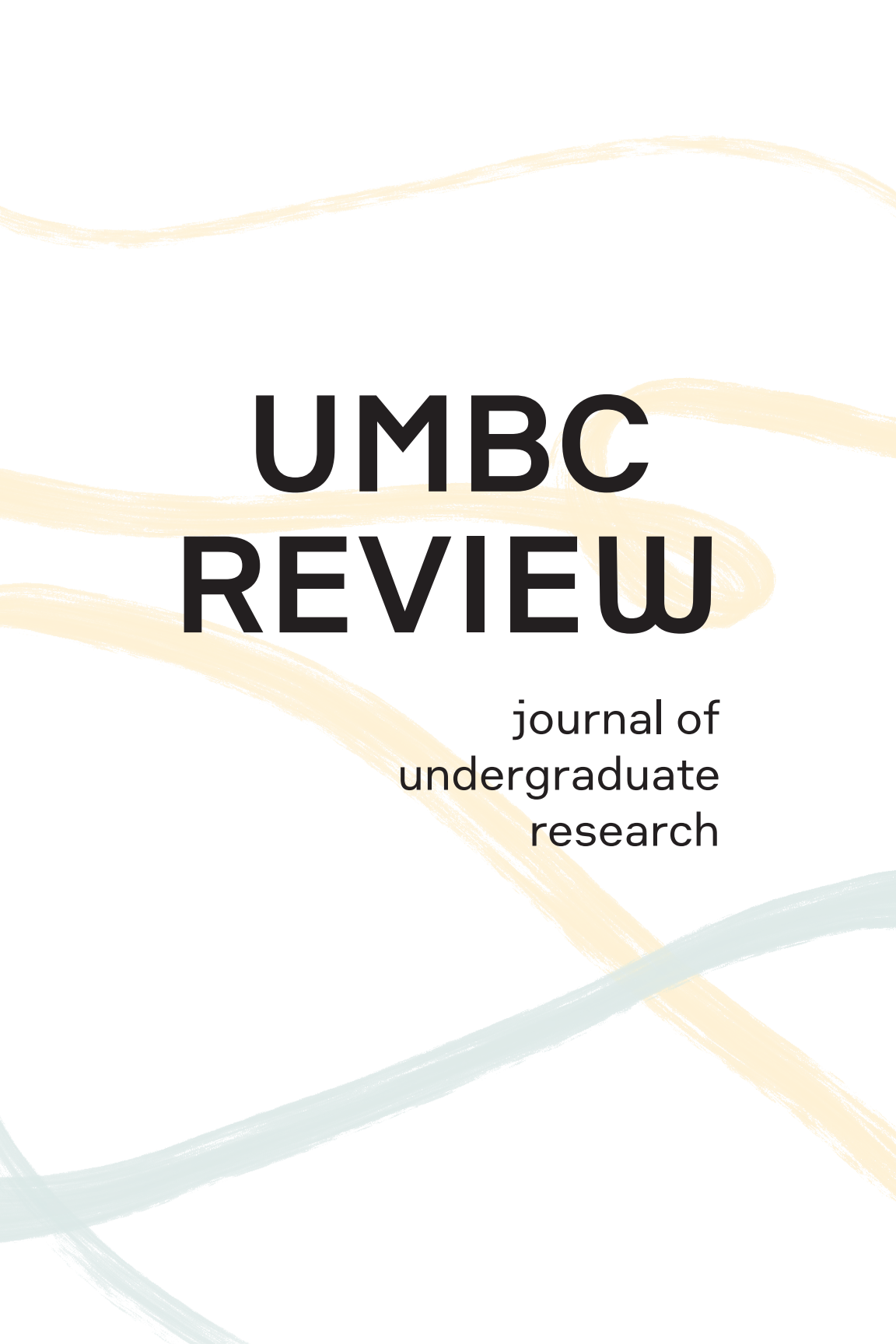


2025  
vol. 26



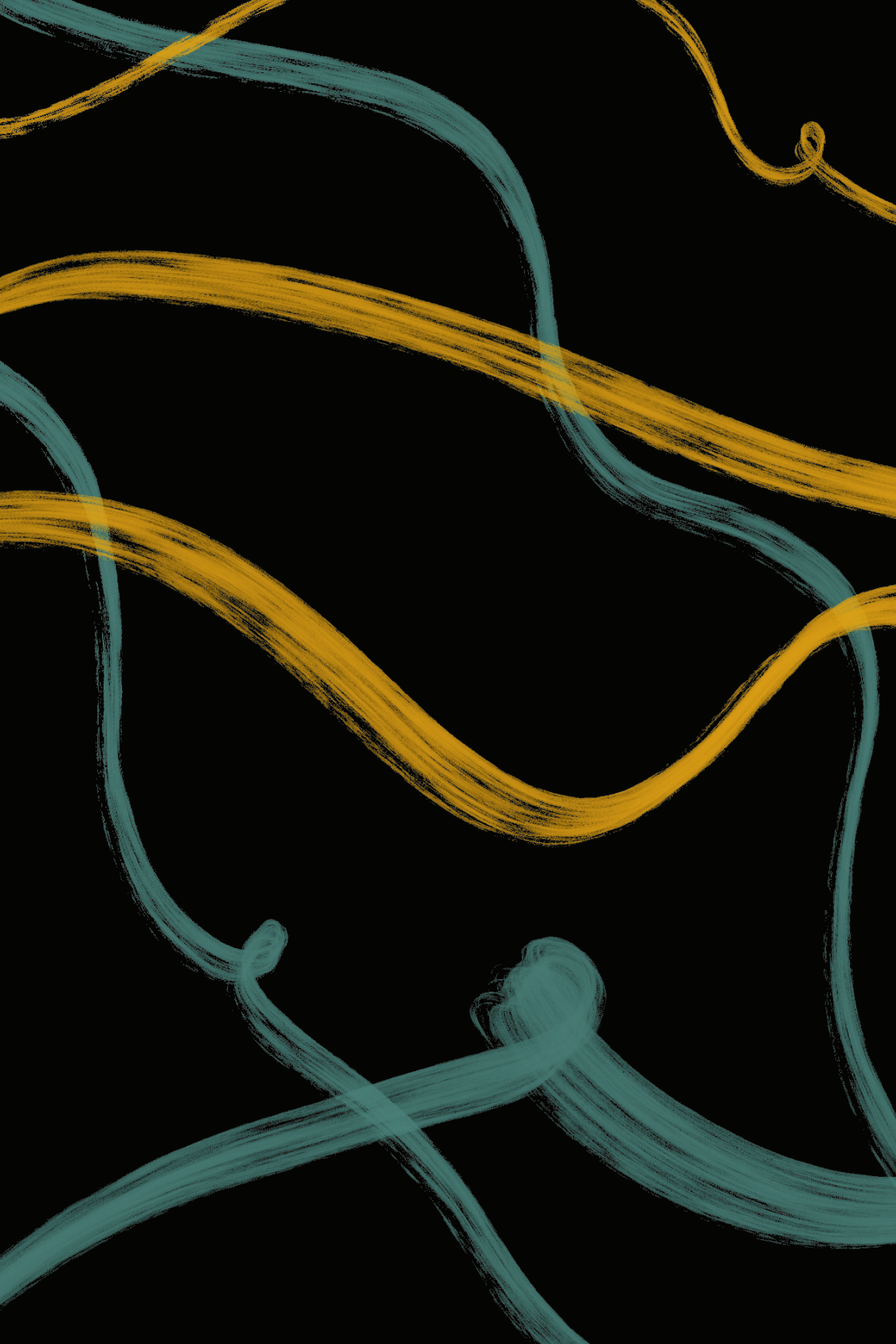
journal of  
undergraduate  
research

# UMBC REVIEW

The background of the cover features several thick, expressive brushstrokes. Two prominent yellow strokes curve across the upper and middle portions of the page. A teal stroke enters from the bottom left, sweeping upwards and to the right, crossing under the yellow strokes. The overall effect is a modern, artistic, and hand-painted aesthetic.

# UMBC REVIEW

journal of  
undergraduate  
research





# UMBC REVIEW

journal of  
undergraduate  
research

vol. 26  
2025



# Contents

## 16 **Polina Kassir**

*Reading the Library: An Ethnography of Place in One  
Baltimore City Library*

## 48 **Stephanie Marceron**

*Would It Still Be Scary Without the Soundscape?*

## 80 **Havvanur Kulu**

*Exogenous Crises and Incumbent Governments:  
A Case Study from Turkey*

## 116 **Gina Khan**

*Identity Formation of Half-Korean Individuals Living in  
South Korea*

**148 Trisha Joy Francisco**

*Analyzing Algorithm and Thermodynamic Influences on  
Purple Air Sensors in Baltimore, Maryland*

**166 Megan Rehbehn**

*Beyond Boundaries: The FDA's Authority and Federal  
Preemption of State Mifepristone Regulations*

**212 Whitney Fils-Aime**

*Toward Linguistic Inclusivity in Audio Deepfake Research*

# Editors' Introduction

## Welcome to the 26th volume of the UMBC Review: Journal of Undergraduate Research!

For a quarter of a century, the UMBC Review has offered undergraduate students the invaluable opportunity to publish their original research in a peer-reviewed journal. Each of our authors have demonstrated an impressive commitment to research and scholarship while simultaneously juggling the demands of being students and having extracurricular commitments. It is with great pleasure that we, the editors, present to you the following seven exemplary articles. We believe these articles showcase the diversity of scholarship at UMBC.

As an interdisciplinary journal, the UMBC Review publishes a collection of outstanding works of authors from any and all academic disciplines. In this volume, we are proud to feature articles from the fields of physics, media and communications, political science, and modern languages, linguistics, and intercultural communication, among others. We begin with **Polina Kassir's** ethnography of a Baltimore City library. Next, **Stephanie Marceron** explores popular horror movies and video games. **Havvanur Kulu** brings us a case study of Turkey's government and its response to major earthquakes.

Opening the second half of this volume, **Gina Khan** studies the identity formation of biracial Koreans living in South Korea. **Trisha Joy Francisco** next analyzes how purple air sensors in the Baltimore area give us key insights on the Chesapeake Bay. Then, **Megan Rehbehn** examines how the restriction of abortion medication mifepristone by the states is federally preempted. Finally, **Whitney Fils-Aime** digs into audio deep-fake research on languages other than Standard American English and non-spoken languages. Each and every one of these authors offer new and insightful research, advancing their respective fields and contributing to our understanding of the changing world around us.

The UMBC Review is crafted by undergraduate students, with support and guidance from experienced mentors. All articles are held to the same standard as other established research journals, and each paper underwent rigorous peer review from off-campus professionals. These papers are the product of multiple rounds of revisions based on feedback from the editors. Being published in the UMBC Review is an honor only a few UMBC students will receive, and we are pleased to be sharing their work with you. We invite you to join us in celebrating the curiosity and creativity embedded in each of these papers!



# Meet Our Amazing Authors!

**Polina Kassir** assesses the relationship between the physical space of the Enoch Pratt Free Library in Baltimore and the users of the library as they shape the mission of the library with every interaction.

**Stephanie Marceron**

investigates how the soundscapes of horror movies *Alien* (1979), *Get Out* (2017) and *Nope* (2022), as well as the video game *Dead Space* (2008), create an emotional reaction among audience members.

**Havvanur Kulu** analyzes how exogenous crises related to climate change and disasters influence support for incumbent governments, specifically examining the effects of the 2023 earthquakes in Turkey on the re-election of President Recep Tayyip Erdogan.

**Gina Khan** examines multiracial identities that are formed in South Korea, focusing on the aspects of Korean culture and society that have an impact on identity formation in half-Korean individuals.

**Trisha Joy Francisco**

dissects air quality tracking measures, inspecting the causes of the PM2.5 concentration errors in Purple Air sensors around the Baltimore, Maryland area.

**Megan Rehbehn** explores state-imposed restrictions on the abortion medication mifepristone in regards to federal preemption laws based on the Federal Food,

Drug, and Cosmetic Act (FDCA) which is enforced by the FDA.

**Whitney Fils-Aime**

expands upon research into audio deepfakes, exposing the lack of deepfake literature in languages other than Standard American English and spoken languages.

# Acknowledgments

While the focus of the UMBC Review is on our undergraduate authors, it would not be possible to publish the journal without the support of numerous other individuals, each of whom is irreplaceable. We extend our sincerest thanks to the following people, without whom Volume 26 of the UMBC Review would not exist.

This journal would not have been possible without the support of various departments and administrative officials. We thank the following:

**President Valerie Sheares Ashby**

Office of the President

**Provost and Senior Vice President for Academic Affairs Manfred H. M. van Dulmen**

Academic Affairs

**Interim Dean and Vice Provost Stephen Freeland**

Undergraduate  
Academic Affairs

Each of our authors works with a faculty advisor to develop their research questions, conduct their investigations, and refine their work. These advisors are our authors' primary source of support as they perform their research and prepare it for publication. We thank them for all of the time and energy they have invested in helping our authors produce their articles. We thank the following individuals:

**Dr. Lucille McCarthy**

Department of English

**Dr. Jason Loviglio**

Department of Media &  
Communication Studies

**Dr. Carolyn Forestiere**

Department of  
Political Science

**Dr. Kyung-Eun Yoon**

Department of Modern  
Languages, Linguistics, and  
Intercultural Communication

**Dr. Belay Demoz**

Department of Physics

**Dr. Eric Stokan**

Department of  
Political Science

**Dr. Christine Mallinson**

Department of Language, Literacy, and Culture and Department of Gender, Women's, + Sexuality Studies

We would also like to thank our advisors for their time, guidance, and support in helping us put together this prestigious journal.

**We thank:**

**Dr. Ian G. Anson**

Editing Advisor; Associate Professor in Department of Political Science

**Ms. Laura Schraven**

Design Advisor; Director of Student Affairs Communications and Marketing

**Dr. April Householder**

Management Advisor; Director of Undergraduate Research and Prestigious Scholarships

We also would like to thank the UMBC Review's outgoing faculty advisor, **Dr. Molly Jones-Lewis**, for her support and guidance.





# **Additional Acknowledgments**

Finally, we extend our gratitude to the following people for their invaluable contributions to this journal.

**Ms. Erin Durham Wright**

**Dr. Anne Brodsky**

**Ms. Anjali Dassarma**

**Dr. Jennifer Joelle White**

**Ms. Malliam “May” Santiago**

**Dr. Young A. Jung**

**Dr. Ricardo Sakai**

**Mr. Peter Grossi**

**Dr. Jennifer Nycz**



# 01

## Reading the Library: An Ethnography of Place in One Baltimore City Library

**POLINA KASSIR**

Lucille McCarthy

Department  
Of English





# Biography

**Polina Kassir** is a UMBC alumna, having graduated with degrees in biological sciences and English in 2024. She is a Sondheim Public Affairs Scholar, Honors College member, and the recipient of a Sondheim Experiential Learning Award. She thanks Dr. Lucille McCarthy for her dedication and support during this research project. In the future, Polina hopes to use her background in science and communication to become a physician focused on community, working with people to emphasize preventative care.

## Research Journey

I came to UMBC knowing that "research" was an important concept for future scientists, but it was an abstract concept; I could only picture a hazy image of serious, lab-coated people handling colorful chemicals. While taking genetics during the spring of my freshman year, "research" began to solidify itself as the process of discovering new knowledge, and I decided I wanted to be involved. I spent the next two years as an undergraduate researcher in UMBC's biology department, working in Dr. Rachel Brewster's zebrafish-based developmental biology lab. I wrote and presented an independent research project of my work in the Brewster Lab. My senior year, I entered the UMBC English Honors Program, which requires students to write and defend a thesis. The only thing I knew going in was that I wanted to focus on some aspect of public life; this was partially informed by my background as a UMBC Sondheim Public Affairs Scholar. Guided by my mentor, Dr. Lucille McCarthy, I eventually settled on "libraries," and then "Baltimore libraries," and, finally, "one Baltimore library." Ultimately, research is a storytelling process, and I hoped to tell one aspect of this local library's story.

# Abstract

In its mission statement, The Enoch Pratt Free Library in Baltimore aims to "empower, enrich, and enhance the quality of life for all through equitable access to information, services, and opportunity." At the branch level, I argue that a successful public library must encourage dialogue between the institution and its users. This dialogue is influenced by the library's physical spaces. Understanding space as an ecology of interactions, I report how a brick-and-mortar library building successfully facilitates a dynamic institution-user relationship. My findings come from a six-month ethnographic study of a Pratt branch in Northeast Baltimore that asks how its users shape the greater Pratt mission through their interactions within the branch's physical spaces. Along with providing traditional library services, this branch library functions as a location where users both directly and indirectly create community through the manipulation of static spaces. Despite these successes, this library building exists in a state of underlying tension as to the future of its physical infrastructure. My reading of space in this branch library also provides useful insights into other institution-user dynamics.

# Introduction

It is not surprising that the public library is often seen as a place of refuge. It is a space where any and all might find material, mental, or physical support. Positive as this idea is, it also describes a one-way, hierarchical relationship between an institution and the public which it serves. I argue here that a successful public library, one that truly serves its patrons, is an institution of community engagement. As this phrase refers to a dynamic relationship between an institution and its users, it implies a transaction between two parties. It is this kind of dialogue between a library and its users that produces the most long-term impacts, and results in both libraries serving users, and users shaping their library.

Focusing on a particular Baltimore City public library, which I refer to using the pseudonym 'Westwood Branch,' in this paper I create a "thick description" of the physical spaces and user interactions within that library. This means I look at four facets of the community-library relationship: the patrons, librarians, and physicality of Westwood, and the institution of the Enoch Pratt Free Library system. From my interviews with Westwood librarians and patrons, along with my own observations of Westwood, I ask how this branch's librarians and patrons shape the greater Pratt mission through physical space. Taken more generally, this is a question of power and agency: Who has it, who knows it, and who can change it?

I present findings based on qualitative data about the physicality of the library and its immediate exterior. I also analyze patterns I find in interviews with both library patrons and the branch librarian. My data collection and analysis reflect a naturalistic approach that emphasizes the importance of context (Spradley 1971, Bogdan and Biklen 2007, Tewell et al. 2017). My goal is to understand the roles, functions, and mechanisms of this public library as it interacts within its local community and the greater Pratt mission. By focusing on

physical space, I find that, in the words of one patron, it is "like a refuge" for its users and exemplifies the meaning of a branch library within a larger public library system.

In organizing my findings, I considered using the Pratt mission statement as a guide, with subsections on "information," "services," and "opportunity" that I could use to easily categorize the experiences of the twelve users informing this study. As I will discuss, mission statements are often agents of hierarchy, defining power within a library system, so I decided against employing these categories. Rather, to dignify the agencies of individual branches and patrons, I organized my study according to categories emerging from my observations of Westwood's physicality. As I will show, I found that as a public space hypothetically guided by an overarching mission, the library exists at the intersection of power and agency, of institution and individual. To show this dynamic at work, I explore how mission statements and physical spaces define power and relationships between the larger Pratt Library system and the Westwood Branch users, both librarians and patrons. I conclude with a look to Westwood's future, and the greater implications of viewing space as a dynamic phenomenon.

## Methodology

### Ethnography

A method of study is often, if not always, a list of the technical tools that the white-coated researcher wields in her attempt to capture data. And indeed, the toolbox of ethnography, my primary methodology here, might be described as "establishing rapport, selecting informants, transcribing texts, taking genealogies, mapping fields, keeping a diary, and so on" (Geertz 1973, 6). It "illuminates the unknown" while it "interrogates the obvious" (Low 2017, 2). The effect, and really the whole point of such a method, is to create a "thick description"



(Geertz, 6). I draw upon Joseph Spradley's *The Ethnographic Interview* (1970) for ways to develop interview questions and follow his plan for keeping detailed field notes during my observations.

I visited Westwood a total of 12 times, from June 2023 to January 2024. I had two 90-minute interviews with the branch manager, Ms. M, and conducted five-minute interviews with 12 library users. The majority of my site visits occurred on weekdays (primarily, Mondays) between 11:00 am and 1:00 pm, and lasted about an hour each time. During a typical site visit, I sat at a round table in the main area, made notes about the atmosphere and any layout changes, and sometimes did some of my own schoolwork on a laptop. I would then walk up to a library user, introduce myself as a college student doing a project about a library, and end by asking if I could ask a few questions about how they use the library. These talks lasted no more than five minutes each.

## Theories of Space and Place

As this project is specifically an ethnography of space, it is based on the idea that "space" is not a discrete element. Rather, I ground my work in the rhetorician Jenny Edbauer's understanding of places as "rhetorical ecologies" (2005). This means that spaces are not static, momentary constructs, but rather lively and evolving environments. In the case of a library, this means exploring how a brick-and-mortar building can be dynamic. When we enter shared spaces, our interactions with people and objects in our environments are not solely composed of those specific, standalone moments. So, Edbauer explains, "place can be characterized less in terms of elements taken together, and more in terms of the interactions between those elements" (10).

Setha Low's *Spatializing Culture: The Ethnography of Space and Place* (2017) describes ethnography of space as "a methodology for addressing socio-spatial problems," and used, for example, to study people and places impacted by policy, violence, social injustice, and

globalization (3). Public spaces in particular are socially produced and continue to develop through "language, social interaction, memory, representation, behavior and use" (7). Additionally, human "pattern[s] of everyday movements and trajectories" shape past, present, and future uses of place (8). A note on semantics: I will use "space" and "place" interchangeably, though, historically, many commentators have seen these as separate concepts. For example, place often refers to "lived space" (12). By contrast, space, as understood by the mathematician and philosopher Gottfried Leibniz, is not about "lived space" but is rather "made up of the relations among [objects and events]." This stands in contrast to Isaac Newton's view of space as a "container...for human activity" (Low, 15). Given these multiple conceptions and definitions, and that this is not a study in linguistics, I choose to use the terms interchangeably.

## **The Voice of the Institution in Compass Magazine**

Shannon Barniskis' analysis of thirty-two public library mission statements revealed that the "location of agency and service discloses how libraries understand their responsibilities and where they decide their influence ceases" (2016, 142). Mission statements, then, can be read as the scaffold on which institutional systems define relationships of power between their constituents; in the case of library systems, those players are the main branch, individual branches, and users of individual branches.

Barniskis finds that the creator of mission statements is often a "vanishing author" which in turn leaves institutions such as public libraries seemingly "distanced from users' lives" (137). Barniskis further argues that deconstructing mission statements helps us see beyond administrative goals and into "the community perspective" (137). Using feminist standpoint theory, Barniskis finds repetitive values in her study of thirty-two library missions, including "lifelong learning," recreation, community service, and information access (141). This kind of close reading of mission statements allows us to

read agency within an underlying tension of "conceptions of 'library in the life of the user' and 'user in the life of the library' (137).

Barniskis argues that putting the "library in the life of the user" is challenging because the values in a library's mission statement are centered primarily within the physical boundaries of the library, and "may not persist beyond the walls of the building into the larger lives of the users" (137). Here, I use the bimonthly Pratt publication, *Compass*, to understand how the greater library institution sees itself in relation to library users. From six months worth of these magazines (June 2023 - January 2024), I found 12 "Community Voices." There is no way to know how edited or cherry picked these voices are, and they are not specific to any one library branch. Thus, this data, collected from *Compass*, provides another "point" in the triangle of ethnography: This is the Pratt library speaking on how it views itself in relation to library users, and its evidence that it is accomplishing its mission in their lives.

## The Participants

As Micheal Seadle (2000) explains in his anthropology of digital library services, "...use of the first person in anthropological articles... reminds readers of the filter through which they are viewing the world" (372). My study follows this ethnographic tradition, and I attempt to create a narrative of my experiences in the library, what I have learned from its users, and my development as a student researcher. As ethnography is filtered through the experiences of the ethnographer, I first outline my own relationship to this study. I am white, of mixed ethnic heritage (Middle Eastern and Eastern European), a 1.5 generation immigrant (moving to the U.S. as a young child), middle-class, 21 years old, and a senior at UMBC.

My parents took me to our local library from a very young age, and I grew up with—and am still heavily influenced by—my dad's motto: "If they have it at the library, we don't buy it!" This means that I have an intimate appreciation of what libraries stand for and

will always be biased in favor of the work that they do for their communities. I first came to the Westwood branch in March 2022, when I co-lead a UMBC Center for Democracy and Civic Life Alternative Spring Break. The librarians—the former manager and Ms. M, who was the Teen Section librarian—opened the branch an hour early for our group and gave us a deep dive into the public school/local library connection. Their kindness and openness are the reasons that I ultimately chose this particular branch for my project.

In terms of my research question itself, it was a months-long work in progress. I knew that I wanted to study some community institution and understand how its everyday users interacted with that institution. Once I narrowed my focus to libraries, I considered a comparison study of two physically different types of libraries—a traditional brick building, and a mobile branch. However, this kind of study would have taken an undergraduate level project to a larger and much more detailed scale than I was prepared to undertake. The final research question combines these ideas by focusing on the effect that the physicality of one library branch has on library users, and how those users in turn shape that physical space.

Ms. M, the library's branch manager, is my study's key informant. That is, she provided the voice of an administrative user of the library through two 90-minute interviews. She is a middle-aged African American woman, and her previous role was that of the library's Teen Librarian. 10 out of the 12 library patrons I spoke to were African American. All but one appeared over 30 years old, and most of these appeared 50 years or older. 7 of the 12 users lived close enough to the library to walk and can thus be characterized as local users.

From the 2017 Baltimore City Health Report, the Westwood neighborhood is 86.5% Black or African American, compared to 62.8% in the city overall, and 8.9% white, compared to 30.3% overall. Westwood's Asian and Hispanic or Latino populations are 1.0% and 2.7%, respectively. Westwood also has a significantly younger population than the city overall, with 18–24 year-olds making up

26.2% of the population, versus 16%. It is comparable to the rest of the city in the other age groups, with about 44% of the population between 24 and 64 years old. My study's participants were 75% Black or African American. 100% appeared at least 25 years old, with about 50% appearing over 65 years old.

## A History of the Pratt and its Redesigned Central Library

My library shall be for all, rich and poor  
without distinction of race or color, who, when  
properly accredited, can take out the books if  
they will handle them carefully and return them.

(Enoch Pratt, 1884)

In 1883, Massachusetts native and Baltimore businessman Enoch Pratt (1808-1896) established a \$1,058,333 endowment to the City of Baltimore for a Central library and four branches (Enoch Pratt Free Library). This gift is the foundation of today's Enoch Pratt Free Library, a system with 22 locations and three mobile units throughout Baltimore City.

From the beginning, the library (known colloquially as 'the Pratt') was heavily intertwined with its physicality. Responding to the elitism of library culture, Joseph Wheeler, the Pratt's head librarian from 1926-1946, argued that "library buildings have been palaces for the learned, pretentious, withdrawn, dull, self-sufficient, making no appeal to the average passerby to come inside" (Flathman 2007, 1). The Pratt system was not innocent of this institutional classism, and Flathman points to macro- and micro-political agendas driving new library sites away from transportation-accessible locations and putting materials for the working class in library basements. For Wheeler, socially conscious libraries "adapt [their facilities] to reflect community life" (29).

One step to countering this elitist narrative can be seen in the 1932 redesign of the Pratt's Central Library, which, Jennifer Flathman finds, is meant to "give form to the belief that service to people -- and not the number of volumes -- gives the library its power" (2). Wheeler fought against administrative attempts to build an updated Central Library in the upper-class Mt. Vernon district, arguing instead that it ought to remain where "the working people who transfer from one streetcar to another can run in five or ten minutes and exchange their books" (33). The redesign prioritized functionality and a connection to local interests; through a long row of windows, outside passersby were allowed an "unobstructed" view into the activities of library patrons (38). The library's adult services area occupied the first floor—rather than the higher levels traditional in libraries of the time—with a central information desk that "reinforced the area's mission as the service hub for the large building" (42). Together with an open floor plan—where "subject areas flowed freely across the north and south wings of the first floor...eliminat[ing] the need to understand the cataloging strategy in order to navigate the building"—the Central Library was redesigned to be a place of "activity and communication rather than solitary intellectual pursuits" (46).

The library's furnishings, however, reflect an interestingly conservative design. Wheeler called for the "walnut finishes and leather upholstery" of a "gentleman's library," a phrase that gave other librarians "a scare": They recommended easily cleaned (from "vermin") imitation leather cushions, and short seats that would prevent "some weary old gentleman [from lying] down on 8-foot long recessed seats" (48). Additionally, departmental reference desks were arranged such that users were always monitored, "library staff believ[ing] that the patrons required continual supervision" (47). The newspaper room, too, was in the basement "to shield regular patrons from contact with its working-class constituents" (48).

# Literature Review

Ethnography is a well-established method of understanding the social significance of library spaces. This includes digital library services, which Michael Seadle argues requires understanding "the people involved" before assessing program success or failure (2000, 370). Tewel et al. (2017) apply ethnographic methods to try and understand how college students used a university library's research facilities. Students rearranged furniture and stacked piles of books to "cocoon themselves...[into] a space of their own"; left personal items unattended "because they felt the library was a 'safe place'"; and preferred different tables when studying in groups versus individually (85-87). These findings facilitated a redesign of that library, the primary objective being to "increase student contact with librarians" (88).

Mobile public libraries exemplify the impact of space on social connection. These mobile units often service rural populations, as was the case in Knight and Makin's (2006) analysis of two "branches on wheels" in southeastern Australia. Initially these were primarily book dispensaries, the trucks "rattl[ing] down a dusty country road each fortnight to be greeted by appreciative borrowers who were provided with a limited... choice of equally dusty books" (Knight and Makin 2006). As traditional libraries began offering Wi-Fi access in the late 1990s, the bookmobiles were also equipped with wireless technology to provide "information and library service that was equitable and accessible" to remote populations. Though these mobile library units were inherently dynamic and of rugged build to withstand the harsh Australian outback, their transformation into Internet hotspots shows how they responded to changing community needs.

In its early history, the Enoch Pratt Library also used mobile libraries to reach Baltimoreans without access to any of the four branches (Flathman 2007). When the city—including the Central Library—was mobilized during World War II, fuel rations led to

the use of a "horse-drawn book wagon to bring materials to areas with large 'disadvantaged populations'" (69). Though these were limited in size and book-carrying capabilities, the Pratt bookmobiles were extensions of the communities they served because "place and space are always embodied" (Low 2017, 6).

## Into the Library: A Walk Through Westwood

Dedicated April 20, 1960, the Westwood Branch of the Enoch Pratt Free Library serves the communities of Northeast Baltimore. Westwood sits at the intersection of four bus stops and is one of the handful of Enoch Pratt libraries with its own parking lot. The building itself is not particularly large and is mostly contained to the first floor level.

The entrance vestibule has built-in flyer holders, where there are usually a few informative library and community programming and events flyers, as well as a shelf with more formal Enoch Pratt flyers and its monthly *Compass* publication. After entering the library proper, a visitor is immediately greeted by a large round circulation desk, surrounded by a tall plastic barrier staffed with at least one librarian, and a security guard nearby. The main attraction to the left is a children's section. This is not obviously marked with an entrance or large sign, but it is immediately clear given the smallness of the chairs and tables, presence of coloring materials and Legos, and the colorful rugs. There is another round circulation desk in the middle of the children's section, but this one is much smaller and shorter, does not seat more than two librarians, and does not have a plastic barrier. This section is about one third of the library's space, and I will refer to it generally as the children's half.

Going right from the main entrance, a visitor is immediately greeted by two parallel, long tables, with computer stations on each side



of each table. Walking between these computer trenches, a visitor might find a seat at one of about 8 round tables. Or they could keep walking to the far wall, and work at one of the two cubicle-style round tables, a few of which also have computer desktops. When facing this back wall—a display of books and magazines decorated with the sign, "Westwood's Greatest Hits"—a visitor will have the option of browsing through the main bookshelves on the left, checking out several specialty shelves of graphic novels, magazines, large print books, or featured book selections on the right. A third, round circulation desk sits in front of a curated "Teens" and "Adults" display shelf. I will refer to this area of the library as the main or general section.



**Figure 01:** A sign (left) for the Stick Together color-by-sticker poster (right) in the Game Corner.

Scattered throughout the round tables area are small flyer displays of upcoming Westwood-specific events. Knot Just Knitting calls crafters and others who want to "just come to hang out" and meets every first and third Saturday afternoons. Line Dancing with Mr. Lamont runs Wednesdays at 1:00 pm. There is also a sizable color by number poster, using small colored square stickers, pinned invitingly to a mobile bulletin board. As of this writing, it was a nearly complete image of whimsically colorful hot air balloons in the sky. Nearby sits a large plastic bin filled with board games and puzzles; I often see a person working on one at the rectangular table placed there seemingly for that sole purpose.

## Findings

Before detailing the ways in which I observed users shaping their spaces at the library, I first outline the main themes about how they use the library, the data being gathered from the 12 patron interviews. Eight patrons used the library as a digital access point. That is, they came to the library to use a computer or access the Internet, using these resources as jumping off points to, for example, search for jobs, do research, or access email. One woman told me that she had been coming to the library recently because her home computer wasn't working. Another man told me,

My Internet isn't working at home, so I've been coming here to log in twice a week for my remote work days.

Six patrons mentioned coming to the library to have a quiet place to work or study. I met one man who had dropped off his wife for an errand nearby, and he decided to stop into the library to get some computer work done. Interestingly, this patron had his own laptop but was set up at one of the long computer tables instead of, perhaps, a regular table. Six patrons also talked about using the library to, of course, check out books. I met one person who was opening a coffee shop, and he told me,

I'm getting research books about starting a small business and making coffee drinks.

Perhaps unsurprisingly, the user interviews did not provide much information about how patrons use the physical space of the library itself. As a result, most of the following data comes instead from my interview with Ms. M, and from my own observations and photographs.

For Ms. M, the library is a living room. It is a "third space": A communal place where people gather, discuss, create, etc. continuing this metaphor, her little office—a former storage space right off the building's main entrance and directly facing the main circulation desk—is more of a private room. Despite the limited square footage and the authority of the room's occupant, Ms. M's office is not like that of the stereotypical administrator or school principal. Her office is a room of warmth and welcome. Her desk is cluttered and colorful, covered with all kinds of toys and books. She described it to be a purposeful move on her part to invite people to ask her questions and feel comfortable during difficult conversations. For Ms. M, space is powerful, shaping our interactions.

The Pratt system includes 22 branches, each of which, Ms. M explained, represents its neighborhood. A branch like Patterson Park, she said, serves more Hispanic neighborhoods and so has more bilingual resources. The Westwood library serves populations that are primarily middle class and over-40, and families. Ms. M explained that most branches don't have a dedicated teen area, and instead have it integrated with the adult section. In places that do have a teen/young adult area, it is usually near the back of the building "because teens tend to make a lot of noise," and other patrons might not want to always see or hear them. This also keeps the section within sightline of a security officer or reference librarian, or the camera. Indeed, at Westwood, the "teen wall" is on the far wall of the adult section. Ms. M commented,

I think that's just the natural design of libraries.

In the main section of the library, Ms. M has noted that people will work on all kinds of activities, including group Bible studies and general work. She has also noticed adults in teen spaces if they need quiet—and because the teen area is nicer looking. Here, she encouraged me to check out the Central Library's Teen Department, which has a recording studio, classrooms, and a movie "theater," plus a "library of things" like sewing machines and whiteboards.

In terms of a dynamic library interior, I initially focused on furniture mobility, whether patrons were able to or actually did move chairs and tables around for specific purposes. This doesn't really happen, though, because most of the furniture is heavy or built into the floor. In fact, Ms. M explained, libraries are moving away from heavy/permanent furniture, choosing instead to have furnishings that can roll.

So, if patrons aren't able to shift their built environments, how are they able to interact with and shape the library's spaces? I have already outlined some of the various adult/teen area seating options—including the general round tables and long computer tables—as well as briefly touched on the children's area. Ms. M described it as allowing kids and their families to have "their own little area." This half of the library is not the focus of my study, but it does reflect interesting user-space interactions. It is a place with easily accessible Legos and coloring materials, because, according to Ms. M, "kids go to what they know." Daycare teachers are also users of the children's area, borrowing a collection of books for the week. On top of the shelves, there are "STEAM kits" (tote bags filled with science/engineering activities) available for checkout, placed out of reach of young children but at parent and guardian eye level. There is also a colorful rug where the children's librarian will conduct programming—where teen/adult programs like dance classes or homework help require open spaces or tables and chairs, children's events are often floor-based.

Across from Ms. M's office are three study carrels that I did not consider to be of interest during most of my trips to the library.

They are unassuming, a set of "sturdy" wooden tables and desks with privacy partitioning between each desk. Ms. M pointed them out to me as an interesting example of the way library users shape space outside of their intended uses. The study carrels are sized for the average fifth grader and are at the edge of the children's area, implying that they were likely meant for use by older kids. Yet, Ms. M always sees adults—including a regular patron and tutors from Morgan State—sitting there, studying or doing homework. This makes sense, as each desk has an electrical outlet, and the area as a whole is semi quiet. The printer and copy machines are also close by. As Ms. M put it,

People can plug in their laptop and do what they need to do.

Although the library's furnishings and general layout rarely if ever changes (although this does not mean that it is not dynamic, as indicated by the study carrels), I noted multiple changes in other elements. Behind the adult section reference desk, there is a large display shelf that has had a different theme every time I've visited. Most recently, it was focused on Black History Month, and the books had topics on Dr. Martin Luther King Jr. and the Civil Rights Movement. This shelf, along with other display areas in the main library area, Ms. M explained, is changed one to two times a month. Although the librarians are directly changing this space, it is not without patron influence. Ms. M explained,

We pick whatever looks interesting for displays. You put books that you think might be popular, and display them to get increased circulation. We might display a book to make it 'new' again, or if there is something relevant to current events.

During most of my 12 site visits, the far main wall had a huge display shelf with a red-lettered WESTWOOD'S GREATEST HITS sign. The books and magazines changed occasionally, and I noted this as an example of the library listening to its users. During



**Figure 02:** The Adult/Teen circulation desk in front of the changing display shelf.

one of my later visits, though, the sign was gone. I assumed the "greatest hits" was a staple at this library, and I asked Ms. M about it. "It needed to be refreshed," she shrugged, and the shelf is now mostly populated with magazines, graphic novels, and anime, "a big thing for adults and teens." In that this important and centrally visible area was changeable, Westwood shows itself to be dynamic and user centered. In both of my long conversations with Ms. M, she told me of her attention to patron needs and her ordering of library spaces to meet those needs. In her words:

Our staff makes decisions on what to put  
in a space depending on the needs of  
the community.



Sandwiched between the adult circulation desk and a display shelf is one of this library's most unique features: The game corner. This includes a table set aside for puzzle-making, a round table that is often set-up with a chess board and pieces, as well as a large plastic bucket filled with donated and library-purchased board games.



**Figure 03:** A back-to-school display and the former "Greatest Hits" wall, now "Teens."



Ms. M explained that they used to have lots of adults working on puzzles, but fewer people—maybe one or two, plus a regular—come in now. During most of my visits, I found a partially completed puzzle (usually the border) on the table, and there would sometimes be someone continuing where a previous user had left off. Most of the puzzles were donated, and I spoke to one woman who pointed out a cat-themed one that she had given the library after she completed it.

One patron, a younger man who in my notes I referred to as "puzzle guy," was hunched over a puzzle before I interviewed him. I soon learned that this was his 10 AM routine: coming into the library for an hour before going to work, putting together a puzzle, and



**Figure 04:** The game corner, featuring a ready-to-play chess board and puzzle-in-progress.



checking out two books a week. He was a regular at his previous library, too, and though he had only recently moved back to Baltimore, he had many insights into this library.

Why not open some windows?" he asked, gesturing around the room. "And they should have plants. And a garden. With a bench to sit on and read and listen to music without earbuds.

As it happens, I had previously met the patron who had donated the puzzle John was working on. This patron was one of three elderly women who frequented the library's game collection and programming. One of them described getting "hooked to Connect 4." They described Westwood as peaceful, "like a refuge." Another woman in the group described coming to the library for the Internet, convenience, free copier use, and to get books and ideas for her preschool class. The third woman also talked about the Internet being an important library resource,

The neighborhood's limited Comcast options means that if you don't have a computer, you can't maintain your Gmail account.

Importantly, Westwood's Game Corner is unique to this branch; it is not a Pratt function, but a community one. One of the women in the regulars group mentioned that she has visited other branches, which did not have any puzzles; she found herself bored at one of these while she sat waiting for her bus.

I also want to focus on the rather unassuming entrance vestibule, a brick wall with built in holders for flyers and displays. Here, patrons can learn about Pratt-sponsored events at Westwood, pick up the monthly copy of the Pratt's publication, *Compass*, and participate in or communicate about neighborhood events. These flyers about neighborhood events are particularly significant, as this is the only space in the library with non-Pratt displays. The only rule here, Ms.

M explained, is that there are no prices displayed on the flyers. For example, you could advertise a local car-washing business, but cannot include the cost, only something like "Call for Price!"

## **The Voice of the Institution: *Compass Magazine***

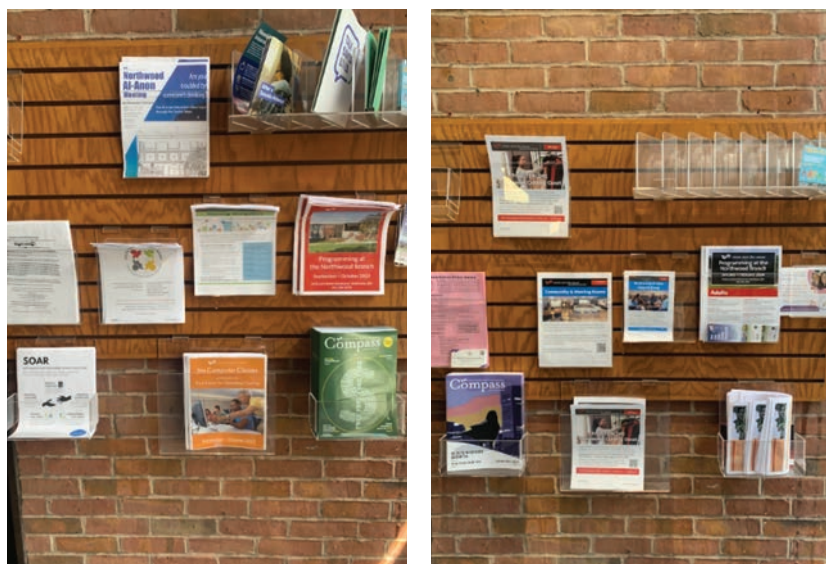
The data presented here reflect both administrative and user voices about the uses and dynamics of one Pratt library branch. Before discussing the implications further, I will detour briefly into the entire world of the Pratt system. I use the 12 "community voices" scattered throughout six issues of the Pratt's *Compass* publication as a proxy for understanding how Pratt views its own successes or failures in accomplishing its mission. Unsurprisingly, all of these "voices" present highly positive views of the Central Library/Pratt. 4 of the 12 comments valued the affordability of library materials; four comments addressed the kindness of library staff; and five comments emphasized accessibility to information and resources. These all directly address Pratt's commitment to providing equitable library access for all.

Most striking, however, is that 8 of the 12 comments referred to the Pratt as a powerful, somewhat mysterious, Other:

I can't overstate how important the library system has been to my growth and well-being over the last five decades. A wealth of resources available without needing to be rich.

*Compass*, Jan./Feb. 2024

This is, perhaps, an example of what Barniskis (2016, 137) called "the library in the life of the user". If these Pratt-curated voices are in reference to the Central Library, it might be reasonable to ask if the goal of a main library is to maintain the image of the omnipotent institution, a symbol of innovation. Indeed, as Ms. M described the



**Figure 07:** Community Event Wall Displays.

Central Library as a highly modern space. The function of a branch library such as Westwood, then, may be to provide an infrastructure that allows users the freedom to shape the limited spaces to their needs.

## Discussion

As Edbauer described, "place" is not a static thing. Rather, it is the integration of movements and connections and interactions into a living ecology. This definition of place is reflected in user agency in shaping space at Westwood. The library's game corner exemplifies this dynamic. That Westwood's board game area is a function of community underscores the importance of this branch library as a user-shaped space. Maintaining a game collection in the general section, rather than, perhaps, in the children's area, breaks down a traditional barrier between playfulness and adulthood. This phenomenon might even translate to the general section of the library as a whole. I once observed a family sitting in the general half of the library with their child playing with Legos on the floor next to them; this space invited more patrons than the "Teen" sign overhead suggested.

I began this project by asking how a brick building could be understood as an ecology, how private users of a public space might shape physical structures into living places. Using the Pratt mission of equitable access to information and resources as a reference point, I find that the Westwood branch is a successfully dynamic community library. It is important to note, however, that few of the users I spoke with appeared conscious of their own space-shaping agency. Instead, my findings came from Ms. M and my own observations and photographic data. Why? One reason may be that the users I interacted with on weekday mornings happened to be more focused on traditional library functions. Perhaps, the library experiences a shift during the afterschool/after-work hours, when clients are more likely to be aware of their moment-by-moment shaping of space. Yet, another consideration, independent of the individual clients I happened to interview, was that people are simply not conditioned to see themselves as these kinds of change agents.

Here, my analysis of *Compass* comes in handy. The overwhelming majority of the community voices included in the publication referred to the Pratt system as a powerful, invisible force, the embodiment of a mystical library spirit. This kind of adoration is seen in other institution-individual contexts and serves to establish the balance of power between governing bodies and their constituents. Whether it is feasible or even necessary to break this kind of structure down is outside of the scope of my study. This line of thinking does raise an interesting question about one facet of the relationship between a central library and its branches. Perhaps, as I noted above, it is the goal of the library institution to represent the current grandeur and future possibilities of the system as a whole, while it is the responsibility of the branch to be more grounded in its community. At Westwood, this manifested through administrator-facilitated user-space dynamics. A central question for Westwood's librarians, then, is one of reconfiguration, of structuring the building to make the most of the existing physical space—and possibly the new one, as will be discussed—and to bring as much of the library into the community as possible.

# Westwood's Future

Ms. M was not involved with either of Westwood's past two renovations. Most recently, these included adding more computers and updating the paint and carpeting. Pratt is also planning on a future upgrade, although there is no set date yet. The building needs "a whole lot of things," Ms. M explained. This might mean remodeling or tearing the building completely down. Ms. M mentioned her concerns about serious, and possibly irreparable, issues with the heating/cooling system. Westwood has often closed during the summer, which has inspired the community to rally in support of the library. The current solution involves a (loud) system of indoor tubes and fans.

Westwood also faces the challenge of reaching out to people in the community that do not use the building, whether because they are unable to reach it physically or because they do not know about resources and opportunities available at the library. One patron I spoke to echoed this sentiment, telling me that you might not know about an upcoming event unless you physically go to the library and get handed a flier. A central question for the Westwood librarians, then, is one of reconfiguration, of structuring the building to make the most of the existing physical space, and to bring as much of it into the community as possible.

Accessibility within the building itself is also a concern. The restrooms are on the basement floor, so they are impossible for those with physical disabilities to use. Since the building does not have an elevator or wheelchair lift; these populations are permitted to use the first-floor staff bathroom instead. The library meeting room, which can be reserved for larger programming events, is also located in the basement. The ground floor computer lab is equipped with 8 computers, so Ms. M says that they want to expand this room so more people can be invited in for classes.

Accessibility also refers to how well the gap between the library (including its resources) and different community institutions and populations is bridged. As Morgan State University is located only a short distance away from Westwood, Ms. M explained that it is important to be able to specifically cater to Morgan students and not only to their faculty and staff:

I gave a talk to Morgan staff about Internet resources, hotspots, and checking out laptops. They asked us: 'Can you come to us to better coordinate time for computer classes on Morgan's campus?' So, we are learning how to work with other organizations that don't move like us.

Ms. M is also focused on connecting with local public schools. This is especially challenging as Westwood does not currently have a Teen Department librarian. This was Ms. M's position until she recently became the branch manager.

You need a designated person to build relationships with schools and teachers. They know how the school operates, know kids' faces and names, and what kind of programming to have.

The Teen section caters to a wide variety of people, including 6th-12th graders, emerging adults—such as 18- to 24-year-olds at Morgan State—adults and college students over the age of 25, and seniors. Ms. M explained that this also includes people who are looking for jobs, reentering society, or who have learning/physical challenges.

The outside of the building is also an important factor. Westwood is one of the few Pratt branches to have its own designated parking lot for staff and patrons, though Ms. M sees the possibility of expanding it further. The building is also at a major intersection with four bus stops. She hopes that the future renovations will improve

the building's street site lines—I had trouble navigating to it on my first few trips—through the use of bright lights and colorful banners, as well as better trimmed trees and bushes. This is also a safety improvement.

Although the building's future is uncertain, Ms. M has met with architects to discuss how the building is used, parking infrastructure, specific user needs (including staff, the general public, older and younger people), and configuration of the circulation and information desks. She noted that there was not much talk of landscaping, although there is potential for a partnership with the Baltimore City Department of Recreation and Parks. This is a recent Pratt trend aimed at attracting youth and doing outreach work and creating a multimodal building that will be used as more than a library in attempts to connect with youth and families.

# Conclusion

The Westwood branch of the Enoch Pratt Free Library exemplifies the concept of space as ecology. From my 6-month ethnographic study, I found that its users are empowered, fulfilling the greater Pratt mission through their shaping of the library's physical spaces. To detail every physical characteristic of this library was outside of the study's scope, yet even my focused look at several spaces in the library's main section—notably the game corner—reflects a dynamic space. At the same time, I found that it is this library's administrative leadership that are most aware of the impact of physical space on patron use; this, I hypothesize, might be an artifact of social conditioning in favor of institutional, rather than individual, power in public places. This theory is partially reflected in my analysis of the library system's publication, *Compass*. Reading this publication as a proxy for the voice of the Pratt, I point out a distinct pattern of the library being referred to as a powerful Other. Perhaps, this is parallel to the distinct functions of a central versus branch library: The former is a symbol, the latter a tool. Neither is superior to the other; rather, each plays an important role in shaping the library.

Though this study is a focused look at a particular library in a particular city, reading spaces as ecologies can be done in every place imaginable. My own view of physical spaces as shapeable entities has exploded, and everywhere I look, I can imagine the past, present, and future of even the most superficially mundane corners of my world.



# References

- Bogdan, R.C. and Biklen, S.K. (2007). *Qualitative research for education: An introduction to theory and methods* (5th ed.). Allyn & Bacon.
- Crawford Barniskis, S. (2016). Deconstructing the mission: A critical content analysis of public library mission statements. *The Library Quarterly*, 86(2), 135–152. <https://doi.org/10.1086/685403>
- Edbauer, J. (2005). Unframing models of public distribution: From rhetorical situation to rhetorical ecologies. *Rhetoric Society Quarterly*, 35(4), 5–24. <https://doi.org/10.1086/685403>
- Flathman, J. L. (2007). *Rereading the library: A cultural conservation approach to determining the architectural significance of the Enoch Pratt Free Library, Baltimore, Maryland*. Thesis Collections: University of Oregon. [https://scholars-bank.uoregon.edu/xmlui/bitstream/handle/1794/5994/Jennifer\\_Flathman.pdf?sequence=1&isAllowed=y](https://scholars-bank.uoregon.edu/xmlui/bitstream/handle/1794/5994/Jennifer_Flathman.pdf?sequence=1&isAllowed=y)
- Geertz, C. (1973). *Toward an interpretive theory of culture*. Ucsd.edu. Retrieved April 27, 2024, from <https://people.ucsc.edu/~ktellez/geertz1973.pdf>
- History of the library. (2020, May 4). Enoch Pratt Free Library. <https://www.prattlibrary.org/about-us/history>
- Knight, R., & Makin, L. (2006). Branches on wheels: innovations in public library mobile services. *Australasian Public Libraries and Information Services*, 19(2), 89–96.
- Low, S. (2016). *Spatializing culture: The ethnography of space and place*. Routledge.
- Pratt publications. (2020, June 8). Enoch Pratt Free Library. <https://www.prattlibrary.org/about-us/pratt-publications>

Seadle, M. (2000). Project ethnography: An anthropological approach to assessing digital library services. *Library Trends*, 49(2), 370-385.

Spradley, J. (1979). *The ethnographic interview*. Waveland Press, Inc.

Tewell, E., Mullins, K., Tomlin, N., & Dent, V. (2017). Learning about student research practices through an ethnographic investigation: Insights into contact with librarians and use of library space. *Evidence Based Library and Information Practice*, 12(4), 78-101. <https://doi.org/10.18438/B8MW9Q>





# 02

## Would It Still Be Scary Without the Soundscape?

**STEPHANIE MARCERON**

Jason Loviglio

Department of Media and  
Communication Studies

# Biography

**Stephanie Marceron** is a Media and Communication Studies Alumna from the University of Maryland, Baltimore County. She graduated Magna Cum Laude in December 2023. She would like to thank her advisor, Dr. Jason Loviglio, and the other professors in the MCS department who lent their expertise and input on the horror genre. She is currently the Office Administrative Assistant/ Receptionist at HASI, a sustainable infrastructure investment firm based in Annapolis, MD.

## Research Journey

At the beginning of my final semester at UMBC, Dr. Jason Loviglio opened his capstone seminar by telling us about himself. He shared how he was fascinated with radio, media history, and sound study. This sparked my interest in my developing capstone project: sound usage in media. I decided to explore the psychological effect of sound in horror media because I knew it would be challenging to scrap my fleshed-out topic from the previous semester and start over fresh. When I came home that day and told my boyfriend my new capstone idea, he was ecstatic and quickly started naming different media I should analyze. Horror media always intrigued me because I never understood why people loved to be scared, or would subject themselves to such terror-inducing imagery for pleasure. This curiosity became my drive and the focus of my research. Most of my research occurred not by watching horror movies but by listening to them and meticulously detailing every sound and musical score and what response they evoked. Communication theorists Debord, bell hooks, and Schafer played a large part in my research. Each of their theories aided my more profound understanding and appreciation of soundscape in horror media.

# Abstract

"Would it Still Be Scary Without the Soundscape?" explores the pivotal role of soundscapes in horror media and how they are used to emotionally manipulate the audience into a desired reaction by the creator. Why do horror media (film and video games) have such a visceral reaction on the audience, and how does this keep the genre alive by emotionally manipulating the audience/player? Through qualitative research and a detailed analysis of the following three films, *Get Out* (2017), *Nope* (2022), and *Alien* (1979) - and one video game, *Dead Space* (2008), this study investigated the historical evolution of sound design in horror media and its psychological impact on audiences. As the film industry has evolved from silent films with only musical backing to modern cinema and game development that skillfully layers different sounds with orchestral support, the sophistication of fear has evolved. The research findings support the significance of soundscape usage in creating suspense and unease in the audience. The purposeful use of soundscape in horror media helps create unease and terror in audience members, which will then produce the desired fear that directors and creators work tirelessly to invoke. The sensorial experience and emotional engagement are what they yearn for.

Behind you, you can hear the subtle creaks of the wood floor paneling. The wind is whistling through the open windows. Tree branches scratch at the glass and the side of the house, but then, there is a sudden crash as a light fixture falls in front of you! And out of the deathly silence, a deep *SQUELCHING* sound can be heard. These sounds draw the viewer into a horror movie or video game, elevating their heart rate and locking their focus on the horrors that are before them. Sound evokes a sense of fear and terror in the audience, but why do people love being scared? How are filmmakers able to use the audiences' emotions against them? By tuning into the series symphony of the horror soundscape, where every note is a whisper of dread and every silence is a looming shadow, I show how they assist in building the terror-inducing sound encapsulation that horror media is known for.

My paper is divided into the following themes: a history of soundscape use in horror films and horror games; how the design mechanisms have evolved with technology through the decades; and finally, a look at the psychology behind horror movies. I argue for the importance of sound design in horror media and the emotional response they invoke, and explore how these mediums keep people returning to the horror genre. I next conduct a content analysis of three movies, *Get Out* (2017, Jordan Peele), *Nope* (2022, Jordan Peele), and *Alien* (1979, Ridley Scott), and one video game, *Dead Space* (2008, EA Redwood Shores), aided by several scholarly written articles and books on the subject. The question to be answered through the work in my research project is: Why does horror media have such a visceral impact on the audience, and how does this keep the genre alive? What do sound designers add to the experience by causing these primal reactions to their horror projects?

Close listening is a term used by sound studies scholars to describe how sound works. It is used to identify and explain key elements of sound, much the same way scholars of literature employ 'close reading' to understand the structure and power of a text. In the case of my analysis, I used close listening to find the key points in a score that heightened a viewer/player's fear derived from the media.

I listened for certain sound effects that would trigger a person's heightened sense of fear, such as a branch snapping or a creak of the floorboard that would typically occur offscreen. Phenomenology is a psychological and research method that studies how people experience things: the phenomena. In this paper, I study how people experience the phenomena of horror media and how it affects them. The logic behind using the three selected movies, which span forty years of cinematography, is to show the evolution of sound design and how it is used in these media. My approach is informed by sound theorists like Crook (2012) and Clasen (2022). Using the method of close listening, as well as borrowing a phenomenological approach by taking the audience through my own experience of "watching" (i.e. listening), I surface some of the emotionally driven choices made by the sound designer, editor, and producer of the selected media.

I analyzed soundscape specifically from an affective point of view, given that most horror media put the audience in the prey's point of view. Sara Ahmed's (2004) work on affective economy added a new layer of emotion, specifically when the object tethered to the fear is passing by the individual experiencing the fear. Absorbing sound from visual media can be made difficult by distractions of the spectacular. To truly understand what the sound designer intended for the audience of their work, whether it be film or video game, I use close listening to more closely analyze the soundscape.

Angela Tinwell (2010) has written about the uncanny behavior in survival horror games. However, one quote from this research fits both horror video games and movies: "[s]ound for which there is no identifiable on-screen visual source intensifies casual listening in taking away the sense of sight" (Tinwell 2010, 9). This statement is what my research is based on. Sound has been used to emotionally manipulate audience members for decades with sound stings and off-screen events that we can only see through the sense of sound. Martin (2012) has a doctorate in psychology and has written numerous novels on the human brain and horror media. One line in particular from his 2012 article, "*(Why) Do You Like Scary Movies?*" aided in my research on soundscapes in horror, as he writes:



"Horror is primarily a sound-based medium". With the addition of close-listening to the horror viewing experience, the listening aspect gets elevated to a new level of terror.

By listening to horror soundscapes, I explore how they assist in building the terror-inducing sound encapsulation that horror media is famously known for. I take an aural approach to the emotional impact on the audience, investigating the entirety of the soundscape rather than just the film scores. Approaching sound this way will allow future movie producers to understand and utilize sound's raw power and effect on the consumer. Using close listening with *Alien*, *Nope*, and *Get Out* were surreal experiences. I felt myself getting more absorbed in the films. I was paying closer attention to the subtle details that the production team intended to add a new layer of terror to the project. Jordan Peele and his sound design team are experts at this in the two films I analyzed. In *Nope* in particular, the sound designer and editors worked to create a subtly terrifying sound for their creature that left me feeling disturbed and on edge anytime it would make an appearance. I go further into detail on the use of sound in these films later in this paper. In horror games, however, the sound is such an integral part of the gameplay that if it were removed entirely, the player would be left stranded in certain portions. Not knowing where the creatures are coming from or if they are safe, this mechanism is used throughout the recent video game *Deadspace*. In *Deadspace*, the sound is the player's biggest enemy. The false stings and animalistic noises from the creatures allow the player to have an inkling of where the necromorphs are.

Soundscapes have been used in horror films since the beginning of sound movies. R. Murray Schafer coined soundscape as a composer, music educator, and writer. Schafer says, "[a] soundscape consists of events *heard* not seen" (Schafer 1992, 8). Soundscape is "...the sonic environment. Technically, any portion of the sonic environment is regarded as a field for study" (Schafer 1993, 274).

In *The Sound Handbook*, Tim Crook defines the soundscape as, "the totality of an environment or place from the point of view of

sound (Crook 2012, 20)". Sound, coming from an invisible source, is a compelling element. Film directors and producers have been using acousmatic sound since the first sound-inclusive horror film, *Frankenstein* (James Whales, 1931), which will be discussed in the next section. Acousmatic sound is a sound that is heard, but the origins of the sound cannot be seen. Consider when you are walking into a haunted house attraction around Halloween: You can hear the banging coming from behind the walls, the overpowering music booming from speakers all around you. But then you hear a heavy boot stomping next to you; you think to yourself, "where is it coming from? Is someone about to jump out at me? Maybe it's just a trick." These questions would be running through your mind as you travel through the narrow, darkened halls of the attraction. Your adrenaline is pumping to keep you engrossed in your surroundings; you have not even seen an actor yet! This is why acousmatic sound is so effective in horror sound design. It keeps the audience on edge, making them susceptible to whatever the next planned scare is.

Sara Ahmed is a scholar who focused on affect theory which can be described as a theory that seeks to organize affect, more specifically in dealing with emotions. In her article *Affective Economics*, Ahmed (2004) uses the notion of affective economies in conjunction with emotion, specifically fear and anxiety. She explained how emotions work to "stick" people together, and how this notion of being stuck together will lead to a collective. One piece in her work that stood out to me was an indication of fear, "...fear is intensified by the impossibility of containment. If the others who are feared 'pass by', then the others might pass their way into the community..." (Ahmed 2004, 124). Ahmed wants the reader to understand the social nature of emotions and how they enable a group of people to be bound together by them. Similarly in a horror movie theater showing, the group of people have been brought together by one commonality, the movie, and then share in the fear produced by said film. In a horror film, the experience of fear wanes as the object that is connected to the fear, like the killer in a slasher, leaves the scene after claiming another victim. The audience experienced the fear completely, both viscerally and personally.

Horror came onto the cinema scene in the 19th century with Georges Méliès' film, *Le Manoir du Diable* (House of the Devil), in 1896. This three-minute horror film was still in the silent movie era, but it led the way for subsequent horror films to be created in the sound era 40 years later. Thus enters the movie *Frankenstein* in 1931. According to Seung Min Hong, author of *Exceptional Sound in Hollywood Monster Horror Films During the Early Sound Era*,

The more important moment in *Frankenstein* is the one in which the audiences see the monster in its entirety for the first time. This is where the sound of the monster's footsteps ominously signals its presence and action before its image is shown on the screen.

(Hong 2019, 220).

The sounds of the footsteps are more critical than the first sighting of the monster because of the anticipation that the footsteps create. Up to this point, the audience has yet to determine what the monster looks like, aside from what they have seen on movie posters. The basis of the horror is in the imagination of the audience. However, hearing the heavy and slow stomping of the boots dragging the feet along the floor as it approaches the camera builds terror. The sound design in film was in its early stages of development, so the engineers used off-screen sound to create a soundscape fit for monster movies. Imagine you are about to face *Frankenstein's* monster for the first time; what sounds would you be hearing? These are the questions that James Whale asked himself when he directed *Frankenstein*. In Spadoni's book *Uncanny Bodies: The Coming of Sound Film and the Origins of the Horror Genre*, he details James Whale and how he pioneered sound design for the genre:

Whale makes these noises fascinating and unnatural sounding again by recontextualizing them, first to set the right mood at the start of his film.

(Spadoni 2007, 101)

Spadoni and Hong also touch on Whale's efforts to capture a shuddering sound, going to the lengths of "putting a microphone inside a casket to record the sounds of the dirt hitting the lid." (Spadoni 2007, 99).

This was a gnarly and forward-thinking sound design because it was the first horror movie with sound design and the sound bite from it. Viewers can think of musical horror motifs from *Jaws* and *The Shining*. As Bruce, the shark, approaches the boat, the audience can feel the booming bass tones from the brass and string instruments in *Jaws* (1975). Whereas in the theme from *The Shining* (1980), the warbling of the synthesizer mimicking an organ brings a feeling of discomfort and unease to the viewer as we pan through the lake. Communications theorist, Stuart Hall, developed the theory of encoding and decoding. This can be understood as, "the process of turning thoughts into modes of communication. Decoding is just the opposite, turning communication into thoughts" (Hall, 2012). From *Frankenstein* to *The Shining* to *Nope*, sound designers and directors have embedded emotion and manipulation into the soundscapes they created.

The reason audiences go to see a horror movie is to get the primal predator/prey rush without putting themselves directly in harm's way. A primal point of view can be understood while watching a nature documentary. The viewers are aware of what it means when a group of wildebeests take a moment of pause at the waterhole. They are acutely aware of a predator's presence, but they are uncertain of the exact location of the lion or crocodile and just when they will strike. The wildebeests are experiencing every level of fear; psychological, physical, and social. When one is attacked, the rest of the herd will scatter and flee the area prioritizing their safety. As consumers would not put ourselves in that exact situation to get that primal rush, so we seek out media to satisfy that need, but with a safety bubble. Primal evokes feelings that are both deeply atavistic and deeply social. Paying attention to soundscapes in horror makes this connection in a way that a purely visual focus on media does not. Typically, people would not want to watch a horror movie by

themselves; they would want to have their partner or some friends with them, similar to going to see a horror film in theaters. We want to have the same social response as those around us, we feed off of the energy in the room; the social response to fear. This social exercise allows individuals to experience fear without having to worry about any physical ramifications.

Many movies in the last few decades have significantly impacted the horror genre. For this research paper, I chose to analyze Ridley Scott's film, *Alien*. This decision was made based on the 1979 Ridley Scott's *Alien*'s critical acclaim as one of the most influential horror films created, and its status as a cult classic. It knows how to string along the audience with the same level of dread that the characters are experiencing. From the film's start, the movie pulls in the viewer with the strings playing in a minor key, expressing feelings of wonder and curiosity. This is all projected through the music of the strings until the fourth minute, when we hear the first sound effect of the film and then begins the soundscape—sharp, digital tones from the ship's computer blare through the speakers. Aurally, the audience is overwhelmed by the humming of the ship and the aggressive digital sound as data rushes onto the screen.

Furthermore, when talking about the sound design and soundscape of *Alien*, it would be a disservice not to look at the introduction of the xenomorph, a parasitic alien lifeform. These creatures grow and feed from their host's insides until they reached a level of maturity, in which they would then be born and kill their host from a traumatic exit from their body. They are towering creatures with oblong heads and a black shiny exoskeleton impenetrable to most weapons. At minute 55:30 of the film, the audience is reintroduced to Kane after he has awoken from his coma. Eating a meal with the rest of the crew, Kane starts to gag and writhe in pain. As the crew is trying to restrain him from doing any harm to himself or others, viewers can all hear a low guttural sound coming from Kane. At 56:20, the sound of Kane's chest plate being shattered from the emergence of the xenomorph, high-pitched nails on a chalkboard

screech from the creature, and an equal scream of horror from the crew. The audience can feel their hearts falling into their stomachs as they hear these sounds.

Returning to what Crook (2012) said about how, in soundscapes, the listener can only experience one point of view to appreciate the sonic experience. I became more aware of the subtle sonic details the directors and sound producers added to the films. In the following example from *Alien*, I could hear the chains tapping each other as they swayed on the ship, and the soft pattering of the condensation hitting Brett's hat. As well as, unfortunately, the subtle heartbeat of the victim just before they die, this detail happens throughout the film. Just before the xenomorph kills each crew member, their heartbeat can be heard in the background. Jordan Peele takes a similar approach with *Get Out*: in any stressful situation that Chris is in, his heartbeat can be heard behind the music. I experienced *Alien* without watching the film, instead, I utilized the prior mentioned approach of close-listening. This added a level of anxiety that I had never experienced while watching the movie before. I was more aware of every sound happening and how the Xenomorph stalked its prey. It made the overall experience far scarier than just watching it as usual. At timestamp 1:07:32 of *Alien*, Brett searches the ship for Jonesy, the crew's cat. The audience can hear a strange warbling in the distant background while Brett tries to get Jones from its hiding place. Tense music is playing with a growing tempo as Jones growls, and we can hear Brett's heartbeat joining the music as a *keynote sound*, which is a musical term; it is the note that identifies the key or tonality of a particular composition. The warbling and shrieking get louder as the xenomorph makes its first on-screen appearance before it snatches up and kills Brett, claiming its first victim. In this example, the audience was only able to experience the soundscape from Brett's point of view and was only able to hear what he heard. *Alien* is considered a horror film classic; the soundscape kept audiences on the edge of their seats, fearing when the *Alien* would appear and how dangerous it was!

Moving into the realm of video games, *Silent Hill* is a horror survival video game that came out on the original PlayStation in 1999. The game's premise is that the main character wakes up after a car accident and cannot locate his daughter. He sets out into *Silent Hill* to find her, encountering numerous unsettling creatures and events that leave the character and player unsettled. William Cheng, Associate Professor of Music at Dartmouth College, wrote the book *Sound Play: Video Games and the Musical Imagination* (2014). In the book's third chapter, Cheng depicts his experience while playing *Silent Hill*, the emotional rollercoaster it takes him on, and some short-term effects he experienced from the sound design. One particularly noteworthy section is the power of soundscape design for a horror video game.

... the game's audio works to unsettle a player's mental and bodily control. Through comparisons of discourses on noises and monsters, I frame the sounds in the gameworld as living monsters in their own right; abject, liminal, and always potentially trespassing on player's own spaces.

(Cheng 2014, 96-97)

Cheng dives into the emotionally manipulative aspect that the creators and sound designers of the game went through to make the player feel the character's pain and stress. Cheng writes, "[p]aranormal externalizations of Alessa's pain are mirrored in the player's distressing interaction with the game. *Silent Hill* compels its player to empathize with Alessa's suffering via gameplay that stresses vulnerability instead of blazing guns and superhuman feats" (Cheng 2014, 95). This game's aural mechanics hone in on the player's senses because of the vulnerability of the character they are playing, really sucking them into the fear and experience of gameplay. One more quote from *Sound Play* that I felt was impactful on the history of soundscape design in horror video games is the following:

For while we can afford to cover our ears and close our eyes when things get scary in a horror film, this isn't a realistic option when playing a horror video game. For the sake of Harry's survival, a player is impelled to stay on high alert, to tolerate every terrifying byte of audio-visual data.

(Cheng 2014, 97)

As is implied through this quote, horror video games put the player in the driver's seat, whereas with a movie, the audience sits in a sidecar with no control over what will happen. This is a significant part of where horror movies and video games differ; with films, they can choose to turn away from the sound that startles them. Nevertheless, with a video game, you are piloting that character and are responsible for what happens to them.

The development process of sound design for the horror genre has improved immensely since *Frankenstein* in 1931. Filmmakers evolved from symphonic methods of getting the desired emotional reaction from the audience to a more immersive method. They began to use sound design to surround the audience with an aural ambiance that would keep them engrossed. This will be explained in the examples of Jordan Peele's 2017 film *Get Out* and 2022 film *Nope*. As the technological advances that come with time improve, so has the allure of horror media. Comparing the low grumbles and thunderous stomps used in early horror films and now looking at sound recordings of ear-piercing subway train brakes, horror soundscape design has come a long way. In comparing *Alien* (1979) to *Nope* (2022), there have been significant improvements in how sound design can suck in an audience. *Alien* focused on sound effects and sound stings to get the audience to experience that prey mindset while being stalked around the ship by the Xenomorph, the alien. In the 2022 film, *Nope*, Jordan Peele wrote the movie with sound in mind. Sound is a character in this film; everything in the movie is surrounded by sound and the importance of sound. When looking at horror media from a Communications standpoint, it is important to remember that every creative choice that a director and



writer make has meaning behind it. These meanings have evolved just as the genre has evolved, as pointed out in the book *The Sound Handbook*, Crook (2012) cites Theo Van Leeuwen in his theory of inclusion and exclusion:

The trend in communication is now towards immersion rather than detachment, towards the interactive and the participatory rather than towards solitary enjoyments, towards ever-changing dynamic experiences rather than towards the fixing of meanings as objects to be collected.

(Van Leeuwen, as cited in Crook 2012, 197)

The trend of immersion in media speaks to how important sound is to film, especially horror films. There are beliefs that without sound involvement in horror movies, they would not be as captivating as when sound is incorporated. In a recent article by Mathias Clasen (2022), the author explains why and how sound is important to horror movies. He has the following to say about the recent use of low-frequency sounds in film: "Some filmmakers have even experimented with so-called infrasound, which is sound at such a low frequency that we do not consciously register it" (Clasen 2022, 1). This use of low-frequency sounds can be seen in Jordan Peele's films, *Nope* and *Get Out*. Liminal and low-frequency sounds surround the entire character and understanding of Jean Jacket in *Nope*. Jean Jacket is an alien in the film who appears in many different forms such as the stereotypical-looking UFO, a cloud, but then an almost angelic jellyfish-looking creature. Jean Jacket is a living being who inhales its victims/food through the opening at the center of its underside. It sees anything that would look at it or challenge it as a threat and must kill the threat for dominance over its territory. These low hums that the audience hear from Jean Jacket when they first try to figure out what it is are surrounded by feelings of dread and unease, and just nope. Viewers do not want to go anywhere near that creature because of the low rumblings they hear as it shoots through the sky, putting them back in a primal prey state of survival.

*Dead Space* (2008, Electronic Arts (EA)) has revolutionized how horror video games manipulate audiences through sound. There is no set sound loop or repeated scares used in *Dead Space*. In *Dead Space*, players are constantly manipulated by the sounds in the game. There are false sound triggers everywhere. Players can hear crashing fixtures and electrical surges from damaged machinery and electronics in the game. Players are exposed to monster “rawrs” (or roars) which would make them think they are about to be killed, but the creature is in an “out of bounds” area. False musical stings can make players think enemies are nearby, increasing their nervousness and heart rate when alone. The boss-battle style of music, which is fast in tempo, heavy in brass and percussion to get across the urgency of the setting, will play in the game's darkness. Because the ship is so heavily damaged, the player has to maneuver through mostly blacked-out areas where the only light is provided from their helmet in a small radius. These environmental and visual limiters leave the players floundering about, trying to find where the monsters are, and if they are even in the room. This game submerges players in a crashed ship, similar to *Alien*, and all they are equipped with is a weapon with a flashlight attachment, which is the only trustworthy light source in the game unless the environment allows light. Now, because this game takes place in space and the main character, Isaac, is equipped with a fully functioning space suit and helmet, he can enter the silence that is Space. This factor of silent outer space comes back later in the game when the player has to maneuver outdoor areas where it is impossible to hear the creatures approach and must rely on the vibrations from their feet on the metal surfaces.

Schafer (1993, 8) states, “A soundscape consists of events heard, not seen”. This concept seemed to be in the minds of sound designers for *Dead Space* when they decided how to build the aural environment of their game. Returning to acousmatic sound again while playing *Dead Space*, countless aural markers alert the player to some impending monster or the triggering of an event. These sounds could be leading the player astray from what is genuinely awaiting them behind the locked door, which adds to the heaviness of the soundscape. We cannot see what is beyond the door, but we

can hear it – the grueling low scrapes of claws against the metal walls, the crashing of fixtures, or basic mechanical movements on the ship. When the player finally approaches the door to press forward, they are filled with anxiety and panic, trying to decipher what is awaiting them behind this door. It is important to note that the soundscape has two main parts: the keynote sounds and signals. Schafer defines these terms as follows:

Keynote is a musical term; it is the note that identifies the key or tonality of a particular composition. ... Keynote sounds do not have to be listened to consciously; they are overhead but cannot be overlooked, for keynote sounds become listening habits in spite of themselves... Signals are foreground sounds and they are listened to consciously.

(Schafer 1993, 9-10)

The *keynote sounds* in *Dead Space* are the musical segments that can be heard when an enemy is around the player. They stay in the background and subconsciously alert the player that danger is nearby. Some announcements play in the background that mask any dangerous sounds that would have been heard clearly. Signals are everywhere in *Dead Space*; stomping, grumbling, and slithering of creatures are the sounds that trigger a player's fight-or-flight response. The sound of a violin playing in the way that a spider would move induces panic and fear in the player as a creature crashes into the frame during a cutscene. No area in this game is safe from sound. Overall, sound design mechanics and the use of sound to induce fear have improved and excelled since the creation of early horror games, and now, we have the remake of *Dead Space*. There was an interview conducted with the audio director of *Dead Space*, Don Veca, where he was asked about the use of music in the video game and the role it played behind the sound effects of the creatures, and he had this to say, "[i]n the final incarnation of the game, the music plays a huge role in the overall soundscape; it's the drama behind everything. It's sometimes very subtle, but can at a moment's notice move seamlessly into a blaring dissonance

cacophony, supporting the action and drama of the gameplay” (Veca, 2009). Over all of the iterations in the *Dead Space* franchise, sound has been at the forefront of the creator’s minds in how to ensnare the players into a false sense of security. Be it through sound bites that will make them feel as if they are jumping out of their skin, to an overwhelming barrage of sounds that leave them in a state of paralysis, unable to move forward. The sound designers and producers of *Dead Space* have been keenly aware of their manipulation of sound in their games.

Horror has had psychological and physiological effects on audience members since the dawn of its creation. From 1896’s *Le Manoir du Diable* to *Nope*, to *Silent Hill* and *Dead Space*, directors, and sound designers have found new ways to manipulate the audience. Whether through sound effects, compositions, or the creation of soundscapes, emotional manipulation is a common factor in the decision-making stage. Horror media have been using jump scares, sound stings, and false scares to get a fright out of their viewers, effectively getting a psychological and physiological reaction out of them. In this section, I will explain horror’s psychological and physiological effects on its audience through sound.

Jordan Peele’s first movie, *Get Out*, used sound in a classic way that made the audience empathize with the main character, Chris. Because of how the soundscape was designed, we were psychologically put right into Chris’s shoes, even in his most uncomfortable situations. The use of sound in *Get Out* is intense yet methodical. Jordan Peele and Trevor Gates designed the soundscape of *Get Out* to include subtle cues and signifiers for both the audience and characters to alert them to any coming danger, especially in the Sunken Place. The teacup tapping could be heard subtly at the beginning of the movie and became more evident as Chris fell further into danger. Missy, the mother of Chris’s girlfriend, used the aural cue of the teacup tapping as a weapon against victims that she would send them into a state of paralysis, and the Sunken Place. For *Get Out*, the tapping sounds were used as keynote sounds as they would be heard unconsciously but unable to be ignored. The sharp tone from the spoon is enough to

break through any lull in sound in the film, as seen in the first scene where Missy is interrogating Chris on his health-related habits to see if he would be a good candidate for their body-snatching ploy. The cup tapping sends Chris and past victims into a trance, making them more susceptible to her psychological warfare. Due to the undertones of classism in *Get Out*, the teacup was an inventive tool for Missy to use as the hypnosis mode. The teacup was far more subtle and nuanced than the stereotypical pocket watch that Chris pokes fun at. Sharing a cup of tea is a time-held ritual for many societies and cultures and is seen as a universal sign of hospitality. Chris was brought into Missy's office with an olive branch and a cup of tea to get to know each other better and maybe for Missy to help Chris with his smoking habit. However, it is ironic because Missy uses the teacup as a secret weapon, which was inventive and creative for Jordan Peele to implement in his film. The tapping of Missy's spoon on her teacup and the Swahili chanting at the film's opening credits are very jarring to the viewer. There are several scenes in *Get Out* when the audience is bombarded with a seemingly endless barrage of sound cues and the harsh pitch increases when certain characters rush across the scene. For example, at the time stamp 30:12-30:28, Chris is standing outside Rose's family home at night, about to smoke a cigarette. The audience does not get a break from the sharp violin crawls as Walter, the groundskeeper, sprints towards Chris, only to veer out of the way at the last moment. The audience and Chris are left attempting to catch their breath and recover from the jarring event, only to have a sound strike as the camera cuts to Georgina, the housekeeper, staring out the window in Chris's direction. In the second part of his article noted previously, Clasen (2022) wrote about how horror movies are only as scary with sound. One quote that held significance for this paper was as follows:

This tendency to overestimate the speed of approaching sounds is called 'auditory looming bias' and is presumably a biological survival mechanism. ... If we automatically perceive a rapidly approaching sound as a sign of danger (for instance, a hungry pred-

ator moving towards us), there is a greater chance that we react quickly and adaptively and avoid being eaten.

(Clasen 2022, 2)

This reaction is exactly what happened with Chris in this scene. The viewer is ambushed by sound in a predatory sense. The following article was written about the same topic and spoke with the composer for both *Get Out* and *Nope*. Gabriel Falcon interviewed David Pogue, sounder designer of *Nope* and *Get Out* on how impactful sound is on the viewer and how it can add to the film's intensity: "[w]e know that the brain is responding to that by activating those brain areas that are going to be involved in protecting you" (Lacagnina, as cited in Falcon 2018). In many of the shots in *Get Out*, the viewer is put in Chris's shoes and consciousness. However, because we are safe while watching a movie, we do not perceive the same level of danger that Chris does. The sound can sometimes suffocate in *Get Out*, literally for Chris, but metaphorically for us as audience members. For example, at 1:31:45, when Jeremy, Rose's brother, is choking out Chris, we can hear the sound of his clothed arm gripping around Chris's and our ear, putting us right into that situation. Viewers can hear the harsh movement of the fabric-on-fabric-on-skin sound as Jeremy presses his arm against Chris's ear to choke him out. The soft grinding, gripping sound of the cotton/polyester scrubs rubbing against a microphone sends a shock and shiver through the spines of all parties involved. Sharing my experiences of close listening to this media allows for an introspective understanding of what an individual is feeling when exposed to these stimuli. It allows for a more intimate understanding of what the sound design team wanted to invoke from their soundscapes. Because I was more acutely aware of the sound choices of the film, it heightened my fear and paranoia, but also made my reactions to startling stimuli; jump scares, aural stings, and even soft creaking of floorboards, more intense. These additions made the process of close listening to the films and gameplay more enjoyable but also allowed me to gain a new appreciation for the editing team and producers of a project.

Falcon, whether he knew it or not, took a page out of bell hooks' work with the following quote about the use of Swahili chanting in the film's title sequence. bell hooks's theory on othering came to mind when reflecting on the use of Swahili chanting in the film's title sequence. hooks said, "[i]t's all about the unknown. When you can't understand what it's saying, then that pulls into your own fears of making things even worse than they might really be, right?" (hooks, as cited in Falcon 2019). In this clip, they incorporated Swahili chanting, which led to a feeling of unrest from the audience because they did not know what was being said. bell hooks also looks at the use of the status quo in society and how it is maintained. In the book *Black Looks: race and representation*, she has a chapter entitled "Eating the Other." In "Eating the Other", she says, "[e]xploring how the desire for the Other is expressed, manipulated, and transformed by encounters with difference and the different is a critical terrain that can indicate whether these potentially revolutionary longings are ever fulfilled" (hooks et al. 2001, 22). An example of this can be seen in the Bingo scene in *Get Out*, where the 'bidders' are first shown studying Chris and seeing if he has the physical attributes that they would be interested in having for themselves. They do not look at him as a person, but as something to be bought and transformed into a host they desire for selfish purposes. Chris and the previous victims are seen as mere commodities. bell hooks had the following to say about commodity and "Other": "[c]ommodity culture in the United States exploits conventional thinking about race, gender, and sexual desire by "working" both the idea that racial difference marks one as Other" (hooks et al. 2001, 22). Chris and the other main characters of *Get Out* struggle to keep going with the film's narrative of 'normalcy' even when everything around them is going wrong. The notion of "Other" is prominent in the silent auction and then after Chris becomes aware that not everything is "normal" with Rose and her family. *Get Out* is especially notable for its use of aural cues to indicate when the status quo is being broken or challenged.

What parts of our brain does sound affect, and how is it processed? Neil Martin (2019) wrote about why people like horror movies and the psychological responses to horror films. One section, in particular, found that sound affected certain brain parts most strongly. Examples of this design are in horror films, as discussed earlier:

Discordant music has been associated with activity in different brain regions to those found when listening to harmonic or pleasant music; these regions include the right parahippocampal gyrus and precuneus and bilateral orbitofrontal cortex (Blood et al., 1999) and may suggest that these regions are involved in mediating our auditory response to some aspects of horror film.

(Martin 2019, 5).

When viewing a horror movie or any form of horror media, certain parts of the brain will be stimulated by the movie or stimulus. As described by Martin in the quote above, while experiencing a horror movie score, the person will feel tension and unease; the regions of the brain that trigger this response will be located in the hippocampus; which controls emotional response, and the frontal cortex; which handles emotional regulation. Discordant music is typically lacking in harmony, thus creating dissonance, which will trigger these portions of the brain to emit feelings of fear and vexation in the viewer. These psychological and physiological responses are why these aural tropes have been recycled in each new horror film iteration. The movie *Get Out* allows us to look into the hidden, twisted nature of Rose and her family. As audience members, people are safe in their homes, but we are experiencing every twist and turn with Chris as he meets his girlfriend's family.

To tackle the monster that is *Nope*, it has to be noted again that Jordan Peele wrote the script with sound in mind from the perspective of the character itself. Every scene from the shooting of Gordy's House, the fictional TV live-action sitcom, is surrounded



by sound, forcing the audience to envision what is happening due to an impaired/blocked visual line of sight. This decision, on the part of the director, makes this sequence even more impactful to the audience. We can hear the squelching, tearing, and ripping of what the audience has to assume are the cast and crew members trying to fend off a raging chimp, Gordy. What this is doing to audience members is putting them in the place of child Ricky, one of the leading human characters, trying to figure out if anyone is coming for him, or if he is the next person Gordy will attack. With each movement, we can hear his panting and hyperventilation, causing us to mimic his reactions. While our line of sight is blocked, the audience can, unfortunately, hear everything, leaving them wondering what is happening out there.

Moving back to a scene prior in the film, after the crowd at Jupiter's Claim is inhaled by Jean Jacket, Angel is getting into his work van after putting up the rest of the cameras on top of the house. As he tries to leave, the radio in his van dies out in a slow-falling pitch until there is nothing but silence. At timestamp 1:16:39, Jean Jacket's theme can be heard as Angel leans forward to see above him. At 1:17:31, inside the house, when Angel gets to safety, what sounds like the brakes on a train are heard screeching to a halt, turning our blood cold and putting both characters and viewers in a fear-induced paralysis. The same thing happens to OJ when he tries to return with Lucky; only this time, the rain that once poured onto his van goes quiet. There is a shadow over him, and as he leans out the door to see if his suspicions are correct, we experience a low guttural growl from Jean Jacket and hear another simple "nope" from OJ. Skipping ahead a bit to 1:19:36, the orchestra hits the devil's tritone as blood floods down the house and over the windows in a display that would humble Carrie. The devil's tritone is a chord surrounded by dissonance and lack of harmony among musical notes. The notes played in the devil's tritone are between a perfect fourth and a perfect fifth. In this scene, the characters are terrified and paralyzed by sound and impending doom, wondering if Jean Jacket can tear the roof of the house off to get to them.

We will now return to *Alien* for more aural examples of soundscape use in the film and how truly terrifying sound can be. Kane has just recovered from the "face-hugger" attaching itself to his face through his suit. Ash, the android aboard the *Nostromo*, left the alien lifeform unharmed on Kane's body for observation, only for everyone to return to the room to find that the creature had removed itself from Kane at timestamp 47:40. Then, from minute 55:00 to 56:40, there is pure horror soundscape chaos. First, we hear Kane beginning to gag in the dinner area, and it only gets worse, causing him to beg, retch, and thrash about as the rest of the crew (minus Ash) crowd around him, trying to figure out what is going on with him. At minute 56:00, the crew hears an old-school monster roar (a low guttural sound) coming from inside Kane and what sounds like a vacuum getting clogged shut. The next few seconds go down in cinematic infamy. We can hear the chest plate beginning to crack as a spurt of blood comes out of Kane's chest. At 56:20, the baby xenomorph is born, bursting forth from Kane's chest cavity, famously catching all of the actors off guard, and their screams of fear and terror are their genuine reactions. From 55:22-56:40, the subtle heartbeat from Kane can be heard, increasing in the background as his distress and discomfort climax to the xenomorph bursting from his chest; the heartbeat slows down at this point and stops when the xenomorph scurries from the table off-screen.

The atmosphere in horror video games is vital to the gameplay for the player and the community at large. This is what Andrea Andiloro (2022) describes in a study of the game *Dark Souls*. The author writes, "[m]ood has been addressed by music scholars stressing the importance of sound for the control and manipulation of player mood and emotion as well as establishing an immersive gameworld" (Andiloro 2022, 209). Like in *Dead Space*, *Dark Souls* uses music as a warning signal for players to know that danger is approaching and to be ready. *Dead Space* uses sound as a way to keep the player confused about what is going to happen next. As the player progresses, they learn what specific audio cues mean. If the players hear a sudden clanging on the ground from a tool that has just fallen, they may think that an enemy is nearby, when

it could just be a fakeout by the game. Sound is constant in this game; through some of my play-throughs, I have noticed that I can hear the ship creaking even when I am not moving. It has left me petrified to move forward, questioning whether I am about to get jumped by a creature around the corridor. Sound keeps the player alert, but in a prey mindset rather than calm and in control because there is no true sense of what the sound could be indicating. In some regions of the game, the player can hear stomping, almost machine-like, but they cannot distinguish from what location or direction they are coming from. The hissing from the hulls can mask an enemy's movement if the player is close by and actively moving machinery or mechanics, which will be a disservice to their health supply. Random minor-keyed violins will play, which could cause the player to think they are approaching creatures when they may be safe. Mary Ballard (2021) performed a research study on the effects of horror video game sound effects on cardiovascular response. She looked at several other undertones; however, for this paper, I focused on the effects on those who played with the sound on and those who played with the sound off and how they differed. Ballard found that the sound effects in the survival horror game resulted in more significant cardiovascular and affective arousal (Ballard 2021, 184). Those who played the game with sound showed higher blood pressure and heart rate than participants who played in silence. The study showed that those in the test group playing with sound effects were likelier to be scared than those who played a silent game. Ballard's study backs up the theory that horror media have a visceral reaction on their audience, explaining why Ballard's test subjects showed their physiological responses to the game.

The theory of commodity has long since been a topic of communication studies and has been used in many educational texts. Guy Debord was a French Marxist theorist who focused on how capitalism used media to control people and alienate them into groups of themselves. He also looked into the idea of spectacle as a commodity for the culture to use media as a sense of false reality to the masses. Debord's theory on the commodity as spectacle and how it helps separate the product from the producer are helpful for

the production of horror media. The commodity stands for the social relation that the consumer would have with the producer. Consumers unknowingly see the media as a spectacle in removing the game from the production company. As sound design technologies grow and advance over the decades, consumers can voice what they liked and did not like about a media's use of sound, like if there were too many aural jump scares, the sounds were ineffective; or if they were too gruesome. This process by the audiences gives the production companies valuable information on how they can improve on their next project. The whole purpose of the spectacle is to sell, and horror feeds off of that by the sheer amount of franchises created in both horror movies and video games.

Dallas Smythe was another communications theorist/political activist from the 20th century who focused on the political economy of communication. His research was primarily on mass media and telecommunications. Smythe says the audience's interaction with media allows them to give the creators or developers more information on improving their product/idea. The audience themselves are the commodity that companies want to take advantage of. The audience's feedback on horror movies and video games specifically allows companies to know in what direction they need to move to stay relevant. The more audiences show the desire and need for these specific media types, the more the producers will create these goods. In the vein of *Dead Space* and Jordan Peele's version of horror movies, they can see what their audiences enjoyed the most from them and how to continue to play on those aspects and improve what they did not enjoy. *Dead Space* came out in 2008 and was one of the first games to put players in a problematic life-or-death position. Ammunition is limited; like in *Resident Evil*, the soundscapes suffocate and encapsulate simultaneously, keeping the players in a near-constant state of distress and panic.

As I had hypothesized early in my development of this paper, people partake in horror media for various reasons, including stimulation. When people are scared or in a frightful situation, a chemical reaction in their brains increases adrenaline. This boost in adrenaline will trigger the fight or flight response, deciding how they will react to the

scare. Haiyang Yang has a PhD in marketing and decision-making while being an associate professor at Johns Hopkins University Business School. His counterpart in the 2021 article, “*The Psychology Behind Why We Love (or Hate) Horror*” is Kuangjie Zhang, who also has a PhD in marketing and his research specializes in brand representation and is an associate professor at Nanyang Business School, Nanyang Technological University, Singapore. People are most excited and frightened when watching a horror movie or playing a horror video game Yang and Zhang (2021) then discuss how we can gain novel experiences from horror media. That sense of accomplishment you may get from beating the final boss near the end of a game or surviving the movie long enough to see if the protagonist makes it out alive! Those who seek out this dopamine rush from beating a horror game or surviving through a film get to say that they did just that: they survived! They were able to do what other players or characters could not. Through this medium of film or gameplay, the individual can experience intense emotions and peril without having any genuine physical harm come to them, even if a character gets harmed. It is a small way they can play God, controlling a character and pushing them forward through a terrifying experience, and being able to say they made it out of the situation. In certain games not mentioned in this paper, the final boss fight usually can take a few tries for them to beat. The final boss battle is the culmination of the player’s work to upgrade their character’s armor and weapons to defeat the last enemy in their way of winning the game. This fight is not always easy; one fight can even take multiple tries for them to win. This is a significant barrier that they have to get past to complete the game entirely. It could have a similar feeling of accomplishment when finishing a semester at school or even graduating, getting through a grueling exam that they felt would never end. Accomplishment and relief sense that the trial before them is finally over, and they can have that sigh of relief.

A 'protective frame' is described by Yang and Zhang (2021) as the psychological nature that allows individuals to derive pleasure from being horrified. The protective frame is broken down into

three categories: a safety frame, detachment, and ‘our confidence in controlling and managing the dangers we encounter’ (Yang and Zhang, 2021). In the first category, it must be believed that people are physically safe from the danger in the game. When talking about the psychology in horror media, Yang and Zhang talk about when an individual can derive pleasure from consuming horror, and they have the following to say about it, “We can derive pleasure from the horror as long as we believe that the evil entity is physically distant from us and hence cannot cause harm to us” (Yang and Zhang, 2021). With detachment, we have to be able to psychologically detach from the experience of the game or movie, reminding ourselves that the killer on the screen is just an actor and cannot cause the viewers genuine bodily harm. In the last category, we must have confidence that we can control and manage the dangers we may encounter. This is true in a haunted house attraction; the actor may pop out of a door or from behind an object in the room, but the person has that confidence that they can easily escape out of the door that leads down the hall and out of the attraction itself. It is what drives people to push through these scary sources of entertainment.

Soundscapes are used in every form of media, but they are manipulated in different ways for the desired outcome of the producer. Fundraisers, awareness advertisements, and public service announcements (PSAs) use this skill well. These types of advertisements use sound to manipulate the audience into feeling sympathy and the desire to aid those who are in unfortunate situations through a monetary donation. When you see an ASPCA commercial and hear *Angel* by Sarah McLachlan, you are filled with sadness and heartache for the animals on your screen. While the song is in a major key, the tempo is relatively slow, allowing Sara’s sustained notes to float around the listener while backed by a solo piano. The notes from the piano have a solemn, pained backing to Sara’s lyrics of pain and agony. The listener can almost feel the anguish in her voice, which translates to their sadness and pain. Listeners will donate, which is the commercial’s desired effect, or they will change the channel because of how heavily the song plays on their sympathetic emotions. There are also opening theme songs to shows,

like *Bluey* (Ludo Studio 2018) that are in a major key, which can bring the viewers joy and happiness, which matches the material the show delivers. *Bluey*'s sound designers created a joy-filled opening theme that was bouncy and energetic, getting the viewers ready for an entertaining episode. The song's tempo is quick enough for the listener to bob their head to the beat. It is a catchy tune that allows it to get stuck in the listener's head, while the notes are consistent in their repetition, which can cause it to become an earworm, a catchy song that can run continually in a person's mind. It is rather simplistic, employing a saxophone, clarinet, flute, and drums to create the recognizable intro song. These kinds of opening themes play on the light-hearted and the remnants of childhood for the parents and adults watching with their children. When the production companies can match the tone of the media with the sound design team well, they can create an emotionally manipulative or suggestive soundscape that will achieve their desired outcome. These examples use soundscapes to their advantage; they are used to get the desired effect and emotion from their audience. It may not be as malicious as the horror producers, but they still get that emotional response.

We, as people, are notorious for seeking out the "next big thing" in media that can hold our attention. Horror is an acquired taste and is not for everyone. Content analysis of horror historically looks at the musical scores and how they add to the scare factors of the medium. However, what needs to be looked at are the sound effects and how they come together to create the anxiety-elevating soundscapes that engrosses the audience. By looking through the lens of horror soundscapes, I found how sound designers build terror-inducing soundscapes that keep consumers returning to the genre. Using acousmatic sound forces the audience and players to figure out what and where the sounds causing them a great deal of fear and anxiety within a protective frame are coming from. I discovered that horror media have such a substantial effect on the audience because they give us that adrenaline rush that we crave but without the threat to our lives. In *Get Out* (Jordan Peele, 2017), Missy uses the teacup as a medium for the horrors she and her family took part in. The subtle clinking of the porcelain cup was

used to enrapture the audience and Chris into sending us to the Sunken Place. Moving forward five years to *Nope* (Jordan Peele, 2022), Jordan and his sound designer have perfected their version of a horror soundscape. From the harrowing sounds of *Jean Jacket*, both inside and out, to the entirety of Gordy's Home massacre that we cannot even see, this film was written and created with sound at the center of it all, and that is precisely what we received.

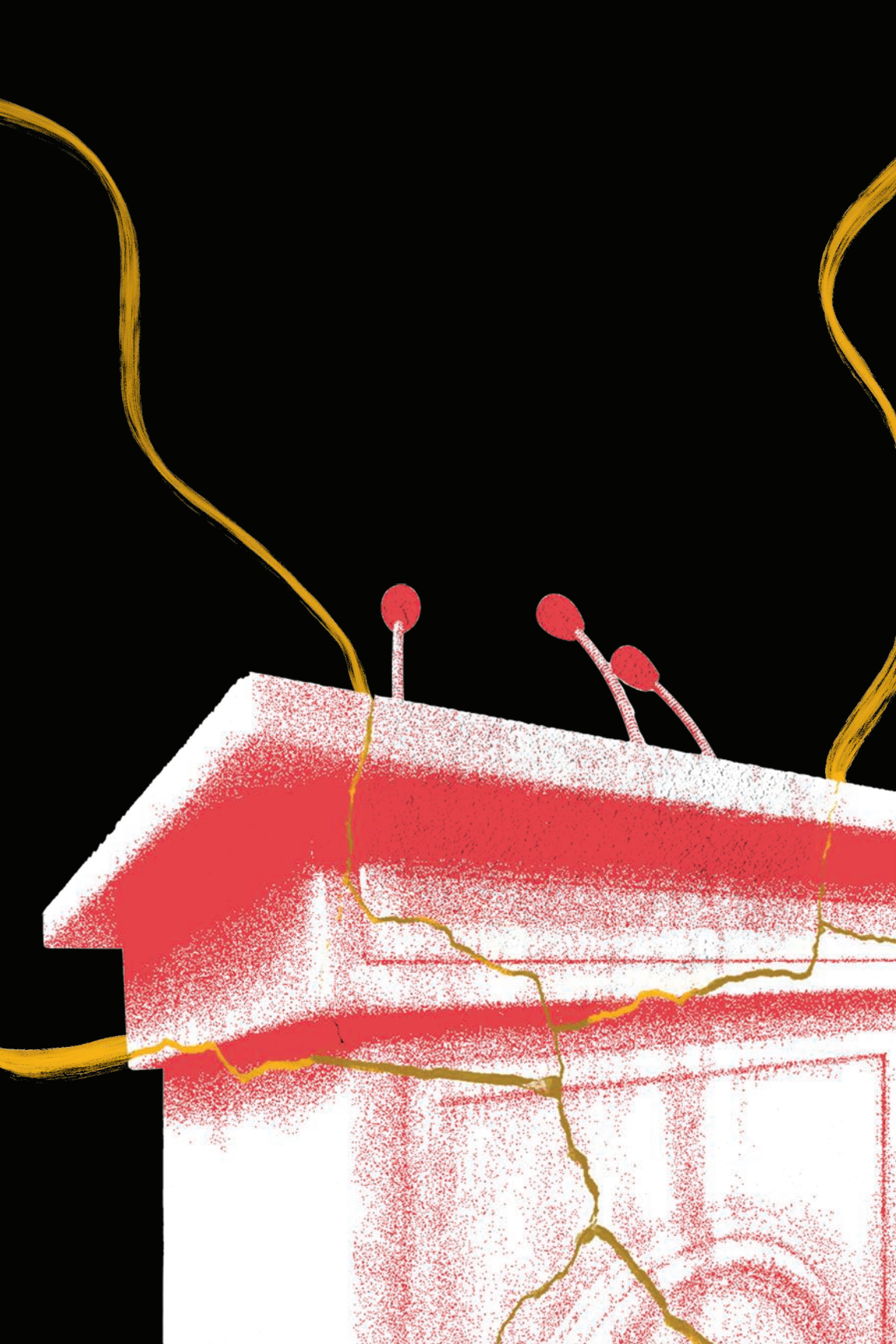
*Alien* (1979, Ridley Scott) plays on the unknown of when the xenomorph will strike; the audience, after its initial birth, which was an aurally harrowing scene for both viewers and cast to get through, is left petrified of when and who it will attack next. For example, mixed with the atmospheric sounds of the ship before, during, and slightly after Brett and Kane's deaths, their heartbeats can be heard in the background of that scene's sound. Lastly, the aural gauntlet *Dead Space* (2008, EA Redwood Shores) leaves the player in a constant state of paranoia on whether they actually heard a creature skulking from around the corner, or if it was just a false indicator. Or if they are in a soundless vacuum of space, is that their faint steps on the metal exterior, or is something stalking them, and they just do not know it yet? For those brave enough to seek out the genre, it triggers several different emotions and branches of those emotions. The next time you are experiencing horror media, take the time to take every element of the film and figure out what makes it scary for you. You might start to notice these common soundscape elements used in different forms of media. The variety of examples provided in this paper only further proves how important soundscapes are to a medium, and without their skilled use, we would still be in a silent film landscape.



# References

- Ahmed, Sara. "Affective Economies." *Social Text*, vol. 22, no. 2, summer 2004, pp. 118–139. Project Muse, [https://doi.org/https://doi.org/10.1215/01642472-22-2\\_79-117](https://doi.org/https://doi.org/10.1215/01642472-22-2_79-117).
- Andiloro, Andrea. "'This Must be the Place': Understanding video game placeness through the atmosphere and the refrain in dark souls." *Journal of Gaming & Virtual Worlds*, vol. 14, no. 2, 2022, pp. 207–223, [https://doi.org/10.1386/jgvw\\_00058\\_1](https://doi.org/10.1386/jgvw_00058_1).
- Ballard, Mary E., et al. "Horror videogame sound effects, cardiovascular arousal, and ethnic bias in the decision to shoot." *The American Journal of Psychology*, vol. 134, no. 2, 2021, pp. 175–186, <https://doi.org/10.5406/amerjpsyc.134.2.0175>.
- Blumhouse Productions. *Get Out*. Universal Pictures Home Entertainment, 2017.
- Cheng, William. *Sound Play. Video Games and the Musical Imagination*. Oxford University Press US, 2014.
- Clasen, Mathias. "Why Sound is So Important to Horror Movies" "Without Sound, Horror Movies Just Aren't Scary." *Psychology Today*, Sussex Publishers, 17 Sept. 2022, [www.psychologytoday.com/us/blog/why-we-love-horror/202209/without-sound-horror-movies-just-arent-scary](http://www.psychologytoday.com/us/blog/why-we-love-horror/202209/without-sound-horror-movies-just-arent-scary).
- Crook, Tim. *The Sound Handbook*. Routledge, 2012.
- Dead Space, *Science Fiction/Horror, Electronic Arts* (2008)
- Debord, Guy, Durham, Meenakshi Gigi, Douglas M. Kellner. "The Commodity as Spectacle." *Media and Cultural Studies: Keyworks*, Wiley-Blackwell, Malden, 2012, pp. 117–121.
- Falcon, Gabriel. "How Scary Music Makes Movies Scarier." *CBS News*, CBS Interactive, 27 Oct. 2019, [www.cbsnews.com/news/how-scary-music-makes-movies-scarier/](http://www.cbsnews.com/news/how-scary-music-makes-movies-scarier/).
- Hall, Stuart, Durham, Meenakshi Gigi, Douglas Kellner. "Encoding/Decoding." *Media and Cultural Studies: Keyworks*, Wiley-Blackwell, Oxford, 2012, pp. 163–173.

- Hong, Seung Min. "Contrapuntal aurality: Exceptional sound in Hollywood monster horror films during the early sound era." *Journal of Popular Film and Television*, vol. 47, no. 4, 2019, pp. 215–226, <https://doi.org/10.1080/01956051.2019.1566201>.
- Hooks, Durham, Meenakshi Gigi, et al. "Eating the Other: Desire and Resistance." *Media and Cultural Studies: Keyworks*, Blackwell Publishers, Malden, MA, 2001, pp. 366–380.
- Isaza, Miguel. "All about the Sound of Dead Space." *Designing Sound*, 22 June 2009, [designingsound.org/2009/06/22/all-about-the-sound-of-dead-space/](https://designingsound.org/2009/06/22/all-about-the-sound-of-dead-space/).
- Martin, G. Neil. "(why) do you like scary movies? A review of the empirical research on psychological responses to Horror films." *Frontiers in Psychology*, vol. 10, 2019, <https://doi.org/10.3389/fpsyg.2019.02298>.
- Peele, Jordan, director. *Nope*, Universal Pictures, 22 July 2022.
- Schafer, R. Murray. *The Soundscape: The Tuning of the World*. Destiny Books, 1993.
- Scott, Ridley, director. *Alien*. Film, 1979.
- Smythe, Dallas W., Durham, Meenakshi Gigi, Douglas Kellner. "On the Audience Commodity and Its Work." *Media and Cultural Studies: Keyworks*, Wiley-Blackwell, Oxford, 2012, pp. 230–256.
- Spadoni, Robert. *Uncanny Bodies: The Coming of Sound Film and the Origins of the Horror Genre*. University of California Press, 2007.
- Tinwell, Angela, et al. "Uncanny behavior in survival horror games." *Journal of Gaming & Virtual Worlds*, vol. 2, no. 1, 2010, pp. 3–25, [https://doi.org/10.1386/jgvw.2.1.3\\_1](https://doi.org/10.1386/jgvw.2.1.3_1).
- Yang, Haiyang, and Kuangjie Zhang. "The Psychology Behind Why We Love (or Hate) Horror." *Harvard Business Review*, 26 Oct. 2021, [hbr.org/2021/10/the-psychology-behind-why-we-love-or-hate-horror](https://hbr.org/2021/10/the-psychology-behind-why-we-love-or-hate-horror).



The background is black with abstract, thick brushstrokes in yellow and red. A yellow stroke curves from the top left towards the bottom right. A red stroke is visible on the left side, partially obscured by a white rectangular shape.

# 03

## Exogenous Crises and Incumbent Governments: A Case Study from Turkey

**HAVVANUR KULU**

Carolyn Forestiere

Department of  
Political Science

# Biography

**Havvanur Kulu** graduated Magna Cum Laude in Spring 2024 with a B.A. in Political Science and a Certificate in Security Studies. Her honors thesis, which investigates the impact of natural disasters on election outcomes in Turkey, earned the Undergraduate Research Award from the UMBC Office of Undergraduate Education. Havvanur has presented her research at multiple conferences, including the Pi Sigma Alpha National Conference. After graduation, she plans to pursue a PhD in Political Science, focusing on comparative politics. She would like to thank her mentor, Professor Carolyn Forestiere, for her invaluable guidance and support throughout her research journey. Havvanur also acknowledges the funding and support provided by the UMBC Undergraduate Research Award (URA) program.

# Abstract

How do exogenous crises like natural disasters, climate change, weather events, or pandemics affect populist leaders? Several studies have demonstrated that incumbent politicians in democratic settings are likely punished for exogenous shocks they are unable to control; however, other scholars have reached different conclusions in other political contexts such as non-democratic and hybrid regimes. To resolve this puzzle, this study investigates the complex relationship between unexpected natural disasters and incumbent support, focusing on the 2023 earthquakes in Turkey and their influence on the elections that took place three months after the earthquake that returned Recep Tayyip Erdogan to presidential office. The analysis of this paper utilizes ordinary least squares regression to explain how the extent of damage in Turkish cities influenced the amount of change in Erdogan's vote share between 2018 and 2023. I find that Erdogan's vote increased by 0.08 percentage points in response to a one percentage point increase in earthquake severity. Considering the rising threat of climate change, this study's results shed light on how increasing natural disasters may help incumbent populist leaders retain their power in subsequent elections.

# Introduction

Governments can cause or exacerbate endogenous crises, but exogenous crises result from factors beyond the control of the government. Because they come from outside sources, exogenous crises are often unpredictable and unexpected, presenting unique challenges to political leadership. These events come from external sources that require immediate and effective response strategies, often under intense public scrutiny. Responding to such crises can significantly shape public opinion, potentially changing the political landscape. An illustrative example of this dynamic is Erdoğan's reelection shortly after two major earthquakes struck Turkey and Syria on February 6th, 2023. These earthquakes affected approximately 14 million people, which accounts for 16% of Turkey's population. Official reports noted that at least 35,355 buildings were destroyed, and around 1.5 million people were left homeless, underscoring the extensive human and infrastructural damage (SBB, Earthquake report). With a confirmed death toll in Turkey of 53,537, these were the deadliest earthquakes in the region's modern history and the most fatal globally since the 2010 Haiti earthquake (World Bank, 2023). These events unfolded as Erdoğan and his party's popularity declined due to economic difficulties, and criticism over their lack of preparedness for such a disaster compounded the difficulties faced by his reelection campaign. This study explores how the earthquakes impacted election outcomes and investigates whether they negatively or positively influenced Erdoğan's support in the May 2023 Turkish presidential elections. It offers a critical examination of the interplay between crisis management and electoral dynamics.

This study was situated within the broader discourse on political reactions to crises, where the intersection of disaster management, public perception, and electoral outcomes came into sharp focus. The study also highlights how populist leaders in hybrid regimes might handle external crises differently from those in more democratic settings. For example, in nations where populists hold strong power, such as Hungary, Poland, and the Czech Republic, the fallout from

the external COVID-19 crisis was minimized. Leaders in these countries employed a strategy of 'naming, blaming, and claiming' to politicize the pandemic effectively, as noted by Boba and Hubé (2021). Moreover, natural disasters like earthquakes in countries governed by populist figures have sometimes reinforced their leadership or shielded them from losing influence. This was evident in the aftermath of Italy's 2009 L'Aquila earthquake, which led to a significant and lasting rise in right-wing populism in the most affected regions (Cerque et al., 2021), and in Mexico during the 2012 elections, where Obrador's vote share in the earthquake-impacted areas of Guerrero and Oaxaca declined less than in other parts of the country. Similarly, this paper examines Turkey's response to an earthquake under President Erdoğan's leadership, providing a detailed case study on how populist leaders manage crises and the impact of these strategies on their electoral support. It utilizes the theoretical concept of crisis management and populist leadership, particularly the 'naming, blaming, claiming' strategy introduced by Moffitt (2015), to explore how Erdoğan's administration addressed the earthquake and its aftermath, potentially framing the narrative to sway public opinion and voter behavior.

This study employed a quantitative research design that drew on province-level data from multiple sources to explore how the 2023 Turkey-Syria earthquake influenced President Erdoğan's electoral support. Electoral returns for the 2018 and 2023 presidential races came from the Supreme Election Council (YSK), while the Presidency of Strategy and Budget (SBB) provided measures of earthquake damage, including the proportion of collapsed or heavily damaged buildings in each province. Additional socioeconomic and demographic variables—population size, GDP per capita, educational attainment, border status, and the share of Syrian refugees—were sourced from the Turkish Statistical Institute (TÜİK). An Ordinary Least Squares (OLS) regression model estimated how earthquake severity was associated with changes in Erdoğan's vote share between 2018 and 2023, comparing earthquake-affected provinces to unaffected regions. The results revealed a small but statistically significant positive relationship ( $\beta = 0.087$ ,  $p < 0.05$ ) between higher



earthquake damage and electoral support for Erdoğan, suggesting that his crisis management efforts may have helped him mitigate or even slightly boost support in the affected area.

In recent years, as populist leadership has gained prominence globally, scientific forecasts have increasingly shown that climate change will likely cause more frequent and severe natural disasters (Baerlocher et al., 2022; IPCC, 2021). As natural disasters occur more frequently around the world, the relationship between exogenous crises and incumbent governments becomes timely and relevant. This analysis aims to enhance the scholarly understanding of how exogenous crises influence political leadership and election results, particularly in countries with populist regimes. The findings of this study are significant not only for political science theory but also for the development of effective political strategies and policies in crises.

## Background

On February 6, 2023, at 04:17 local time, a catastrophic 7.8 magnitude earthquake hit southern and central Turkey and northern and western Syria, with an epicenter located 37 km west-northwest of Gaziantep. According to the Modified Mercalli intensity scale, which measures the effects of an earthquake at a given location, the seismic event is marked as XII Extreme, the highest intensity on the scale. It was followed by a second major quake—a 7.7 at 13:24, centered 95 km north-northeast from the first. This sequence, among the strongest recorded in the Levant, was felt as distant as Egypt and the Black Sea coast of Turkey. The area experienced more than 30,000 aftershocks over the subsequent three months.

The disaster zone covered approximately 350,000 km<sup>2</sup>—roughly the size of Germany—and affected an estimated 14 million people, which accounts for 16% of Turkey's population. Approximately 1.5 million people were reported homeless, underscoring the extensive human and infrastructural toll. The confirmed death toll on February 8th, 2023 in Turkey reached 53,537, making it the deadliest

earthquake in the modern history of the region and the deadliest worldwide since the 2010 Haiti earthquake. As stated by government sources, at least 35,355 buildings collapsed. The economic repercussions were severe, with damages estimated at US \$34.1 billion in Turkey—representing 4 percent of the country's GDP (World Bank, 2023).

The initial response to the earthquakes was significantly impaired by damaged infrastructure, adverse winter conditions, and disrupted communication systems. Turkey's Disaster and Emergency Management Presidency responded with a large-scale relief operation, deploying a search-and-rescue team of 35,250 personnel, 5,000 healthcare workers, and 30,000 volunteers. An international appeal for assistance resulted in a substantial global response, with over 141,000 individuals from 94 countries participating in the rescue efforts. At the height of the operation, the total search and rescue personnel amounted to 166,334, including teams from Turkey's Disaster and Emergency Management Presidency (AFAD), Gendarmerie Special Public Security Command (JÖAK), and other national and international agencies. By February 16, 2023, these concerted efforts had rescued over 8,000 people, some occurring as long as 296 hours after the earthquakes. Following the conclusion of search and rescue activities, the focus shifted towards demolishing extensively damaged structures in the most affected areas (World Bank 2023).

The earthquakes in Turkey-Syria 2023 were a massive exogenous crisis that the government could not control, but the negligent policies worsened the situation. The ruling Justice and Development Party, known as AKP, employed a rapid economic growth strategy that led to widespread construction with often compromised safety standards. Many buildings were cheaply made and lacked earthquake resilience. Although the earthquake was natural, the government's negligence in ensuring building safety exacerbated its destruction (Gokay and Aybak, 2023). Besides the negligence towards precautionary measures to the earthquakes, the institutions responsible for the post-disaster responses, such as The Disaster

and Emergency Management Authority (AFAD) and Turkish Red Crescent (KIZILAY), were the target of criticism from many. According to the extensive earthquake report from the Presidency of Strategy and Budget, 35,250 searches and rescue personnel were mobilized to rescue individuals trapped in the debris of 35,355 collapsed buildings, with nearly every building having just one search and rescue personnel, excluding volunteers (SBB, Earthquake report). In particular, Turkey's disaster relief agency AFAD had witnessed budget cuts during the period of AKP rule and misuse of earthquake-related taxes. At the same time, its leadership lacked expertise due to political influence, and AFAD's response was criticized (Links, 2023).

On the other hand, Erdoğan promptly labeled the event "the Biggest Disaster in the Century" and focused on preventing opposition parties from using it to their political advantage. Avoiding political conflicts, he prioritized announcing new reconstruction projects, including the rapid start of new housing for earthquake victims, with a promise to complete a significant number within a year. His record of swift infrastructure projects added credibility to these promises. In addition, two weeks after the earthquake, the government announced various assistance programs for earthquake victims whose homes collapsed, or were heavily or moderately damaged. This assistance program offered 10,000 TRY (530 USD at the aid announcement date) Emergency Cash Aid, 15,000 TRY (795 USD) moving expenses aid, 5,000 TRY (215 USD) monthly payment for homeowners, 2,000 TRY (106 USD) for renters, and 100,000 TRY (5,300 USD) for the families of those who had died. Despite attempts by the opposition to leverage the earthquake's negative impact, the government's quick response maintained the government's standing. The opposition's lack of a clear post-disaster plan contrasted with the government's decisive actions, suggesting that Erdoğan's administration might have strengthened its position amidst the crisis.

In May 2023, two months after experiencing earthquakes, Turkey held general elections featuring simultaneous presidential and

parliamentary contests. President Recep Tayyip Erdoğan sought re-election, supported by the People's Alliance, which included his Justice and Development Party (AKP), among other right-wing parties. The main opposition, led by Kemal Kilicdaroglu of the CHP, struggled with internal disagreements and a fragmented support base of diverse ideological groups collectively known as the National Alliance.

In the initial round of the 2023 presidential election, held shortly after devastating earthquakes, President Recep Tayyip Erdoğan nearly secured an outright victory with 49.5% of the vote, necessitating a runoff with Kemal Kilicdaroglu, who garnered 44.9%. The proximity of the elections to the earthquakes arguably influenced the political discourse, with Erdoğan leveraging nationalist themes to consolidate support amidst the crisis. This strategy emphasized stability and continuity under his leadership, contrasting with Kilicdaroglu's proposals for change. Ultimately, Erdoğan was re-elected with 52% of the vote in the runoff.

Simultaneously, in the parliamentary elections, Erdoğan's Justice and Development Party (AKP) maintained its majority, though it achieved its lowest vote share since coming to power in 2002. Despite these losses, the AKP's enduring influence underscored its entrenched position in Turkish politics, which was critical in navigating the post-earthquake political landscape. The election also highlighted the challenges faced by the opposition, which only marginally improved its standing, reflecting difficulties in presenting a unified and compelling alternative to Erdoğan's leadership.

Recep Tayyip Erdoğan and his party AKP faced many crises during his incumbency since 2002. In particular, President Recep Tayyip Erdoğan and his Justice and Development Party (AKP) have demonstrated remarkable resilience in various crises, including a coup attempt in 2016, attacks from different terrorist organizations, and the party closure trial in 2008 (Aytac and Elci, 2019). The unexpected outcome of the 2023 elections, where Erdoğan and the AKP maintained power despite the February 2023 earthquake

and economic challenges, necessitates a deeper understanding of the populist strategies at play (Gokay and Aybak, 2023).

The literature on Turkish populism often returns to the ideational approach, which frames populism as a thin-centered ideology that posits society as divided between 'the pure people' and 'the corrupt elite' (Mudde 2007). The socio-political cleavages in Turkey also play a critical role in the populist equation. Scholars explain the historical ethnic and religious divides that shape modern Turkish politics, stemming from a long-standing cultural division between the 'center' and the 'periphery.' These divides are critical in understanding the populist appeal, as they often align with the populist narrative that pits the marginalized 'people' against the elitist 'center' (Aytaç and Çarkoğlu, 2019)

This ideational approach sets the stage for understanding how Erdoğan changed his rhetoric from a social democrat to an Islamist populist. Scholars agree that when the AKP took power in 2002, Turkish politics was characterized as a "tutinary democracy<sup>1</sup>." It was largely shaped by the Turkish military and secular-republican elites, which controlled the judiciary and bureaucracy and had veto power over elected officials (Gokhan and Aybak, 2019). After the AKP won the second term in 2011, the political regime underwent substantial changes, with the AKP diminishing the power of established "center" elites and becoming a competitive authoritarian regime<sup>2</sup>. It is essential to understand this historical shift since it contributes to Erdoğan's framing of political conflicts as battles between "us and them" between his supporters and the secular-republican elites and military (Aytac and Elci 2019, 97).

Several factors might explain Erdoğan's victory in the elections. One significant aspect was the opposition's fragmented campaign, which failed to present a cohesive and convincing alternative, thus contributing to Erdoğan's continued dominance (Gokay and Aybak, 2023). Additionally, Erdoğan's strategic manipulation of the media played a critical role; by shifting the focus from economic issues to national security and controlling the media narrative, Erdoğan

successfully framed the election as a battle against internal and external enemies, thereby consolidating his support base (Esen and Gumuscu, 2023). This manipulation of media and narrative aligns with observations by scholars such as Moffitt (2016), who notes that populist leaders often leverage crises to bolster their legitimacy and appeal to the electorate's desire for stability and decisive leadership. A critical component of Erdoğan's strategy was his exploitation of long-standing tensions surrounding the Kurdistan Workers' Party (PKK), a Kurdish separatist group that has waged an insurgency against the Turkish state since the 1980s. The PKK, officially designated as a terrorist organization by Turkey, the European Union, and the United States, remains one of the most polarizing issues in Turkish politics. Erdoğan repeatedly accused the opposition coalition of harboring ties to terrorism, a claim underscored by his frequent invocation of the PKK during campaign speeches. At several rallies, he even showed a doctored video depicting PKK leaders singing along to Kilicdaroglu's campaign song, a tactic aimed at undermining the opposition's legitimacy (Esen and Gumuscu 2023, 23).

This focus on the PKK not only diverted attention from pressing economic challenges but also painted the election as a fight to preserve national unity and security. The opposition's implicit cooperation with the Peoples' Democratic Party (HDP), which is broadly supported by Turkey's Kurdish population and often accused of having ties to the PKK, provided Erdoğan with further ammunition to frame the coalition as a threat to national stability. Such tactics illustrate how Erdoğan harnessed populist rhetoric to polarize the electorate, appealing to nationalist sentiments while portraying himself as the guardian of Turkey's sovereignty and security.

The election outcomes and the strategies employed by the ruling party underscore the enduring influence of populism in Turkish politics, characterized by a division between 'the pure people' and others. This populist narrative has been a crucial factor in the AKP's ability to maintain its appeal, even as it assumes the characteristics of an establishment party, by stoking fears of external threats and fostering a sense of intimidation among its supporters.

# Literature Review

## Thematic Literature Review

### *The Impact of Natural Disasters on Incumbent Governments and Populist Leaders*

Natural disasters, ranging from earthquakes and hurricanes to wildfires and floods, have long been an unpredictable and formidable force that not only disrupts the lives of individuals but also significantly impacts the political landscapes of affected regions. The relationship between natural disasters and incumbent governments has been a subject of interest. The aftermath of such catastrophic events can pressure governments regarding response and recovery efforts, as well as their political standing and legitimacy. An earthquake, differing from endogenous crises, represents an unexpected exogenous crisis that incumbent governments or populist leaders cannot initiate for increased support, contrasting the scenarios Moffitt (2016) described where leaders could “perform a crisis” for political gain.

Continuing from the existing literature, it is evident that the relationship between natural disasters and incumbent governments is a context-dependent issue. The impact of these catastrophic events on political landscapes is influenced by various factors, including the type of government, the level of preparedness, and the authorities' responsiveness. Scholars concentrating on natural disasters' effects on incumbent governments have reached different conclusions. Several studies (Achen and Bartels, 2004; Gasper and Reeves, 2011; Cole et al., 2012) have demonstrated that incumbent politicians are likely punished for exogenous shocks they are unable to control in democratic settings; however, scholars have reached different conclusions in other political contexts (Lazarev et al., 2014; Baerlocher et al., 2022; Szonkyi, 2012).

In democratic settings, research by Achen and Bartels (2004), Gasper and Reeves (2011), and Cole et al. (2012) collectively emphasize the far-reaching implications of natural disasters on

incumbent governments. These studies offer insights that highlight the profound impact of exogenous shocks on the political landscape and the complexities of how governments are evaluated and held accountable during and after such crises.

Achen and Bartels (2004) explain the concept of "blind retrospection," suggesting that voters tend to attribute blame to incumbent governments when they experience pain or hardship, even if the government had little or no control over the situation (Achen and Bartels 2004, 7). This insight underscores a critical point – in democratic contexts, incumbents may be unjustly penalized for events beyond their control, ultimately affecting their political fortunes. Achen and Bartels highlight how disasters can lead to a disconnect between public perceptions and the actual responsibilities of the government. On the other hand, Gasper and Reeves (2011) offer a different perspective by demonstrating the attentiveness of electorates. They argue that while voters respond to severe weather events, their reactions are not arbitrary. Gasper and Reeves highlight that voters can distinguish between random events and the government's responses to these events, making distinctions based on the defined roles of politicians (Gasper and Reeves 2011, 354). This perspective emphasizes the role of informed and discerning electorates in democratic systems, implying that the quality of government response influences the impact of disasters on incumbent governments. In alignment with Gasper and Reeves (2011), Cole et al. (2012) have found that voters tend to punish the incumbent party more heavily when the government fails to respond effectively to weather events beyond its control. Conversely, fewer voters punish the ruling party when the government responds effectively. This highlights the crucial link between government responsiveness and electoral consequences in the context of natural disasters.

On the other hand, scholars such as Lazarev et al. (2014), Baerlocher et al. (2022), and Szonkyi (2012) have reached different conclusions when examining non-democratic or hybrid political contexts. In some authoritarian regimes, governments may have more centralized control and hence the ability to suppress negative narratives and



opposition, allowing them to better manage the perception of their disaster response efforts. In such cases, natural disasters may not have as profound an impact on the government's political standing, as dissent and criticism are often stifled. Lazarev et al. (2014) research highlights the role of democratic mechanisms in shaping public perceptions. They found that in non-democratic settings like rural Russia, where the state controls the media landscape and political opposition is limited, the blame for disaster response inefficiencies does not receive the same level of attention as in democratic contexts. In such cases, the government often manages the perception of its disaster response efforts through state-controlled media.

Consequently, a significant portion of the population attributed the primary cause of the disaster to uncontrollable factors like weather rather than government incompetence, effectively shielding the government from blame (Lazarev et al., 2014). The findings of Baerlocher et al. (2022) also indicate that natural disasters can benefit despotic leaders. They propose a model wherein the government can mitigate economic losses caused by natural disasters, thus gaining support from voters who expect relief. Using this mechanism in non-democratic contexts could reduce interest in supporting democracy (Baerlocher et al., 2022).

Contrary to other scholars, Szakonyi's (2011) findings support the idea that state incapacity and inadequate responsiveness to natural disasters can lead to voter discontent and blame attribution in semi-democratic contexts. The more damage inflicted, the greater the negative informational shock about the regime's incompetence. In response, voters can punish the ruling party in elections or stay away from the polls, affecting the regime's fortunes. Szakonyi's study demonstrates that in competitive authoritarian systems, where elections play a role, voters punish the ruling party for its incompetent response to the wildfires in Russia (Szakonyi, 2011).

Collectively, these studies emphasize the complexities of the relationship between natural disasters and non-democratic or hybrid political contexts. While in some cases, authoritarian governments

may have more control over the narrative and opposition, the extent of their ability to manage the perception of their disaster response efforts can vary. The specific political dynamics within each context, including the level of state capacity, responsiveness, and the role of elections, influence the impact of natural disasters on incumbent governments. Furthermore, it is crucial to consider that the interaction between natural disasters and political landscapes in non-democratic or hybrid regimes also extends to the potential rise of populism, as seen in various contemporary examples.

Populist leaders have emerged in different countries and have gained power through various means, including crises (Moffitt, 2016). Scholars have articulated fundamental perspectives on the relationship between crises and the rise of populism, which have significant implications for the stability of political regimes, whether democratic or non-democratic. Crises, particularly those seen as exogenous shocks, alter the political terrain, often playing into the hands of populists. Weyland (2022) highlights this dynamic, emphasizing that crises that cannot be solved quickly, like the COVID-19 pandemic, unveil the weaknesses of personalistic leadership (Weyland 2022, 19). While such leaders may initially gain momentum by offering simple solutions to complex problems, persistent challenges can expose the inadequacies of their approach, as seen in populist responses to the pandemic (Weyland 2022, 24).

On the other hand, Baerlocher et al. (2021) illustrate how crises can sometimes bolster the appeal of authoritarian populists, such as during the 1982 Brazilian elections when regions afflicted by adverse weather demonstrated diminished protest voting against the ruling military regime. This trend suggests that in the throes of crisis, the populace may lean towards figures who pledge prompt and decisive action (Baerlocher et al. 2021). This contradiction points to an understanding of how crises can simultaneously be a populist's stepping-stone and a stumbling block, depending on the nature of the crisis and the strategies employed by populist figures.

Crises are often perceived as external shocks that catalyze the rise of populist leaders, but some scholars suggest that the relationship between crises and populism is more complex and reciprocal (Moffitt 2015; Resende 2021; Bobba and Hubé 2021). Moffitt (2015) describes a strategy employed by populists that involves 'naming' crises to highlight their existence, 'blaming' certain groups to ascribe fault, and 'claiming' to offer simple yet authoritative solutions (Moffitt 2015, 195). This sequence identifies the crisis and constructs it to validate the imposition of extraordinary measures and consolidate power (Moffitt 2015, 190). Resende (2021) reflects on this during the COVID-19 pandemic, observing how some leaders exploited public fears and tightened their grip by restricting civil liberties. This practice can also be extended to other crises, including natural disasters like earthquakes (Resende 2021, 147). She notes, however, the difficulty populists may encounter when trying to control the narrative of inherently unpredictable crises (Resende 2021, 152). Moffitt (2015) adds that populists may actively perpetuate a state of crisis, intensifying the sense of urgency to justify their authoritative stance (Moffitt 2015, 195). Bobba and Hubé (2021) support this view, indicating that populist leaders often harness crises like the COVID-19 pandemic to advance their political agendas, aligning with the 'naming, blaming, claiming' framework. The inherent unpredictability of crises such as pandemics or natural disasters, though, can undermine the populist's narrative of control and expose the limits of their authority.

Combining these insights reveals the dual nature of crises in the age of populism: they can be both an opportunity for populists to rally support and a challenge to their claims of competence. Whether facing a health emergency like the pandemic or the aftermath of an earthquake, populist leaders engage in a delicate balancing act, seeking to exploit the situation for political gain while navigating the unpredictable reality that crises inevitably present.

# Theory and Hypothesis

## Theoretical Framework

This study's theoretical foundation is based on the literature on disaster politics, which provides insights into how governments react to and manage significant external shocks is critical in assessing how President Erdoğan's administration navigated the aftermath of the 2023 earthquake, a crisis outside typical political challenges. The theory suggests that the effectiveness of crisis response can significantly influence public perception and political stability, mainly when the government's actions are under intense public scrutiny.

Simultaneously, the study engages with populism literature, which suggests that crises provide fertile grounds for populist leaders (Moffitt, 2015; Resende, 2021; Baerlocher et al., 2022; Bobba and Hubé, 2021). Moffitt (2015) outlines a strategy where populists 'name' crises to highlight their presence, 'blame' specific groups for these crises, and 'claim' to offer simple, authoritative solutions. This approach helps them consolidate power by legitimizing extraordinary measures. Similarly, Bobba and Hubé (2021) describe how populists politicize crises, like the COVID-19 pandemic, to advance their agendas by naming failures, blaming adversaries, and claiming to provide new solutions.

In Turkey's case, Erdoğan's response to the earthquake crisis can be analyzed through the “naming, blaming, claiming” framework, with unique adaptations. He began by 'naming' the crisis, labeling the earthquake as “the Biggest Disaster in Century,” and emphasizing that “the earthquakes were too big” and “no one could be prepared for such earthquakes.” (Kenyon, 2023). This “naming” set the tone for the subsequent “blaming” phase, where he diverted responsibility from government policies, such as the widely criticized building amnesties, onto contractors and builders (Ozdemir and Kirby, 2023). Erdoğan's government had previously offered amnesties for illegal buildings, referred to as “zoning peace,” allowing builders to circumvent safety regulations. This approach led to millions of

buildings being certified without adequate safety checks. Erdoğan boasted about these amnesties during the 2019 election campaign, including in Hatay, which was severely affected by the earthquake. He claimed to have solved the problems of 205,000 citizens with these amnesties. However, in the 'claiming' phase of the earthquake crisis, over 200 people were arrested for breaching building codes, and many more arrest warrants were issued. At the same time, Erdoğan quickly promised houses to the earthquake victims and various cash aid to the victims who had damaged houses (Ridgwell,2023).

## **Hypotheses**

Building on these theoretical frameworks, the study proposes the following hypotheses, which are designed to test competing perspectives on the impact of Erdoğan's crisis management during the 2023 earthquake:

H1: Negative Electoral Impact Due to Crisis Management - Inspired by the works of Tol (2023), Weyland (2022), and Szonkyi (2011), this hypothesis proposes that Erdoğan's management of the earthquake crisis resulted in decreased electoral support. It is grounded in the belief that ineffective or poorly perceived crisis management can lead to declining public trust and political support for incumbent leaders.

H2: Increased Electoral Support in Affected Areas - Contrasting H1, this hypothesis, drawing on insights from Beris (2023) and Baerlocher et al. (2021), Erdoğan's response to the earthquake increased support for him in the affected regions. This hypothesis is based on the notion that the public often gravitates toward leaders who display decisiveness and stability during crises. Beris (2023) emphasizes the appeal of such leadership qualities during crisis times, while Baerlocher et al. (2021) argue that authoritarian leaders who offer rapid solutions tend to gain public favor.

H0: Null Hypothesis - This hypothesis maintains that the 2023 earthquake had no significant effect on Erdoğan's electoral support in the 2023 election compared to 2018 across both affected and unaffected provinces. This suggests that the earthquake's impact did not influence public opinion or electoral outcomes related to Erdoğan's leadership.

Furthermore, applying Moffitt's (2015) 'naming, blaming, claiming' framework in this context could reveal how Erdoğan potentially utilized the crisis to strengthen his political standing by effectively managing the public narrative around the earthquake. In the context of Erdoğan and the 2023 earthquake, applying this framework could mean that Erdoğan effectively acknowledged the crisis and diverted any potential blame away from his administration, mitigating any negative impact on public opinion. However, this strategic approach does not automatically translate to increased support; as expected by either H0 or H2, it may simply stabilize or maintain existing levels of support by preventing a decline. This consideration adds depth to our understanding of the potential outcomes of Erdoğan's crisis management strategies. While it is plausible that Erdoğan's response to the earthquake, framed within the "naming, blaming, claiming" narrative, could have bolstered his support in the affected regions (as posited in H2), it is equally possible that these efforts prevented significant losses, thus aligning with the null hypothesis.

The hypotheses aim to capture the potential three outcomes of Erdoğan's crisis management: a decrease in support due to perceived inadequacies, an increase in support due to effective leadership and narrative control or staying the same. These outcomes will be examined in the context of both affected and unaffected areas, offering a nuanced understanding of the political impact of the earthquake under Erdoğan's leadership. By exploring these theoretical perspectives and hypotheses, the study seeks to provide a more in-depth analysis of the interplay between crisis management, populist leadership, and electoral outcomes.

# Methods and Data

This study employs a quantitative research design that draws on data from multiple sources. The Supreme Election Council (Yüksek Seçim and Kurulu - YSK) provides the foundational data set with detailed electoral results from Turkey's 2018 and 2023 presidential elections. This data is crucial for assessing any changes in Erdoğan's post-earthquake electoral support across all Turkish provinces. The Presidency of Strategy and Budget (Strateji ve Bütçe Başkanlığı - SBB) contributes with its extensive earthquake report, offering a quantitative measure of the disaster's impact through data on damaged and destroyed buildings for each province in Turkey. The Turkish Statistical Institute (Türkiye İstatistik Kurumu - TÜİK) further enriches this analysis with socio-economic and demographic data, such as population statistics, GDP per capita, educational levels, and the Syrian refugee ratio in each province.

In this research, the dependent variable is the change in electoral support for Erdoğan, operationalized as the percentage change in Erdoğan's votes between the 2018 and 2023 presidential elections in each province. This continuous variable with a -100 +100 range captures the dynamic nature of electoral support. A positive number indicates an increase in support; a negative number indicates a decrease in support. The primary independent variable, earthquake impact, is quantified by the proportion of heavily damaged and collapsed buildings relative to the total number of buildings in each province from the comprehensive earthquake report of the Presidency of Strategy and Budget. This continuous variable with a 0 to 100 range indicates the earthquake's severity and potential influence on the electorate.

The study incorporates several control variables to account for factors influencing voting behavior. These include the population of each province as of 2022, representing the demographic scale; whether a province is located on the border or not<sup>3</sup>; each province's GDP per capita, offering insights into the economic well-being of

each region; educational attainment, measured by the percentage of the population aged 15 and over with high level of education in 2021, reflecting the educational landscape; and the Syrian refugee population ratio, indicating the demographic impact of Syrian refugees in each province.<sup>4</sup>

**Table 1.** Concept Measurement Table

	Concept	Indicator	Variable
Dependent variable:	Electoral support for Erdogan	The difference in Erdogan's vote between the 2018 presidential election and the 2023 presidential election first round for all provinces in Turkey (n=81)	Continuous  (-100 Percent Point=lost all support,0 Percent Point=no change, 100 Percent Point=gained all support)  The vote for Erdogan in the 2023 presidential election-the vote for Erdogan in the 2018 presidential election=Vote Change Variable (Percent Point)
Independent variable:	Earthquake impact	Severity of damage by Feb 2023 Turkey-Syria earthquakes	Continuous  (0%= no heavy damage, 100%= all buildings are heavily damaged)  Number of heavily damaged buildings+Number of collapsed buildings/Number of total buildings=Earthquake affect variable (%)
Control variables 1:	Population	Population living in each province in 2022	Continuous
Control variables 2:	Economic situation in the province	GDP per capita (in dollars)	Continuous
Control variables 3:	Educational Attainment in the Province	Percentages of high education level attained by 15+ population in 2021	Continuous  Number of high education level attained/population=Percentage of High Education Level  (High Education= Associate, Bachelor, Master and Doctorate)( %)
Control variables 4:	Syrian population	Percentage of Syrian population (documented by TUIK)	Ratio Number of documented Syrian population/province's population Syrian Ratio Variable (0% = no Syrians, 100%= all provinces are Syrian)



An Ordinary Least Squares (OLS) regression model is used to analyze the relationship between the earthquake's impact and changes in electoral support for Erdoğan. This model includes all variables mentioned above, making it possible to isolate the specific effect of the earthquake from other socio-economic and demographic influences. The regression equation is below (Full Model)

$$\text{Difference in Erdoğan's vote} = \beta + (\beta_1 \times \text{Earthquake damage}) + (\beta_2 \times \text{Population}) + (\beta_3 \times \text{Border Town}) + (\beta_4 \times \text{GDP per capita}) + (\beta_5 \times \text{High Education}) + (\beta_6 \times \text{Syrian ratio})$$

This approach ensures a thorough examination of the research question. Integrating detailed electoral results with extensive earthquake and socio-economic data, the study aims to uncover how external crises like natural disasters can shape political outcomes, particularly in Turkey's recent history.

## Results

**Table 2.** Descriptive Statistics Table (Province/City level)

	Minimum Value	Maximum Value	Mean	Standard Deviation
Dependent Variable (Continous: The difference in Erdogan's vote between the 2018 presidential election and the 2023 presidential election first round in a province in Turkey) (-100 Percent Point=lost all support,0 Percent Point= no change, 100 Percent Point=gained all support)	-6.98	+1.85	-2.74	1.92
Earthquake damage variable (Ratio: 0%= no severe damage, 100%= all buildings heavily damaged or collapsed)	0	25.96	1.38	5.12
GDP per capita (in thousand dollars)	3,275\$	18,269 \$	7,954 \$	3,016 \$

Educational attainment (Percentage of Highly Educated) ( 0%= no highly educated population, 100%= all province population is highly educated)	6.82	23.37	13.86	2.97
Syrian population (Ratio: 0% = no Syrians, 100%= all province is Syrian)	0.02	52.31	2.79	6.74

The descriptive statistics provide a detailed view of the variability and distribution of critical variables at Turkey's province/city level. For the dependent variable, which measures the change in Erdoğan's vote between the 2018 and 2023 presidential elections, the range of change varies significantly from a decrease of 6.98 percentage points to an increase of 1.85 percentage points. The average change across the provinces is a decrease of 2.74%, with a standard deviation of 1.92%. This standard deviation indicates a moderate level of dispersion in the changes in electoral support for Erdoğan among the provinces.

Regarding the earthquake damage variable, measured as a ratio indicating the severity of damage (0 representing no severe damage and 1 indicating all buildings heavily damaged or collapsed), the minimum value is 0, and the maximum value is 25.96, with an average impact of 1.38. The standard deviation for this variable is 5.12, showing a wide range of earthquake impacts across different provinces.

Population figures vary widely across provinces, from a low of 84,241 to a high of 15,907,951, with an average population of 1,052,834. The standard deviation of almost 2 million indicates substantial

diversity in the size of populations across different provinces. Such variation can influence both the logistics of electoral campaigns and the distribution of resources, potentially affecting voting patterns.

Regarding geopolitical positioning, approximately 16.05% (13 of 81 provinces of Turkey) of the provinces are classified as border towns. As a result, border regions' socioeconomic and security dynamics may differ from those of non-border regions, such as cross-border trade or security concerns that might not affect inland provinces.

The GDP per capita, an important economic indicator, ranges from \$3,275 to \$18,269 among the provinces, with an average value of \$7,954 and a standard deviation of \$3,016. For educational attainment, precisely the percentage of highly educated individuals in each province, the data ranges from a minimum of 6.82% to a maximum of 23.38%, with an average of 13.86% and a standard deviation of 2.97%. This also indicates a notable variation in the higher education level across the provinces.<sup>5</sup>

The Syrian population ratio, quantifying the proportion of Syrian refugees in each province, shows a minimum of 0.02 and a maximum of 0.52, with an average of 0.03 and a standard deviation of 0.07. This metric reveals that only five provinces have a Syrian refugee population exceeding 0.1 percent, with the highest concentration in Kilis at 0.52 percent. Most provinces, however, host less than 0.1 percent. Notably, provinces that were severely affected by the recent earthquake also have significant Syrian refugee populations. This correlation underscores the importance of including the Syrian population ratio as a control variable in our model.<sup>6</sup>

**Table 3.** Results For Linear Regression

Independent Variables and Controls	Model 1 $\beta$ (Std. Error)	Model 2 $\beta$ (Std. Error)	Model 3 $\beta$ (Std. Error)	Model 4 $\beta$ (Std. Error)	Model 5 $\beta$ (Std. Error)	Model 6 $\beta$ (Std. Error)	Model 7 $\beta$ (Std. Error)
Earthquake damage variable	.082* (.041)						.087** (.042)
Population		-0.06 (0.01)					0.09 (0.01)
Border Town			0.013** (0.06)				0.015** (0.07)
GDP per capita				0.08 (0.07)			.0.06 (0.07)
Educational attainment					-.14* (.07)		-0.07 (0.08)
Syrian population ratio						-.016 (.03)	-0.07 (0.08)
Constant	-2.85 (.22)	-2.67 (-245)	-2.95 (.226)	-3.35 (.61)	-.81 (1.01)	-2.69 (.23)	-2.387* (1.286)
N	81	81	81	81	81	81	81
Adj. R2	0.04		0.0529	0.002	0.03	-0.01	0.1033

\*\*\*p<0.01; \*\*p<0.05; \*p< 0.1

Based on the linear regression analysis results, several noteworthy patterns emerge regarding the factors influencing President Erdoğan's electoral support following the 2023 earthquake. Model 7, which incorporates earthquake damage, population, being on the border, GDP per capita, educational attainment, and the Syrian population ratio, provides insights into the complex interplay between these variables. Notably, the coefficient for the earthquake damage variable is statistically significant ( $\beta = 0.087$ ,  $p < 0.05$ ), indicating that as earthquake severity increased by 1 percentage point, Erdoğan's vote increased by 0.08 percentage points. This finding suggests that despite the challenges posed by the earthquake, Erdoğan's management of the crisis may have positively influenced his electoral support in the affected regions. Moreover, the estimated earthquake damage coefficient differs little between Model 1 and Model 7, demonstrating the exogeneity of the variable and providing credibility to the empirical specification.

The border town and Syrian ratio coefficients are small and statistically significant, suggesting limited direct effects on electoral changes. Similarly, while high educational attainment has a negative coefficient, indicating a potential dampening effect on electoral support, it fails to reach statistical significance. Nonetheless, the modestly adjusted R<sup>2</sup> value of 0.103 for Model 7 implies that these variables collectively explain only a small portion of the variance in Erdoğan's electoral support change, underscoring the presence of other influential factors not captured in this analysis. Given the significant coefficient for earthquake damage, we reject the null hypothesis, indicating that the 2023 earthquake had a small, but noticeable impact on Erdoğan's electoral support in the affected regions.

## Conclusion

Through its regression analysis, this study has provided nuanced insights into President Erdoğan's electoral performance following the 2023 Turkey-Syria earthquake. Although Model 1 and Model 7 highlight a statistically significant yet slight positive correlation between earthquake severity and changes in Erdoğan's electoral support, the magnitude of this effect is modest. While this suggests a trend of the electorate leaning towards leaders who demonstrate decisive action in crises due to its small coefficient and small adjusted R<sup>2</sup> values, these results suggest not so much a significant increase in support but rather to avoid a significant decline despite the shortcomings before and after the earthquake.

Building on these results, the study's broader analysis of President Erdoğan's response to the earthquake provides observations on crisis management in populist regimes, with implications for global political trends, particularly in times of crisis. Erdoğan's crisis management strategy reflects the strategic use of Moffitt's (2015) 'naming, blaming, claiming' framework. He framed the earthquake as an unprecedented disaster beyond preparation ("naming"), deflected criticism from government policies like controversial

building amnesties to contractors and builders (“blaming”), and positioned himself as a decisive leader by swiftly promising housing and financial aid to victims (“claiming”). These tactics neutralized opposition narratives and maintained his political support, demonstrating how populist leaders leverage crisis management to reinforce their leadership image, even in the face of structural failings and public criticism. However, Erdoğan's rapid housing construction for earthquake victims while addressing immediate needs brings long-term sustainability and safety concerns. This action reflects a common tendency in populist governance to prioritize immediate, visible responses, often at the expense of more sustainable, long-term planning. In an era marked by global challenges such as pandemics and climate change, this focus on short-term, visible solutions is noteworthy, particularly because scientific forecasts indicate that climate change will likely increase the frequency and severity of natural disasters (Baerlocher et al., 2022; IPCC, 2021).). It raises questions about the capability of populist leaders to manage ongoing complex challenges that require comprehensive, long-term strategies.

Furthermore, while the positive impacts of being on the border for a province might be attributed to Erdoğan's focus on national security and terrorism issues, and the negative impacts of the Syrian refugee ratio might stem from criticisms of Erdoğan's refugee policies, these variables are not exogenous. However, they present another layer of research that may support the claim that populist leaders benefit from crises. Their effects need further study; however, in this research, they underscore the significance of earthquake severity, as including these strong control variables made the earthquake impact's coefficient even more pronounced. This demonstrates the significant influence of the earthquake on electoral behavior, leading us to reject the null hypothesis and support the hypothesis (H2) that earthquakes positively impact Erdoğan's support. Additional factors such as a fragmented opposition lacking a post-disaster plan and the electorate's tendency to lean towards decisive figures during crises, as argued by Baerlocher (2022) and Beris (2023), might have also contributed to these results, creating favorable conditions for Erdoğan despite criticism of his government's preparedness for the disaster.

The study extends beyond Turkey's borders, underscoring potential trends in global populist governance. Populist leaders, as seen in countries like Hungary, Poland, and the Czech Republic during the COVID-19 pandemic, often maintain support during crises by projecting decisiveness and control, employing tactics such as the 'naming, blaming, and claiming' strategy to politicize events effectively (Bobba and Hubé, 2021). This approach was also evident in the aftermath of natural disasters, where populist leadership in the face of events like Italy's 2009 L'Aquila earthquake and Mexico's 2012 elections in earthquake regions demonstrated an ability to bolster or maintain political support through crisis management.

However, their typical focus on short-term, nationalistic goals may not align well with the needs of complex, long-term challenges such as climate change. For instance, Brazil under President Jair Bolsonaro and the United States under President Donald Trump exemplify how prioritizing nationalistic and immediate economic objectives can undermine global environmental efforts. Bolsonaro's tenure was marked by increased deforestation in the Amazon, a crucial carbon sink, favoring agricultural expansion and economic development. Similarly, Trump's administration withdrew the United States from the Paris Agreement and rolled back numerous environmental regulations to boost domestic fossil fuel production, prioritizing economic gains over environmental sustainability. Both leaders' policies reflect a broader trend of sidelining the urgent need for global cooperation and long-term planning in climate change mitigation, underscoring a significant misalignment between nationalist policies and the global imperative to address environmental challenges. This misalignment poses significant implications for democratic governance and international cooperation, suggesting that the public's inclination towards decisive leadership in times of crisis, such as climate change, might foster a growing preference for authoritarian populism, potentially eroding democratic principles and processes. The examples of populist leaders leveraging crises to their advantage underscore the potential risks of this trend.

In conclusion, this paper examined the impact of natural disasters on the electoral success of populist leaders, focusing on the 2023 Turkey-Syria earthquake and President Erdoğan's administration. The study, while informative, was limited by its reliance on city-level data. Future research could benefit from using neighborhood-based data for greater precision. Additionally, expanding the scope to include other countries with populist incumbents during crises could offer a broader perspective on crisis management strategies. Also, a qualitative analysis of Erdoğan's speeches and media headlines could further enrich the understanding of the "naming, blaming, claiming" framework, providing deeper insights into how populist leaders influence public perception and electoral outcomes in times of crisis.

## **Appendix A**

This appendix was added after presenting the paper at a conference, where comments were received regarding the relocation of earthquake victims during the election and its possible impact on electoral participation, and it presents a summary of the voter count analysis carried out for the 2023 earthquake to assess the impact of the earthquake on Turkish electoral participation. The analysis compares voter count percentages between cities affected by the earthquake and those unaffected by it. A two-sample t-test was employed to assess the statistical significance of the differences in voter count percentages between affected (treated) and non-affected (untreated cities) cities.



**Table 4. Results For Differences in Means Test**

<b>Voter Count Percent- ages of Earthquake- affected cities and others</b>	<b>Group</b>	<b>Number Of Observations</b>	<b>Mean</b>	<b>Standard Deviation</b>
	Not affected (0)	70	-.0444504	.0453059
	Affected (1)	11	-.019803	.0798648
Difference			-.0411032	

The negative mean voter count percentages indicate decreased voter participation from the 2018 to the 2023 presidential elections. Specifically, the mean voter count percentage for cities unaffected by the earthquake (Group 0) is approximately -0.0445. In earthquake-affected cities (Group 1), the mean voter count percentage is approximately -0.0198. This suggests that, on average, the voter count decreased more in cities unaffected by the earthquake than in those affected. However, the lack of statistical significance implies that this difference may be due to random variation rather than a genuine effect of the earthquake, which would not influence the validity of this study’s analysis.

Despite initial concerns about the earthquake's impact on voter turnout, the data suggests that seismic activity did not lead to a significant decline in electoral participation. A further study could investigate the voting behavior of earthquake victims and why there has been no decline in voter registration following the disaster.

# References

- Achen, Christopher H., and Larry M. Bartels. 2004. "Blind retrospection: Electoral responses to drought, flu, and shark attacks."
- Ashawi, Khalil, and Ali Kucukgocmen. "Syrians Worry over Turkey Opposition's Anti-Immigrant Stance." Reuters, May 26, 2023. <https://www.reuters.com/world/middle-east/anger-fear-among-syrians-amid-turkish-oppositions-anti-immigrant-campaign-2023-05-26/>.
- Aytaç, S. Erdem, and Ezgi Elçi. 2019. "Populism in Turkey." In *Populism Around the World: A Comparative Perspective*, edited by Daniel Stockemer, 89–108. Cham: Springer International Publishing. [https://doi.org/10.1007/978-3-319-96758-5\\_6](https://doi.org/10.1007/978-3-319-96758-5_6).
- Baerlocher, Diogo, Renata Caldas, Francisco Cavalcanti, and Rodrigo Schneider. 2022. "Natural Disasters Support Authoritarian Populism: Evidence From the Brazilian Shrimp Vote." SSRN Scholarly Paper. Rochester, NY. <https://doi.org/10.2139/ssrn.4249006>.
- Beriş, Hamit Emrah. 2023. "Key Issues in Turkish Politics before the 2023 Elections." *Insight Turkey* 25 (1): 125–45. <https://doi.org/10.25253/99.2023251.7>.
- Bobba, Giuliano, and Nicolas Hubé, eds. 2021. *Populism and the Politicization of the COVID-19 Crisis in Europe*. Cham: Springer International Publishing. <https://doi.org/10.1007/978-3-030-66011-6>.
- Cole, Shawn, Andrew Healy, and Eric Werker. 2012. "Do Voters Demand Responsive Governments? Evidence from Indian Disaster Relief." *Journal of Development Economics* 97 (2): 167–81. <https://doi.org/10.1016/j.jdeveco.2011.05.005>.
- Gaspar, John T., and Andrew Reeves. 2011. "Make It Rain? Retrospection and the Attentive Electorate in the Context of Natural Disasters." *American Journal of Political Science* 55 (2): 340–55.

- Gokay, Bulent, and Tunc Aybak. 2023. "2023 Elections in Turkey within Global Context: Right Wing Populism in the Era of Global Shift." *Journal of Balkan and Near Eastern Studies*, September 1–13. <https://doi.org/10.1080/019448953.2023.2258003>.
- Kenyon, Peter. 2023. "Turkey's President Takes Heat for Earthquake Response and Poor Quality of Buildings." NPR, February 14, 2023, sec. Middle East. <https://www.npr.org/2023/02/14/11156987146/turkeys-president-takes-heat-for-earthquake-response-and-poor-quality-of-buildin>.
- Lazarev, Egor, Anton Sobolev, Irina V. Soboleva, and Boris Sokolov. 2014. "TRIAL BY FIRE: A Natural Disaster's Impact on Support for the Authorities in Rural Russia." *World Politics* 66 (4): 641–68.
- Levitsky, Steven, and Lucan Way. "Elections Without Democracy: The Rise of Competitive Authoritarianism". *Journal of Democracy* 13, no. 2 (April 2002): 51–65.
- Links, Justus. 2023. "Erdogan's Earthquake: How Years of Bad Government Made a Disaster Worse." *The Guardian*, May 4, 2023, sec. World news. <https://www.theguardian.com/world/2023/may/04/turkey-erdogan-earthquake-how-years-of-bad-government-made-a-disaster-worse>.
- Moffitt, Benjamin. 2015. "How to Perform Crisis: A Model for Understanding the Key Role of Crisis in Contemporary Populism." *Government and Opposition* 50 (2): 189–217. <https://doi.org/10.1017/gov.2014.13>.
- Ozdemir, Ozge, and Paul Kirby. 2023. "Turkey Earthquake Failures Leave Erdogan Looking Vulnerable." February 10, 2023. <https://www.bbc.com/news/world-europe-64594349>.
- Resende, Almeida and Erica Simone. 2021. "Pandemics as Crisis Performance: How Populists Tried to Take Ownership of the COVID-19 Pandemic." *Czech Journal of International Relations / Mezinárodní Vztahy* 56 (4): 147–56. <https://doi.org/10.32422/mv-cjir.1822>.
- Ridgwell, Henry. 2023. "Engineers Blame Building Amnesty for Turkey Quake's High Toll." *Voice of America*. March 8, 2023. <https://www.voanews.com/a/engineers-blame-building-amnesty-for-turkey-quake-s-high-toll/6995406.html>

- SBB (Strateji ve Bütçe Başkanlığı) Presidency of Strategy and Budget. Türkiye Earthquakes Recovery and Reconstruction Assessment. Prepared with the support of the United Nations and the European Union. Ankara: Government of Türkiye, 2023. <https://www.sbb.gov.tr/turkiye-earthquakes-recovery-and-reconstruction-assessment/>
- Szakonyi, David. 2011. "You are Fired!: Identifying Electoral Accountability in a Competitive Authoritarian Regime." SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.2064959>.
- Taş, Hakki. 2015. "Turkey – from Tutelary to Delegative Democracy." *Third World Quarterly* 36 (4): 776–91.
- Tol, Gonul. 2023. "Corruption and Misrule Made Turkey's Earthquake Deadlier." *Foreign Policy*, no. 248 (Spring): 26–27.
- Türkiye İstatistik Kurumu (TÜİK) [Turkish Statistical Institute]. Various Datasets. Accessed January 4, 2025. <https://data.tuik.gov.tr/Search/Search?text=referans>.
- Weyland, Kurt. 2022. "How Populism Dies: Political Weaknesses of Personalistic Plebiscitarian Leadership." *Political Science Quarterly* (Wiley-Blackwell) 137 (1): 9–42. <https://doi.org/10.1002/polq.13277>.
- World Bank. 2023. Global Rapid Post-Disaster Damage Estimation (GRADE) Report: February 6, 2023, Kahramanmaraş Earthquakes - Türkiye Report. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/099022723021250141/P1788430aeb-62f08009b2302bd-4074030fb>.
- Yüksek Seçim Kurulu (YSK) [Supreme Election Council]. Seçim Sonuçları [Election Results]. Accessed January 4, 2025. <https://sonuc.ysk.gov.tr/sorgu>.

# Endnotes

**1.** Tutelary democracy is a regime with competitive, formally democratic institutions, but with a power apparatus which remains able to intervene when necessary to correct undesirable outcomes (Tas 2015,77). There is consensus among scholars that when the AKP assumed power in 2002, Turkish politics was characterized as “tutelary democracy” and largely shaped by the Turkish military and secular-republican elites, who controlled the judiciary and bureaucracy, which exerted veto power over elected officials. After the AKP won the second term in 2011, the political regime underwent substantial changes, with the AKP diminishing the power of established “center” elites (Somer 2017). It is essential to understand this historical shift, since it contributes to Erdoğan's framing of political conflicts as battles between “us and them” (Aytac and Elci 2019, 97)

**2.** Competitive authoritarianism refers to a regime type where formal democratic structures are recognized but routinely undermined by incumbents who violate democratic norms significantly, preventing the regime from meeting basic democratic standards. It is also called “hybrid regime.” Although elections occur and are not grossly fraudulent, incumbents manipulate the system by misusing state resources, restricting opposition media coverage, and harassing political adversaries. Despite these abuses, the presence of democratic institutions offers some scope for opposition challenges, distinguishing these regimes from outright authoritarian systems where democratic processes are merely for show (Levitsky and Way, 2002).

**3.** The inclusion of the “Border” variable in the analysis is significant given the political context surrounding the 2023 presidential election in Turkey. The primary rationale stems from President Erdoğan's strategic utilization of the Kurdish question to undermine the opposition coalition, which was perceived to have tacit support from the Kurdish Party, allegedly linked to the PKK. This tactic served

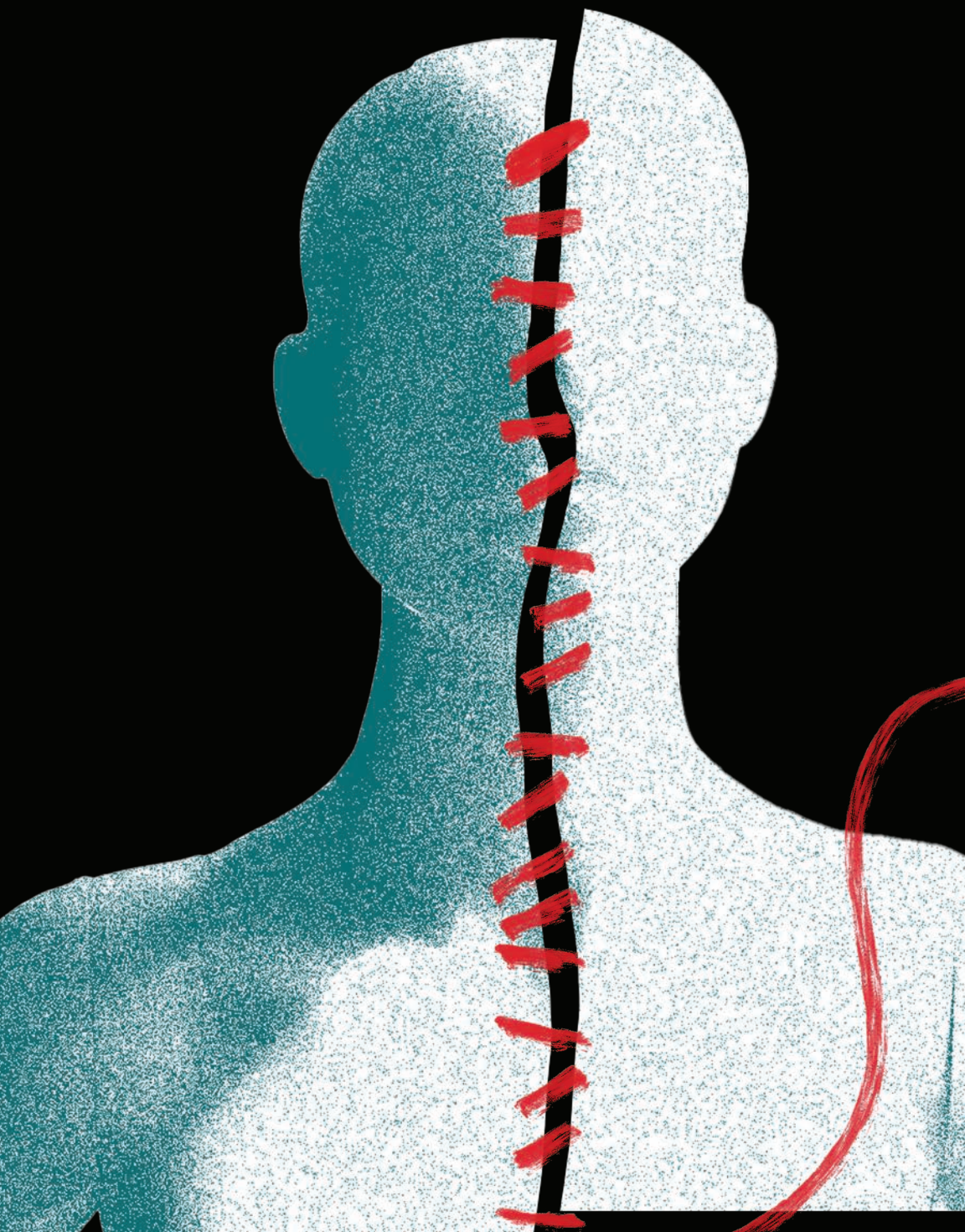
to delegitimize the opposition and solidify Erdoğan's position. The extensive emphasis on national security during Erdoğan's campaign and given the geopolitical significance of border regions, where issues such as security and cross-border dynamics play a prominent role, it essential to control this variable.

**4.** The People's Alliance, which backed Erdoğan, included far-right nationalist parties. Throughout the campaign, Erdoğan and his party, the AKP, avoided employing negative rhetoric about Syrian refugees. However, parties from other alliances, particularly during the campaigning period, criticized Erdoğan's refugee policies, portraying the Syrian refugee presence as a significant national issue resulting from his administration's ineffective management (Ashawi and Kucukgocmen, 2023).

**5.** The regression analysis conducted to investigate the relationship between GDP per capita and educational attainment, measured by the higher education ratio, indicated no significant multicollinearity between the two variables. The results of the regression yielded a p-value of 0.806, suggesting that the higher education ratio does not significantly predict GDP per capita in this model. Also, the relationship between GDP per capita and population did not indicate multicollinearity with a p-value of 0.820.

**6.** The regression analysis indicates a statistically significant relationship between the percentage of heavy damage from the earthquake and the Syrian refugee ratio ( $p=0.0135$ ), suggesting that the impact of the earthquake might be compounded by the existing demographic pressures from the refugee population. This supports the decision to control for Syrian refugee presence in our analysis of earthquake damage and recovery needs.







# 04

## Identity Formation of Half-Korean Individuals Living in South Korea



**GINA KHAN**

Dr. Kyung-Eun Yoon

Department Of Modern  
Languages and Linguistics and  
Intercultural Communications



# Biography

My name is Gina Khan. I am an undergraduate student in Modern Languages and Linguistics at UMBC with a focus in Korean language. I am also an honors student and humanities scholar at UMBC. I graduate in Spring 2024 and will proceed to obtain my Master's in Intercultural Communications at UMBC. For years, I have tutored Korean, English and even math, despite that being outside of my field. As a result of this, I realized my desire to be in academia and continue to teach. My goal is to become a professor of Intercultural Communications to help foster a more culturally and interculturally competent world. I also intend to do research related to culture and language with a focus on Korean culture and literature as this is my area of interest. I would also like to note that this research was supported by URA funding.

## Research Journey

I did not originally know what major I would choose at UMBC. All I knew was that Korean language had to be a part of my degree whether a minor or a major. I placed into the 301 level course of Korean language in my freshman year at UMBC, and met the most influential person on my academic journey thus far. Dr. Kyung-Eun Yoon is my research mentor and the person who encouraged me to pursue research and helped me cultivate my Korean language skills. Through the many classes I took of hers, I learned more about Korean culture, language, and conducting research. As I am now proficient in Korean, I am able to use this skill to conduct research about an area of the world that has not been featured in much research until now. In the past, many studies referring to "East Asia" only contained data from Japan or China, leaving Korea out. Additionally, this particular project is about multiracial identity which is close to my heart. As a mixed-race woman, I have felt my identity been determined for me by others and experienced difficulties grappling with that. This research intends to highlight the experiences of mixed people, who

are often overlooked in race and cultural studies (especially outside of America). My passion for Korean culture, language and my personal identity are the inspiration for this research.

## **Abstract**

This research focuses on the topic of multiracial identity formation in South Korea. Particularly, focus on the question of how multiracial individuals' identities are developed in South Korea, and which aspects of South Korean society may contribute to their identity formation. As much of the current literature on multiracial identity is centered on the biracial experience in the United States, this research addresses the gap by examining half-Korean individuals in South Korea, a context often overlooked in existing studies.

The study aims to provide a new perspective on biracial identity formation by analyzing the experiences of half-Korean individuals. Using qualitative content analysis, the research will identify patterns in how these individuals perceive their identities, the influence of Korean sociocultural aspects, and the impact of societal views of monoracial Koreans.

As the number of mixed individuals is growing around the world, understanding this complex identity is imperative to further research on education, diversity studies, and intercultural communications. In a global context, understanding specific identities can aid in peaceful international relations since one is more culturally aware and sensitive to the needs of the other party or individual.

# 1. Introduction

This research focuses on the topic of multiracial identity formation in South Korea, particularly the question of how multiracial individuals' identities are developed in South Korea and which aspects of South Korean society may contribute to their identity formation. As there is a larger mixed-race population in America compared to other countries, the field of multiracial individuals' development currently focuses on the biracial experience in the United States. Thus, much of the existing literature is based on the American conception of race; this conception is unique and differs from other countries' views of race and what it means in society. This gap in research leaves out entire communities of multiracial individuals. To fill this gap, the research focuses on the particular community of half-Korean multiracial individuals living in South Korea and highlights their identity development and experiences. As the number of mixed individuals is growing around the world, understanding this complex identity is imperative to further research on education, diversity studies, and intercultural communications.

This research aims to understand the experience of biracial individuals (specifically half-Korean individuals) living in South Korea to provide a new perspective in the discourse of biracial identity formation. Using a qualitative content analysis methodological framework, this research understands the identity formation of biracial Koreans in Korea by seeking patterns in the individuals' described experiences. This research attempts to answer three questions:

1. What are the experiences of mixed Koreans living in Korea?
2. How do these experiences and the opinions of monoracial Koreans affect their identities?
3. What kinds of identities do they use to define and view themselves?

## 2. Literature Review

### 2.1 Biracial Identity Formation

Multiple researchers in this field, including Stonequist (1937), Rockquemore (1999), and Root (1990) have noticed that monoracial racial identity development (RID) models do not address or accurately depict the multiracial identity. Initially, Stonequist's (1937) *The Problem of the Marginal Man* studied the complex and polarizing identity of being mixed. Since then, the study of biracial identity has grown substantially, integrating new ways of understanding the mixed experience. Stonequist asserts that "the biracial nature of the individual creates a need to reconcile two distinct and antagonistic cultures"; this identity will be said to create "inevitable maladjustment because of hostility coming from both race groups of the individual" (Bergkamp, 2020, p. 228). The idea that hostility is bound to come from both sides is no longer accepted as the landscape of race politics has unquestionably changed. Additionally, the polarizing quality of the identity options Stonequist offers ("identifying with dominant or subordinate culture") is critiqued and considered outdated. Newer research suggests a "life in duality," where mixed individuals embrace/reconcile both races in their self-identification (Perkins, 2014).

Root (1990) expands the field by offering more diverse identity options. She identifies four identity options observed in her research: 1) acceptance of the identity assigned by society, 2) identifying with both racial groups, 3) identifying with a single race, 4) identification of a new racial group (Root, 1990, as cited in, Bergkamp, 2020). The final of these four identity options is particularly interesting; it refers to those who ignore race altogether and identify in terms of something else such as "being human." This idea is furthered by Rockquemore's (1999) transcendent identity option where an individual claims no race unless pressured to do so. He also identifies a protean identity where an individual identifies as biracial in some contexts and monoracial in others. This situational identity is a common theme throughout studies of mixed people's experiences and exists as a prominent identity option for multiracial people.

In a study on the Black-Korean identity in South Korea, Kim (2016) outlines the identity options she observed, including identifying as monoracial, identifying with more than one group, and “moving among identity options” (p. 47). This paper delineates many instances of participants being discriminated against (i.e. name-calling), feeling shame and self-hatred, being treated as a foreigner, and the participants’ desire at times to be monoracial. In response to the negative treatment associated with being multiracial, some participants opted for a monoracial identity, telling others they were fully Korean to avoid discrimination. However, in other contexts, they asserted that they identify as mixed.

This fluid identity is also shown in a study on multiracial school-aged children in South Korea (Cho, 2015). The findings of this study showed that “biracial children construct and reconstruct their identities while blurring the racialized mainstream labels through their diversity and hybridity” (p. 223). The multiracial identities observed are analyzed as fluid and unfixed,

constantly affected by outside factors such as language, class, and the perception of others. The fluidity of the multiracial identity and the lifelong process of understanding one’s identity are both modern ideas in the field that are congruent across studies of mixed individuals in multiple countries. For example, Akulenko (2022) states that the “possibility of extracting benefits” from going back and forth between identities demonstrates one of the reasons that a mixed individual may adopt a certain identity in certain situations. This paper outlines the complex and robust history of Korean settlement in Vladivostok, Russia beginning in the mid-1800s. This settlement eventually led to the emergence of half Koreans in Russia. Chagubya and Argubya (mixed Koreans in Russia) are granted certain benefits from the Korean government such as a five-year visa if they identify as Korean. In the researcher’s words, the ROK’s policy “influences the situational choice of informants’ identification, inciting them to choose in favor of Korean ethnicity because of obvious advantages in the form of receiving benefits for education, special forms of visas and other preferences” (p. 26).

## 2.2 “Race” and Racial Classification in Korea

Korea has a long history of ethnic nationalism and purism that was strengthened by the oppression during the Japanese colonial period from the early 1900s to 1945 (Yoo, 2017). This period was characterized by the Japanese government’s attempt to erase Korean culture by banning the public use of the Korean language, forcing Koreans to adopt Japanese names and styles, and other official acts. In an effort to reinstate Korean authority, the idea of sunhyeoljuui (순혈주의 / ‘pure blood theory’) emerged to maintain the homogeneity of the Korean race. This idea was also intended to arouse national pride (Jager, 2003, as cited in Kim, 2016). This construction of race supposes that the meaning of race interacts within a wide scope of societal aspects such as thought, policies, and discourse (Omi & Winant, 2015, as cited in Kim, 2016). The idea of sunhyeoljuui is that the strength of the “superior bloodline” or “one people” (danil minjok / 단일민족) will be able to fight against Japanese colonist policies and thus, other threats as well (Schumid, 2007, as cited in Kim, 2016). Though these sources describe this phenomenon as a political tool, this idea fomented a widespread thought about what it means to be “Korean”: having pure Korean blood.

The growing damunhwa (다문화 / ‘multicultural’) phenomenon in Korea threatens the belief observed in the theory of sunhyeoljuui that a racially and ethnically homogenous state will lead to social cohesion and state power. Despite the increase of multicultural people in Korea, a survey by the Ministry of Gender Equality and Family and the Asian Institute shows that almost eighty-seven percent of South Koreans believe in the importance of the Korean bloodline (Moon, 2015, as cited in Yoo, 2017). Although this statistic does not directly indicate hostility toward other races, it does demonstrate an adherence to, and belief in, ethnic purism. This statistic also begs the question of how to define “Korean.” In this case, the emphasis on the “bloodline” represents the attachment to ethnicity rather than other factors associated with being part of a country, such as speaking the language and adhering to cultural norms. According to the literature on Korean identity and race, the qualifications for

identifying as “Korean” refer to having Korean blood, speaking Korean, and understanding and endorsing the cultural values, beliefs, norms and practices (Kim, 2020). These three main factors are in alignment with the idea that nations are determined by “common ethnic ancestry, common language, and a common faith” (Muller 2008, as cited in Kim, 2020).

### 2.3 Biracials in Korea

There are various issues outlining biracial politics in South Korea which affect biracial Koreans’ image and experiences. Lee (2008) asserts that Korean honhyeols (혼혈 / lit. mixed blood) were once considered to be “shameful, regrettable byproducts of U.S.-Korea state relations” during and following the Korean War (p. 57). Later, after the popular success of a half-Black, half Korean athlete named Hines Ward and Korea’s plummeting population, the government began viewing honhyeols from mixed marriages as a “potential national asset” (Lee, 2008, p. 57). Despite this seemingly positive change, research on the daily lives of mixed children shows that they are agonized by discrimination as a result of negative societal perceptions. Honhyeols in Korea are less likely to graduate from every level of school and often drop out, citing that they constantly suffer abuse from peers and teachers (Lee, 2008).

Before 2011, multiracial Koreans were not allowed to enter the typically mandatory military service for all able-bodied males (Lee, 2010, as cited in Kim, 2016). The government’s justification for this law was that mixed Koreans would face challenges in the military due to ‘culture shock.’ One may assume this ban only applies to mixed Koreans that were raised abroad, but this law applied simply on the basis that these individuals were not fully ethnically Korean. Their justification supposes that mixed Koreans have a different “culture,” and the fact that such laws existed supports the ‘othering’ of multiracial Koreans. Due to common experiences of institutional and social discrimination and discriminatory laws, it can be viewed that “the closer one is to having Korean skin color, the more possible it is to access power and privilege” (Kim, 2020, p. 80).

# 3 Methodology

## 3.1 Methodology

This research was conducted using Qualitative Content Analysis. Generally viewed as the analysis of text, Content Analysis involves the analysis and interpretation of various types of communicative media and ideas. Klaus Krippendorff (2004) defines Content Analysis as “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use” (p.18). In the modern usage of Content Analysis, these “texts” include verbal, symbolic, communicative, and pictorial data. Content Analysis as we currently see it originated in the early 20th century, but sources using a foundational version of Content Analysis can be observed in early religious works dating as far back as the mid-1600s (Krippendorff, 2004). Work from the 17th century does not represent Content Analysis as it is currently regarded, but it provided an early conception of the technique. Qualitative Content Analysis differs from quantitative analyses in that it has a stronger focus on interpretivism and subjectivity. Much of humanities research follows qualitative approaches in order to answer questions about lived experiences or things that are challenging to quantify. The validity of qualitative analysis relies on the methodological framework used to analyze such fluid data.

Content Analysis may follow a deductive or inductive approach. This research uses an inductive approach where “data moves from the specific to the general, so that particular instances are observed and then combined into a larger whole or general statement” (Chinn & Krammer, 1999, as cited in Elo & Kyngäs, 2008, p.109). The multiracial identity development in Korea has not been a source of frequent study and thus lends itself to an inductive approach. The data collected has been categorized into broader ideas that answer the research questions. It is important to note that the researcher did not pre-suppose categories to organize data,



but rather created categories organically from the observed data. The three phases of an inductive approach using Content Analysis are preparation, organizing and reporting (Elo & Kyngäs, 2008).

This paper may also align with the methodology of media ethnography. A media ethnography combines traditional anthropological methods for ethnographies such as informal talks, participant observation, and media data (Drotner, 1994 as cited in Pastina, 2005). This style may also lend itself to textual analysis of media data. Online data collection for ethnographies has been criticized or deemed inferior to traditional offline processes because data is passively acquired and under the premise that online media is artificial and/or inauthentic (Petschow, 2014). However, Petschow (2014) argues it is a meaningful and unique tool for re-understanding ethnography. Media contexts hold distinct and legitimate realities that are unique but not entirely separate from offline contexts that are deemed symbolic constructions of reality (Coman and Rothenbuhler, 2005; as cited in Petschow, 2014). One may also argue that the lines between online and offline contexts are blurring as online contact grows. This research acknowledges the limitations of passively gathered data from media sources while acknowledging the benefits of media data.

### **3.2 Data**

The researcher selected YouTube videos, including interviews and entertainment programs, as data. In preparation for selecting videos, the researcher focused on videos showing individuals who are multiracial with one half of their race being Korean. In total, from twelve YouTube videos and one episode of an entertainment program, this paper looks at the accounts of eighteen multiracial Korean individuals: ten women and eight men.

The first piece of data selected for this study is from a South Korean reality/entertainment program called “My Neighbor, Charles” in English and “이웃집 찰스” in Korean reuploaded to YouTube. This program typically follows foreigners’ daily lives in Korea. However,

the episode selected for this research is a special episode about multicultural Korean university-aged individuals. The title of this episode is “Multiculturalism: Season 2 Special: We are Korean Kids” (이웃집 찰스 다문화2세특집우리는한국애들). This episode was first aired on April 13th, 2021. The individuals analyzed in this study include two women and three men ranging from ages twenty to twenty-two.

Secondly, the researcher used three videos from a YouTube channel called, “K Explorer” where an American man living in Korea conducts street interviews with people living in or visiting Korea. As the interviewer is foreign, he often interviews foreigners about their lives in Korea; however, he also interviews Korean people usually asking them questions related to other cultures or directly about Korean cultural phenomena. Out of these videos, this research focuses on three half-Korean mixed-race men living in South Korea. I examine their backgrounds to uncover their identity perception and experiences.

Thirdly, this research utilizes seven videos from the YouTube channel “Creative Den,” where the YouTuber, Den, conducts interviews with various individuals focusing on foreigners in Korea. The seven videos include the experiences of six mixed race Korean women. Finally, one video clip from “Global Earth” on YouTube was used, featuring one mixed race woman named Queenie.

The researcher began by transcribing quotes from the selected mixed-race individuals that were most relevant to the research questions; these included their experiences due to being mixed in Korea, personal thoughts about their mixedness, and their interpretation of Koreanness. After transcribing, the researcher observed categories into which examples could be coded.

### 3.3 Analytical Procedure

This research's analytical procedure is based on the work of two scholars. These categories are based on existing categories from other studies on mixed race identity/experiences (Akulenko, 2022; Kim, 2016). Kim (2016) identified some common experiences of multiracial Koreans: 1) difficulty to identify with Korean heritage 2) feeling a lack of belonging 3) discrimination and bullying 4) questioning of their racial identity from outsiders and 5) feeling pressure to prove their identity. The categories "lack of belonging" and "discrimination" were selected as two subcategories under a broader category called "Struggles in Korea." One category was adapted from Akulenko (2022). The author explains that mixed Koreans may identify as Korean to extract legal benefits. This category was adapted to include overall advantages, including tangible benefits, that one can get due to their mixed status. Finally, out of Kim's (2016) four identity options, two of the categories were selected: belonging to more than one group and moving among identity options. This paper uses these prior studies as a guide to categorize findings while adding unique findings that were not found in the previous literature. The goal of this analytical procedure is to add to the existing work in the field.

## 4. Findings

The first two sections under "Findings" (4.1 & 4.2) will focus on specific experiences and viewpoints expressed by mixed Koreans. First, the researcher identified the advantages of being mixed that the individuals in this study cited. Secondly, the researcher identified the challenges and struggles mentioned in the data. These experiences are relevant to the study as they help explain what experiences have influenced mixed Koreans' perceptions of their identities. These sections also discuss the sociocultural aspects of Korea and the viewpoints of monoracial Koreans based on the individual's stories and experiences. The final section (4.3) will dive deeper into the specific identity options as per the analytical procedure.

## 4.1 Advantages & Pride in Being Mixed

As mentioned in the literature review, for various reasons, a mixed person may view their identity as an advantage; this could be for legal benefits or societal benefits (Akulenko, 2022). Eight of the people selected for this research expressed positive views of their mixed identity based on the perceived advantages that their mixedness has given them.

### 4.1.1 Employment Advantages

Due to the way they look physically or their status as a mixed person, certain job opportunities may be more accessible to mixed individuals. Chris and Hojin are working as models in Korea and perceive their “unique” appearance as an advantage. Chris says, “in a way, it’s good to live in Korea as a mixed race in the entertainment industry like modeling...because in a way you have a certain character or look for fashion brands or magazines and also commercials and these fields requires someone that has a certain look which is why I think in that aspect being a mixed race person is good in Korea” (K Explorer, 2023a). Hojin expressed a similar sentiment, stating: “But as soon as I grow up, people in Korea sees much [sic] foreigners on TVs, lots of idols or halfies like me, and they feel like halfies are cool, which is the same in my fashion field. They feel like it’s a different kind of vibe they could see because we can see [sic] European kind of style in a side [sic] and kinda Asian style on the other side. It’s good” (K Explorer, 2024).

These work-related advantages also seem to have a positive effect on the individuals’ self-perception. Since they are viewed positively by employers, a part of them recognizes that they are ‘cool’ since they are perceived that way by society. These quotes also imply that a part of society sees mixed Koreans as special in a country that is mainly racially homogenous. The perception of society impacts the way that multiracial Koreans view themselves.

#### 4.1.2 Pride in Uniqueness

Outside of more tangible benefits such as work opportunities, many people expressed the confidence they have gained from the uniqueness that comes with being mixed. This ranges from confidence in their appearances to pride in their values and ways of thinking. For instance, Sofiya attributes her unique mindset that is different from monoracial Koreans to her mixedness. She sees her different mindset as an advantage over monoracial Koreans who may be limited by their way of thinking. She says:

I learned that my personality is more important than my family...There are a lot of good things for [sic] having two different cultures. When I'm with my Korean friends, I have a very different mindset [from them]. My values and mind...many of my friends say that 'your mindset is amazing.' I protect my friends' self-esteem. If it's too much, I might be arrogant. But in my opinion, I think Korean people have low self-esteem. They're conscious of others' opinions, putting others first before themselves...that's really hard...[so] it helps a lot when I tell this to my friends.

(Creative Den, 2022b)

Hinting at the widespread belief in the importance of family in Korea, Sofiya claims that she has a different perspective because of her multicultural background. It not only makes her unique, but she also stated it as an advantage since her perspective can help offer a new way of thinking to her friends who may have never thought that way previously. This can be viewed as a social advantage and also a skill, since she can comfort others by her unique perspective.

Although uniqueness is often associated with being “othered” in the form of discrimination, it has also been cited positively because being unique comes with positive attention. Yeseul says, “...but now being mixed is more special; I'm thankful for my parents” (Creative

Den, 2022c). She contrasts the past where she was made fun of to the present where she is considered special by her peers. Insong furthers this, stating “Here [in Korea] it’s more like admiration than made [sic] fun of” (Creative Den, 2022d). When compared to Bolivia, she recognizes a more positive perception of her mixedness in Korea, where people find it interesting or admirable rather than negative. Hanna discusses walking with her Peruvian mom in public and says, “There were people who thought it was interesting. I think I enjoyed that interest” (Creative Den, 2022a). Chris states, “I like living as a mixed race because I think of it as being special,” showing his positive perspective toward his mixedness (K Explorer, 2023a).

These individuals also cite receiving envy from those around them. Sofiya says, “I like to get that kind of attention, whenever my friends are jealous, I feel happy and I’m proud” and “Some friends say this a lot: ‘I wish I were a mixed race’” (Creative Den, 2022b). Famous model, Han Hyunmin expresses a similar opinion, saying “But the older I got, the more envy I got” (K DOC 2021c). Many individuals in this study describe that negative attention was more common in their youth, but the attention became positive as they got older (even to the point of instances of jealousy and envy from others). This change may imply that Korean society has become more aware of and/or accepting of multiracial Koreans as their presence has increased. As the world globalizes and people become more familiar with identities outside of their own, the level of acceptance and integration of these diverse identities may increase.

The positive views associated with being unique and the tangible opportunities from being mixed are factors impacting how mixed Koreans view their experiences and themselves. Stating that they ‘enjoyed’ the positive attention and that they are ‘thankful’ to their parents shows how their experiences and self-perceptions impact their self-esteem and pride in their mixedness.

## 4.2 Struggles in Korea

Discrimination is often cited in prior studies related to the mixed identity and experience. As stated in the literature review, the idea of “Koreanness” and ethnic purism in Korea can lead to discrimination toward non-Koreans or multiracial Koreans. This section delves into particular instances of hardships, and how those experiences affect multiracial Koreans.

### 4.2.1 Discrimination

Korea is generally considered a racially homogeneous country, which leads to the assumption that if you do not look Korean, you must be a ‘foreigner.’ This idea is especially important to ethnic Koreans who grew up outside of Korea, since they are not considered to ‘embody’ Korean values and culture, which are imperative to being considered ‘Korean’ (Lim, 2014). Multiracial Koreans in this study cite a similar phenomenon in how they are treated. Although many of the individuals in this paper were born and raised in Korea, they are often viewed as foreigners and treated as so. This tends to create dissonance in their mixed identity. For example, Hancheol says:

One day, one customer had too much to drink. He started to cross the line. He said ‘I wanna see the owner of this restaurant. Why is a foreigner working here?’ What shocked me the most was when he said, ‘How dare a non-Korean like yourself speak Korean?... It hurt me but I overcame it quickly... I exploded and threw my ID at him yelling ‘I’m Korean!’ But then when I went home, I kept thinking, ‘Am I really Korean?’ I felt guilty. How can we define ‘Korean?’

(K-DOC, 2021d)

He indicates at the end that he feels guilty, questioning if he is correct in asserting his ‘Koreanness.’ When one is treated as an outcast, they may begin to view themselves that way. The force of the public’s perception may have an even greater impact in this case, since many

of the individuals facing these issues are young adults. Hancheol's feeling that he had to prove his 'Koreanness' is supported by the work of Root (1998, as cited in Kim, 2016). The author asserts that when receiving discrimination from the majority group, mixed race individuals feel pressure to prove their 'insider status.'

As shown in the video, this can be in the form of a physical ID card or language abilities. Since Hancheol's 'Korean' status is questioned, he feels self-doubt; in his perspective, other Koreans do not need to show their ID, but since he does, he questions his own Koreanness. Hojin expresses negative feelings about the workplace discrimination he experienced in the modeling industry as well. He states, "There are a lot of clients who think, like, I don't speak Korean because I look a lot more foreign, but whenever I go to a shoot, they think they're really speaking in their ears [sic]. I can hear it sometimes. They say bad things which is not [sic] good for me, and I can understand everything, which is not cool" (K Explorer, 2024). The assumption that he cannot understand Korean is also a prejudice and stereotype. Although Hojin was born and raised in Korea, Korean people treat him as if there is no way he could speak Korean. These instances of discrimination occurred in the workplace, but there are many instances in other social settings as well such as school. Minseok explains his experience:

The kids treated me different [sic], obviously.  
They were young, and they would judge a  
person by how they look as they would around  
their age. One day, they brought some gar-  
bage from the dumpster behind the school.  
And said to me, 'This is you'... it was a girl...  
she said 'Hey, you're even more worthless  
than this.' Pointing at the garbage.

(K-DOC, 2021d)

Starting from a young age, Minseok was told he was different by peers and experienced negative treatment for that reason. He wondered if the bullies were right, and if he truly was 'less-than' because of his mixedness. However, comfort and reassurance from his



mother helped him get through the hardships he endured (K-DOC, 2021d). Yeseul and Hyunmin also say that they experienced teasing in schools. Yeseul says, “When I was young, we were all just kids so, I was teased a lot for being half-blooded...even if I don’t say it [that I am mixed], I look different or when I’m with my mom they found out that I’m a mixed race...I had some friends who made fun of me back then... it was hard back then so I wanted to hide that I’m mixed” (Creative Den, 2022c). Hyunmin, who mentioned receiving envy for his appearance states, “when I was young, I was also made fun of and discriminated against for my different looks” (K-DOC, 2021d). These individuals attribute these experiences to the fact that their peers were young. Sofiya adds to this idea:

When I was young, it was really hard. When you’re young, you don’t have that [what they call] ‘the line.’... they’re not careful when they talk. They were like ‘Oh! She’s different... She’s a foreigner.’ I really hated to hear that... some friends said, ‘You’re a foreigner, so you can’t play with us.’ So there were a lot of times I said, ‘I’m not a foreigner!’ I don’t think I’m different, but the others see me different from a different perspective.

(Creative Den, 2022b)

Sofiya recognizes that children are not conscious of what is considered ‘politically correct,’ and tend to cross the line of what is appropriate. Despite Sofiya and Yeseul recognizing this, they were hurt by being outcast because of their mixedness. Sofiya also explains that she protested that she was not foreign. She felt that she was Korean but since she was treated as an ‘other,’ this may have caused some identity dissonance. Outside of discrimination from peers, Lena and Queenie also reveal instances of strangers saying ignorant things to them:

Even if it's your first time meeting, they ask  
'you're not Korean, you're a foreigner, right?'  
Lots of people just straight out ask rude  
questions like that.

(K-DOC, 2021d)

As I really am Korean, I just say that I am Kore-  
an but they keep asking back if I am really  
Korean or not, which makes me feel bad,  
since it's like they don't trust me.

(Global Earth, 2022)

These quotes depict the constant questioning of one's identity that many biracial individuals face (Kim, 2016). Queenie describes that even once she confirms her identity, they do not believe her. She feels uncomfortable because of the preconceptions people hold about her based on the way she looks. The opinions of monoracial Koreans are likely to cause identity dissonance as in the case of Hancheol.

When Hojin is asked about the discrimination he has faced, he says that "taxi drivers [discriminate] a lot. They ask me weird questions... sometimes they didn't take me in the cab because I was a foreigner for them, but [sic] I had to talk in Korean but still they didn't want me to get the cab" (K Explorer, 2024). Despite his Korean language abilities, Hojin is still treated as a complete outsider by this taxi driver. He points out that he is a foreigner "for them," referring to the taxi driver's perspective. By saying that, he indirectly implies that he does not consider himself foreign despite the views of others such as the taxi driver. Denied the privilege of Korean status despite sharing a common language (considered as a key to being 'Korean'), Hojin has undergone uncomfortable experiences in his home country. Seongmin also cites feeling uncomfortable because of always being stared at. He says, "also, since I look Western, that also made it a little tough because people kept staring at me. I felt uncomfortable but it's okay now as I've gotten used to it" (K Explorer, 2023b).

Being viewed differently for the way one looks seems to be a common theme. In 4.1, some mixed individuals perceive being looked at as a sort of positive attention, but for others, such as Seongmin, he cites it as an uncomfortable experience he had to ‘get used to.’ As shown here, similar experiences may be interpreted differently depending on the individual and their perceptions.

#### **4.2.2 Lack of Belonging & Coping**

Cedric came to Korea later in life after growing up in the United States. He often cited feeling unsure about his identity because of the difficulty he faced in being accepted by Koreans. He describes this experience in the quote below.

I think my biggest struggle and challenge would have to be me feeling like I'm an outsider. I feel like there's always a constant reminder that I'm different. And then there's always comments from people, albeit they're friendly comments... 'Do you know how to use chopsticks?' Those are the things where it just reminds you're different. So, that's a struggle for me.

(Asian Boss, 2020)

Cedric recognizes that those around him are not intending to be rude or exclude him, but they still do by treating him as if he does not share traits of Koreans (e.g., knowing how to use chopsticks). This treatment reinforces his feeling of being different despite wanting to fit in. He says when living in Daejeon, “I would get a lot of stares, and I know people don't mean bad by it but you know, after a while when you go out you know you just said you don't want those eyes on you, so I don't think I can do too much to really blend in” (Asian Boss, 2020). The dissonance of wanting to blend in but constantly ‘sticking out’ leads Cedric to some identity confusion and eventually acceptance:

I love the fact that I'm half, and I don't ever wanna change that. I just have to... take these struggles and just accept it as the way it is, but also just be confident in who I am as a person as a human being, that I am just as good as anyone else right? I am just as Korean or I am just as Black; I am just as human as anyone else.

(Asian Boss, 2020)

To cope with his struggles, he has employed affirmations that he should be confident in who he is; this demonstrates the struggles and self-doubt he faced while feeling othered in Korean society. Sooyeon also cites similar confusion and identity dissonance; she says, when coming to Korea, “I was strongly think [sic] I’m Korean. But when I came to Korea, everyone sees me as a white [person]... that hurts me a bit” (Creative Den, 2019). In Austria, Sooyeon felt very connected to her Koreanness, but when she came to Korea, the lack of belonging from monoracial Koreans affected her greatly. As she works in the entertainment industry, there are times where she was employed to represent “a foreigner in Korea” rather than a mixed person. Although she felt negatively about these positions, she did them to gain work experience and build her resume. While doing them, she felt like she was portraying a “character” that did not represent her (Creative Den, 2019). From then on, she decided to reject broadcasts that wanted to depict her as a foreigner, even if it was difficult. This choice shows her coping with the difficulties of not being considered for her Korean side.

Feeling unaccepted by society is a common experience cited in this study. The individuals in this paper discuss instances of feeling ‘othered,’ by being treated as a foreigner or being outcasted. This treatment has caused instances of self-doubt in one’s identity and the feeling that they do not belong, leading to lasting struggles for these individuals.

### 4.3 Identity Options

Multiracial individuals have a unique position in society where they navigate and construct their identities based on a wide range of factors. Based on the literature review, I observed two main identity options that the individuals in this study adopted.

#### 4.3.1 Identifying as Two or More Races

In previous literature, there are cases where biracial individuals identify as both races at the same time. Many of the individuals in this study described their identity as biracial/mixed. Insong mentions struggling with her identity but eventually comes to love her mixed identity:

First of all, I'm not ashamed of anything. I think coming here, really getting to know my other side, made me more sure of who I am. I feel more confident in who I am since I came. It's more accepting that I am different and it's beautiful... I shouldn't be sad that I don't belong to either but I should be happy that I have two sides to belong to.

(Creative Den, 2022d)

Despite experiencing discrimination in her youth for being different, as she has grown older, she has recognized the positives of her mixedness and definitively self-identifies as mixed. She cites having both cultures as a benefit and positively views her identity. Sooyeon also identifies with both of her cultures, saying "I'm Korean, and I'm also Austrian. People don't accept me here and there. This was a little bigger when I was a kid. I think it's getting better now" (Creative Den, 2021a). In a way, the discrimination she experienced reinforces her mixed identity. As a child, she felt unaccepted by either society, but as she gets older, she notices a positive change in society's perceptions. Additionally, her use of the word 'also' demonstrates that she identifies with both races. She also implies

that the lack of acceptance was “bigger” when she was young, which may imply a change in society or a change in her ability to deal with discrimination and other hardships because of her mixedness.

Sihyun also identifies as mixed, but cites that Korean people may not agree with that fact. She says, “First of all, in France, mixed blood is not that fascinating...I'm not confused but I don't think Korean [people] think I'm Korean yet...I have to look like a Korean to become a Korean” (Creative Den, 2021b). Because of her experience as a mixed person in France, she is confident and sure of her mixedness. In France, it is not unusual to be multiracial. However, in Korea, she recognizes that Korean people do not fully accept her as Korean. Still, she sees herself as a mixed person. Cedric also cites a similar experience, stating:

“When I first moved to Korea, to be honest, I felt like ‘you know what, I'm a Korean going back to my home country!’ And then as soon as I got here, I'm like, ‘I am NOT Korean.’ Yeah, so I had sort of a, I guess you could say, it was a culture shock, because what I had envisioned Korea to be culturally as much as I was exposed to the media and I was into Korean entertainments, I thought Korea was gonna be a certain way and as soon as I got here, I realized that I'm way more American than I thought. So, I think just to answer the question I would consider myself just both. Just a mixture of both.

(Asian Boss, 2020)

Prior to living in Korea, Cedric felt confident in his Korean identity. However, due to the views of others and culture shock when coming to Korea, he recognizes that his ‘Americanness’ does play a role in who he is. As such, he views himself as a “mixture” of both Korean and American. Sihyun and Cedric cite how they are often viewed

as foreigners, however, they still identify strongly as mixed race. These individuals choose to proudly identify as both or all of their racial identities while still recognizing that their identity may not be the same as the identity that society assigns them.

#### 4.3.2 Situational Identity & Moving Among Identities

One commonality in the data was the idea of situational identity, as well as the idea of ‘moving among identity options.’ Kim (2016) states, “The term situational identities is used to describe a fluid identity in which an individual’s racial identity is stable, but different elements are more salient in some contexts than in others” (p. 42 & 43). Depending on the scenario or other factors, individuals may take on a monoracial identity or something else. In Steven’s case, he states:

For me, when I'm in Korea, I identify as an American, you know... But yeah - when I'm in the States, I kind of identify as Asian...in high school I was always being called, like, ‘China boy’, and I'd always like, tell them, like, ‘hey man, like, my mom's from Korea.’ But I come from, like, a really small town where people don't really know like countries and stuff, so they'd just be like, ‘Oh yeah, Korea is the same thing as China,’ ‘You China boy,’ ‘You chink’, and yeah, I kind of had, like, an identity crisis so, ‘cause like, yeah, in the States, I was like, ‘man, like, what am I?’

(Asian Boss, 2020)

By identifying as American in Korea, but not in America, Steven shows how he feels unsure about how to identify in America. Steven implies that because of the discrimination he faced in America for being Asian, he did not/does not feel accepted as an ‘American’ while there. His situational identity may be based on how he is perceived in each country. It is possible that in Korea, he is seen as a foreigner and thus takes on an American identity. In this video,

he also mentions being a receptive bilingual, struggling to produce Korean while being able to understand it almost perfectly. His lingual status may contribute to his choice of identifying as American in Korea. Sarah Jane also moves among identity options because of her want to 'belong' or fit in. She says:

For me it depends where I'm at [sic]. Like, for example, I'm in the Philippines, I want to be like, I am a Filipino... and in the Philippines the culture, the food, I love the food, the people - I speak the language perfectly - but then when people, like, look at me like, you know, I still get that stare, and when I come here I still get that stare, so I'm like 'Oh my god, what should I do?'

(Asian Boss, 2020)

Sarah Jane feels that her identity depends on where she is physically. In the Philippines, she will identify as Filipino, and in Korea, she identifies as Korean. She furthers this point by discussing ways she tried to fit into Korean culture even further. She says:

One time, I think I try [sic] to change how I do stuff, watch videos of how they do Korean makeup, and that was the beginning, I think, when people don't notice me [sic] because I don't want them to notice me. I want to fit in, you know .... so when I tried doing it, I noticed that no one, you know, tries to bother me on the street, no one like '죄송한데' [excuse me, but]... and on the subway, like, no one is, like, trying to look at you. It's like you're a normal person but you know deep inside 'Oh my God, thank you makeup!'

(Asian Boss, 2020)

Another key point about situational identities is that the person is secure in their racial identity but may take on different identities in different scenarios. As Sarah Jane mentioned earlier, she loves



Filipino culture. Her choice to wear Korean-style makeup in Korea does not negate her identity as both Korean and Filipino, but rather delineates her desire to be perceived and treated as the majority. There may be many reasons that one wants to fit into a society, whether it be to form relationships with ease or to avoid stares and other unwanted attention. The unique ability of some mixed people to identify differently depending on the situation may be an interesting area of further study in the field of multiracial peoples' development and experiences.

More than how one identifies, how one acts may also depend on location. For example, Yeseul says "When I'm in Korea, I'm more modest and I don't want to stand out. I just wanted to be normal and quiet" (Creative Den, 2022c). She contrasts this from her experience at an international school where she is more outgoing and open. Her identity as a mixed person may be relevant to the two different personalities she takes on depending on who she is around. This kind of 'code switching' of not only identity, but in some cases, personality, further describes the unique experiences and identities of mixed individuals.

Overall, the above discussion highlights common themes found throughout the data related to multiracial Koreans' experiences and interpretations of themselves and their lives. The data showed that these individuals recognize both advantages and struggles they have encountered because of being mixed. The quotes and experiences underline the uniqueness of the mixed-Korean experience while recognizing common themes and patterns in terms of how they are viewed by the public, which serves as a useful basis for further research related to multiracial identity in South Korea.

## 5. Discussion / Conclusion

This research suggests that Korean multiracial individuals living in Korea adopt various identity options that may be influenced or affected by their experiences and self-perceptions. This is consistent with previous research of Korean multiracial children and adults (Kim, 2016; Cho, 2015). Kim discusses the negotiation and navigating of Black-Korean identities and finds common experiences such as discrimination in the educational system and society, as well as identity confusion and the feeling of straddling multiple identities. In the analysis of videos featuring Steven and Sarah Jane, we see the subjects adopt a situational identity where they change how they identify depending on where they are. This may be due to the perception they usually receive at each place, or because of a desire to belong to both societies. Others decisively take on the mixed or *honhyeol* identity, identifying with both / all their races / cultures. Though considered to have a negative connotation, many mixed individuals used the word *honhyeol* to describe themselves (Yoo, 2017). Despite identifying as both, subjects like Cedric and Insong still point out that they are often questioned about their status as Korean or their other race.

Kim (2016) identifies important limitations of studies on multiracial individuals. For one, many of the selected individuals for this study grew up outside of Korea. For the individuals who grew up only in Korea, their experiences may be vastly different than if they were to spend time abroad during crucial developmental periods. This is because complex identities may be constructed and changed over a long period of time. Since the present identity may vary depending on age, socioeconomic and educational status, and localities, results and overall ideas about multiracial development may lack durability. Additionally, as the individuals in this study were willing to show themselves on a public platform (YouTube, entertainment show, etc.), they may not best represent the population as a whole. The downside to using pre-existing data is that these videos are likely to be edited and do not include the full content of the interview.

Using already-conducted interviews, the researcher cannot ask specific or follow-up questions and must rely on the content shown in these videos. The subjectivity with which these videos are edited may impact results.

This research describes the experiences of how mixed Koreans navigate their identities, which will provide information and hopefully help others to understand their identities and support the growing diversity in Korea. The results of this study may add insights to the field of biracial identity and its paradigms, while also adding to studies on the specific population of mixed Korean identities. As Korea becomes increasingly multicultural, whether by the increase in foreigners or mixed Koreans, it is important to acknowledge these trends in order to improve multicultural education in Korea. It is hoped that studies on this topic will create support in enhancing multicultural education programs in Korea to address issues such as educational discrimination, subjugation and negative societal treatment of *honhyeols* and multicultural people living in Korea.

# References

- Akulenko, V. (2022). Shuttles of the Ethnic Borders -Case of the Mixed Identity of Chagubya and Argubya in Vladivostok, Russia-. 사이間 SAI, 32, 225- 255.
- Asian Boss. (2020, March 15). Being Half Korean in Korea | ASIAN BOSS. YouTube. <https://www.youtube.com/watch?v=oVZepLDDtFc>
- Bergkamp, J., Ermann, K. and Geissler, V. (2020). Biracial and Multiracial Individuals. In The Wiley Encyclopedia of Personality and Individual Differences (eds B.J. Carducci, C.S. Nave, J.S. Mio and R.E. Riggio). <https://doi.org/10.1002/9781119547181.ch302>
- Cho, H. (2015). Race, Language, and Identities of Biracial Children in Multicultural Schools in South Korea (Order No. 10646327). Available from ProQuest Dissertations & Theses Global. (1938357046). Retrieved from <https://www.proquest.com/dissertations-theses/race-language-identities-biracial-children/docview/1938357046/se-2>
- Creative Den. (2019, July 5). 외국인 아닌 한국인이고 싶은 한국인 자부심 가득한 윤수연! [GRUB & GAB]. YouTube. <https://www.youtube.com/watch?v=L1B-fMX2DIX4>
- Creative Den. (2021a, August 14). 한국 혼혈인이 한국에서 5년 살고 달라진 점은? [외국인코리아]. YouTube. <https://www.youtube.com/watch?v=-eqkbuImVBs>
- Creative Den. (2021b, September 8). 프랑스 혼혈이 홀로 한국에 살아가기란? 연기자 되고 싶은 안시연! [GRUB & GAB]. YouTube. <https://www.youtube.com/watch?v=uEOsLBPD1Vc>
- Creative Den. (2022a, January 5). 한국에 오니 역시 좋네요.. 페루 혼혈 한나가 한국으로 돌아온 이유는? [GRUB & GAB]. YouTube. <https://www.youtube.com/watch?v=TbryoO2Mszs>
- Creative Den. (2022b, July 3). 한국에서 혼혈로 태어나면 어때요? 국뽕가득한 여고생 김소피아! [Creative Den]. YouTube. <https://www.youtube.com/watch?v=X-OkEPaRuMAM>

- Creative Den. (2022c, August 27). 필리핀 혼혈이라 놀림 받았지만 지금은 자랑스러워요! 20살 항공과 정예슬 [Creative Den]. YouTube. <https://www.youtube.com/watch?v=hW1DpxJ1ayQ>
- Creative Den. (2022d, September 17). 남미 혼혈이라 차별 받지만 한국에 오니 오히려 좋아요! 불리비아에서 온 인선! / [Creative Den]. YouTube. <https://www.youtube.com/watch?v=c37WN-op1QG>
- Elo, S. and Kyngäs, H. (2008), The Qualitative Content Analysis Process. *Journal of Advanced Nursing*, 62: 107-115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>
- Global Earth. (2022e, June 17). Korean teen meets half-Korean teens for the first time. YouTube. <https://www.youtube.com/watch?v=a5m6s3-GDvQ>
- Hsieh, H.-F., & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, 15(9), 1277-1288. <https://doi.org/10.1177/1049732305276687>
- Iverson, S., Morning, A., Saperstein, A., & Xu, J. (2022). Regimes beyond the One-Drop Rule: New Models of Multiracial Identity. *Genealogy*, 6(2), 57. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/genealogy6020057>
- K-DOC. (2021a, May 18). Introducing the future bartender, baker, opera singer, and flight attendant [Part 1] | K-DOC. YouTube. [https://www.youtube.com/watch?v=vVV2XbQT\\_I8](https://www.youtube.com/watch?v=vVV2XbQT_I8)
- K-DOC. (2021b, May 20). That ONE line Koreans always say to a mixed-race person [Part 2] | K-DOC. YouTube. <https://www.youtube.com/watch?v=-0KAHvznIVM>
- K-DOC. (2021c, May 23). Han Hyunmin back at work again, but this time with kids his age [Part 3] | K-DOC. YouTube. <https://www.youtube.com/watch?v=FI-TOcoXeNi4>
- K-DOC. (2021d, May 25). [FINAL PART] The worst things they had to be called for being mixed-race in Korea | K-DOC. YouTube. <https://www.youtube.com/watch?v=cEj5YgyNqOw>
- K Explorer. (2023a, January 24). What's Living In Korea Like as a Half Black Half Korean? | Blasian in Korea. YouTube. <https://www.youtube.com/watch?v=kjphXWTFBk4>

- K Explorer. (2023b, May 8). What's it Like Being Half White In Korea? YouTube. <https://www.youtube.com/watch?v=g1PBhL584d0>
- K Explorer. (2024, January 15). What's it Like being Half French in Korea? YouTube. <https://www.youtube.com/watch?v=sKB8WxXUMtM>
- Kim, H. A. (2016). Biracial Identity Development: A Case of Black-Korean Biracial Individuals in Korea. *International Journal of Multicultural Education*, 18(3), 40–57.
- Kim, H. A. (2020). Understanding “Koreanness”: Racial Stratification and Colorism in Korea and Implications for Korean Multicultural Education. *International Journal of Multicultural Education*, 22(1), 76–97. <https://doi.org/10.18251/ijme.v22i1.1834>
- Krippendorff, K. (2004). *Content analysis*. SAGE Publications, Inc., ISBN 0-7619-1544-3.
- Lim, T. (2014). What is a Korean? The Challenges and Prospects of "Multiculturalism" in Korea.
- Pastina, A.C. (2005). Audience Ethnographies: A Media Engagement Approach. *Global media journal*, 4.
- Petschow, A. (2014). *Ethnographic Research on Creators in an Online Video Space: Chances and Challenges*. Södertörns Högskola School of Culture and Education Media, Communication and Cultural Analysis.
- Perkins, R. M. (2014). Life in Duality: Biracial Identity Development. *Race, Gender & Class*, 21(1/2), 211–219. <http://www.jstor.org/stable/4349697>
- Rockquemore, K. A. (1999). Between Black and White: Understanding the “biracial” experience. *Race and Society*, 2, 197–212.
- Yoo S. (2017). Legal Reform Related to Interracial Koreans, 16 WASH. U. GLOBAL STUD. L. REV. 365,, [https://openscholarship.wustl.edu/law\\_globalstudies/vol16/iss2/9](https://openscholarship.wustl.edu/law_globalstudies/vol16/iss2/9)





An abstract teal-colored line, resembling a paint stroke, curves from the top left towards the center of the page. Several small, irregular teal dots are scattered around the line and in the open black space.

# 05

## Analyzing Algorithm and Thermodynamic Influences on Purple Air Sensors in Baltimore, Maryland

**TRISHA JOY FRANCISCO**

Belay Demoz

Department of  
Physics



# Biography

**Trisha Joy Francisco** is a senior Mechanical Engineering major with plans to graduate in May 2025. Trisha Joy is part of the 20th cohort of the Center for Women in Technology (CWIT) Scholars Program, and a member of the 7th cohort of the Grand Challenges Scholars Program. During her undergraduate career, Trisha Joy's research has been mostly based in atmospheric sciences, ranging from air quality, satellite validations and wind energy. Trisha Joy is grateful to her graduate mentor, Kylie Hoffman, for her continuous support and guidance throughout her undergraduate research career. She would also like to thank Dr. Belay Demoz and Dr. Kenneth Davis for their guidance in this research paper. Moving forward, Trisha Joy aims to continue working in interdisciplinary spaces and expand her skill sets as an engineer.

## Research Journey

Analyzing Purple Air sensor performance was my first research experience. It started when I interned for NASA's Student Airborne Science Activation program as a freshman. This sparked my interest in atmospheric science. I met my graduate mentor, Kylie Hoffman, during that program, and she offered me a position as a student researcher at Dr. Belay Demoz's research lab here at UMBC. They gave me projects such as satellite validations for NASA's Aura satellite and allowed me to build a cheap STELLA Q spectrometer. I enjoyed the research I was doing because it gave me interdisciplinary experience. It also helped hone my skills in data analysis. During this past summer, I had an internship with the Mid-Atlantic Meteorological Air Quality Health Research program, as a joint partnership between Pennsylvania State University and UMBC. For my summer research topic, I chose to go back to my previous work on analyzing Purple Air sensor accuracy. But this time, I focused on comparing the algorithms used by the sensor. I find Purple Air interesting because of its global network and accessibility. Improving the accuracy and reliability of these sensors will help policy makers address environmental health issues and injustices.

# Abstract

Purple Air sensors are low-cost air quality sensors, widely used by community scientists for local air quality monitoring. However, Purple Air data has been shown to overestimate PM<sub>2.5</sub> concentrations when compared to the EPA's Air Quality Monitoring Network. PM<sub>2.5</sub> is particulate matter with a diameter of 2.5 micrometers or smaller which can pose significant health risks. This research investigates the environmental conditions contributing to measurement errors in Purple Air sensors, specifically focusing on how humidity, temperature and dewpoint temperature affects sensor accuracy in the Chesapeake Bay area, particularly in Baltimore, Maryland. Using data collected from a two and a half year period, a nationwide correction model based on Clements et al 2020 was applied to the Purple Air data. This research compared the CF\_1 and ALT\_CF3 algorithms used by Purple Air to process PM concentrations. The goal of this research is to better understand the underlying cause of PM<sub>2.5</sub> measurement errors in Purple Air sensors, which can inform future improvements in calibration and data interpretation. The findings confirm previous research claims that the CF\_1 algorithm significantly overestimates PM 2.5 concentrations while the ALT\_CF3 is less susceptible to environmental biases. The nationwide correction factor is more effective when applied to the ALT\_CF3 data.

# Introduction

Purple Air sensors are low-cost air quality sensors used by community scientists which have led to a significant increase in air quality observations across the world. Despite being a low cost air quality monitor, studies have shown that they are reliable devices even when compared to gold standard Federal Equivalent Methods (FEM) and Federal Reference Methods (FRM) certified monitors [1]. Due to Purple Air's affordability and accessibility, they are a popular source of air quality data for researchers and policymakers.

Purple Air sensors use two identical Plantower PMS5003 laser particle counters placed in the same shelter to estimate concentrations of particulate matter (PM). Particle counts are processed by the sensor using a complex algorithm to calculate the PM mass in  $\mu\text{g}/\text{m}^3$  [2]. These sensors come factory calibrated and the algorithm they use (CF\_1) is deemed proprietary information. The Plantower sensor inside Purple Air monitors uses a laser scattering principle. It produces scattering using a laser to radiate suspended particles in the air, then collects scattering light to a certain degree, and finally obtains the curve of scattering light change with time. In the end, equivalent particle diameter and the particle counts for each diameter can be calculated by microprocessors based on Mie theory [3]. While this technology allows for real-time, high-resolution air quality monitoring, it has been shown to overestimate the density of particulate matter smaller than 2.5 microns (PM<sub>2.5</sub>), especially under certain environmental conditions. This overestimation is primarily due to the sensor's sensitivity to larger particles and its response to high humidity levels, which can cause water vapor to be detected as particulate matter erroneously. Purple Air is known for overestimating PM concentrations. A nationwide correction factor has been shown to be effective in decreasing the error of Purple Air measurements with FRM and FEM monitors [4].

Aside from measuring particulate matter of different sizes (1, 2.5, and 10 microns), Purple Air also measures temperature, humidity, pressure, and Volatile Organic Compounds (VOCs). The focus of this research is to analyze different correction methods and the correlation between meteorological variables such as relative humidity, temperature, and dew point temperature on the accuracy of PM2.5 measurements by Purple Air sensors.

Given the importance of PM2.5 as a key indicator of air quality and its strong association with adverse health outcomes, accurate measurement is crucial. PM2.5 is a significant component of air pollution and has been linked to various health issues, including respiratory and cardiovascular diseases, making it a critical focus for public health research and policy [5]. The overestimation of PM2.5 by Purple Air sensors could result in misleading conclusions about air quality, potentially affecting public health advisories and policy decisions. By understanding how these thermodynamic influences such as relative humidity, temperature and dewpoint temperature influence sensor performance, we can improve the reliability of Purple Air data. This can enhance the role of Purple Air sensors in citizen science, contribute to more informed public policy decisions, and provide more reliable data for research applications.

## Theory

The Plantower PMS5003 laser particle counters in Purple Air monitors come factory calibrated (CF\_1 algorithm) to calculate PM concentrations. The algorithm is deemed proprietary information however, researchers have closely approximated the algorithm [6]. A main flaw of the CF\_1 algorithm is that concentrations falling below  $1 \mu\text{g}/\text{m}^3$  are all given a value of zero, therefore at low concentrations, zeros often predominate [7]. The Plantower PMS5003 sensors tend to overestimate PM2.5 concentrations due to several factors. First, the algorithm assumes a constant density for all particles, which does not always accurately reflect the true density distribution of particulate matter, especially in varying environmental conditions [6].

Second, high relative humidity can cause water vapor to condense on particles or in the sensor, leading to overestimations of particulate matter. Overall, the CF\_1 algorithm lacks flexibility in adjusting for different particle compositions and environmental conditions, leading to consistent biases in certain conditions.

These flaws highlight the need for calibration and alternative algorithms, such as ALT\_CF3, a new algorithm developed by Wallace et al. 2021 [7], which offers more accurate readings by better accounting for environmental variables and particle compositions. ALT\_CF3 is included in the Purple Air data archive and is based on a method that has been used for decades to calculate PM 2.5 from monitors providing estimates of particle numbers in several size categories [7]. The ALT\_CF3 algorithm never reports zeros, since there are always some particles in the 0.3-0.5  $\mu\text{m}$  size category. It produces extremely good precision, averaging 4-8% error, compared to about 10-15% error for the CF\_1 algorithm [7].

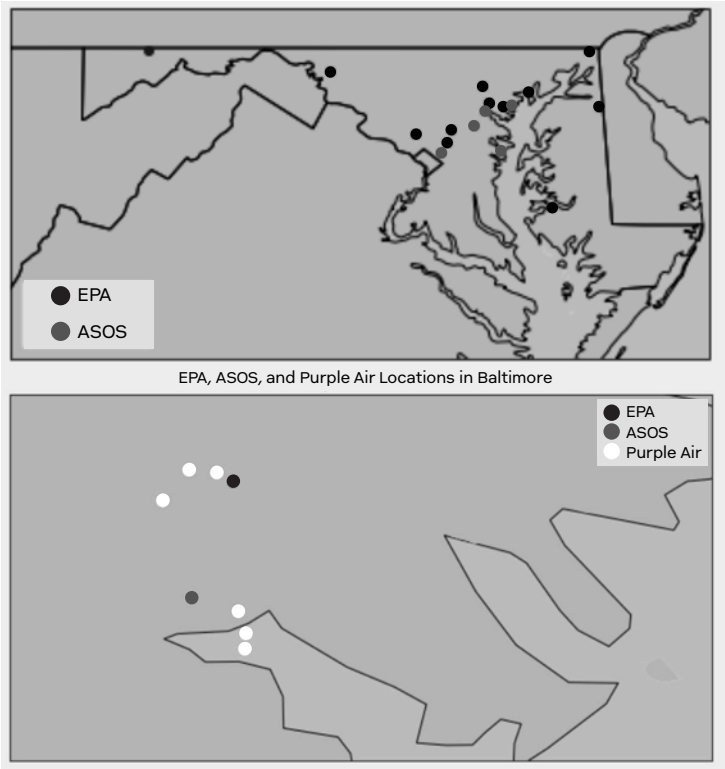
A nationwide correction factor developed by Barkjohn et al. (2022) [4] helped combat the consistent overestimation of the CF\_1's algorithm. There are two versions. One version is for PM2.5 concentrations less than 300  $\mu\text{g}/\text{m}^3$  and the other is for concentrations equal to or above 400  $\mu\text{g}/\text{m}^3$ . There is a transition zone between 300 and 400  $\mu\text{g}/\text{m}^3$  where a blend of both models is used to ensure a smooth correction. For Baltimore, the correction factor for concentrations less than 300  $\mu\text{g}/\text{m}^3$  suffices. In this study, we apply Barkjohn et al.'s (2022) correction factor to the CF\_1 measurements, which we treat as raw PM2.5 data. It works by scaling the PM2.5 values output by the sensor and accounting for the relative humidity in the sensor's location, effectively reducing the inflated measurements.

## Methods

This study focuses on coastal cities in Maryland to examine how local variations in humidity, temperature, and dewpoint temperature in these regions affect Purple Air measurements. The top map in

Figure 1 shows the Environmental Protection Agency’s (EPA) monitors reporting air quality data and the Automated Surface Observing System (ASOS) monitors reporting surface meteorological data certified by the National Weather Service. The data from the EPA and ASOS monitors serve as the reference standard. Upon inspection of the data shown in this map, pairs of ASOS and EPA monitors near bodies of water guided the decision to focus on the Baltimore, Maryland area.

Figure 1



Two groups of Purple Air sensors were identified for comparisons: three purple air sensors near Lake Montebello and three purple air sensors near the Inner Harbor, all less than five miles apart. Data collected by the EPA station located at the Lake Montebello

reservoir is used for PM comparisons, and data collected by the Inner Harbor ASOS station is used for meteorological analyses. Two different bodies of water (lake and harbor) affect the group's humidity. For each of the two Purple Air groups, data from the three sensors were averaged to reduce the impact of local influences on the data. The bottom map in Figure 1 shows the six Purple Air sensors that were analyzed. Both groups are compared to the same EPA and ASOS sensor.

In order to compare the three Purple Air datasets (CF\_1, CF\_1 with the Barkjohn et al. correction, ALT\_CF3), the results section will show time series plots of daily average PM2.5 concentrations, as well as root mean squared error values calculated from comparisons with EPA data, our truth for reference.

The equation for the ALT\_CF3 algorithm [7] is:

$$PM_{2.5}=3(0.00030418*N_1)+(0.0018512*N_2)+(0.02069706*N_3).$$

ALT\_CF3 calculates PM2.5 mass concentration as a weighted sum of the number of particles in these size bins:  $N_1$ : 0.3–0.5  $\mu m$ ,  $N_2$ : 0.5–1  $\mu m$ ,  $N_3$ : 1–2.5  $\mu m$ . Each bin is assigned a coefficient based on its contribution to the total particle mass which represents the relative influence of each particle size on the total PM2.5 concentration. To account for differences in outdoor air quality conditions, a calibration factor of 3 is applied to the entire sum of weighted particle counts which was determined by comparing Purple Air sensor data with measurements from regulatory grade instruments using federal reference and Federal Equivalent Methods (FRM/FEM) [6]. The CF\_1 algorithm is proprietary, although it has been closely approximated in [6] as:

$$PM_{2.5}=aN_1+bN_2+cN_3+d$$

where  $N_1$ ,  $N_2$ , and  $N_3$  follow from the size bins identified above, and constants  $a$ ,  $b$ ,  $c$  varied for each sensor tested, but averaged 0.017, 0.0064, and 0.11 in the nonlinear least squares fit. A second version of the CF\_1 data is used in the comparisons, the corrected CF\_1 data, where the nationwide correction factor from [4] was applied:

$$PM_{2.5} = PA\_CF1 * 0.52 - RH * 0.085 + 5.75$$

Where  $PA_{CF1}$  is the PM<sub>2.5</sub> measurements collected by Purple Air using the CF\_1 algorithm with the units of  $\mu g/m^3$  and RH is the relative humidity converted from percentage to decimal form. Time series plots were created to compare the PM concentrations from raw CF\_1 Purple Air data (no correction factor), corrected CF\_1 Purple Air data, and ALT\_CF3 data to the EPA data. The EPA air quality monitors collocated at Lake Montebello use two different sensors. The Met One BAM-1020 Mass Monitor which has daily PM 2.5 measurements is FEM certified while the R & P Model 2025 PM-2.5 Sequential Air Sampler which has PM 2.5 measurements every three days is FRM certified. The EPA data used in this research is the daily average of those two sensors for the sake of conducting a comprehensive year-long analysis. Since the R&P sensor does not provide daily data, the daily averages in this study are based solely on the BAM-1020 measurements on most data. On days when both sensors have data, their values are averaged. It is recognized that relative humidity and PM<sub>2.5</sub> concentrations exhibit significant variation on an hourly basis which could affect the correction factor's accuracy. Hourly data may provide a more precise analysis by capturing these fluctuations in real-time. However, for a long term analysis, daily averages are more practical and provide a better representation of overall patterns and seasonal changes.

To analyze the differences between CF\_1 and ALT\_CF3, the PM<sub>2.5</sub> concentration measurements were plotted against the EPA sensor's measurements and a root mean square error was calculated. To analyze the effects of thermodynamic influences such as humidity, temperature, and dew point temperature, the Pearson correlation



coefficient between error against the weather variables was calculated for each season. The months were grouped into four different three month-long seasons. Winter: December to February, Spring: March to May, Summer: June to August, and Fall: September to November. Error was defined as the difference between EPA PM 2.5 measurements and Purple Air PM 2.5 measurements. When the correlation between a meteorological variable and error is moderate to high, this indicates that the PM overestimation or underestimation may be influenced by the local meteorology.

The time period analyzed for this research is based on the earliest recorded data of the Purple Air sensors which happens to be January 2022 for the Lake Montebello group and June 2022 for the Inner Harbor group. To keep the analyses of both locations on the same timeline and to avoid data gaps, the analyses started on July 1, 2022. The analysis ended with the most recent data available at time of conducting this analysis, which is July 1, 2024. In total, 731 days of data was used in the Lake Montebello and Inner Harbor analyses.

## Results

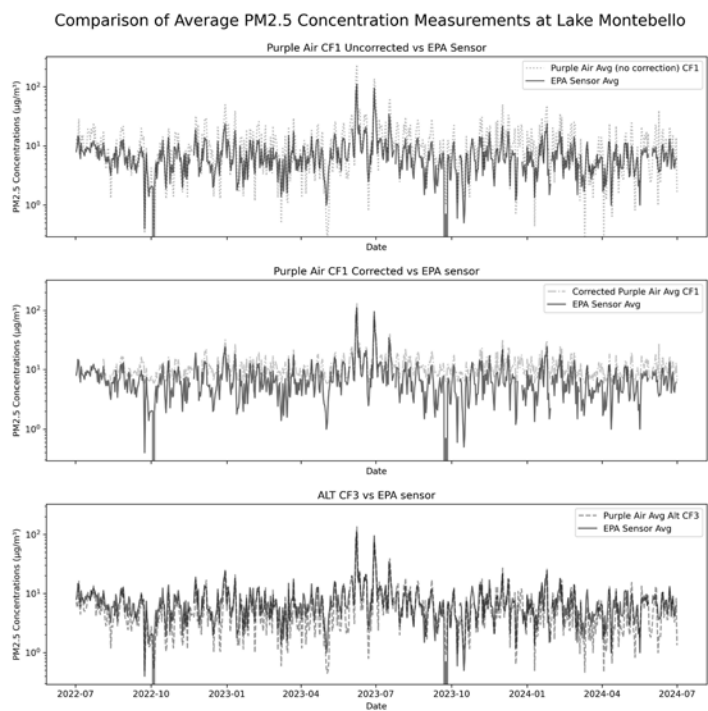
### Algorithm Comparison

Figure 2 shows three sets of time series plots of daily average PM<sub>2.5</sub> concentrations at Lake Montebello comparing Purple Air's CF\_1 data versus EPA sensor data (top panel), CF\_1 data with the Barkjohn et al. (2022) correction applied vs EPA sensor data (center panel), and ALT\_CF3 data vs EPA sensor data (bottom panel). Table 1 accompanies Figure 2 which shows the root mean square error for each algorithm when compared to the EPA data as truth. Without correction, Purple Air's overestimation is easily seen, especially during June 2023, when wildfire smoke from Canada reached Maryland. The nationwide correction factor (Barkjohn et al. 2022) decreased the overestimation, but ALT\_CF3 is even more accurate when compared to the EPA values. Table 1 shows that ALT\_CF3 performed the best with the lowest RMSE value of 2.856 while CF\_1 uncorrected performed the worst with an RMSE

of 9.021. Overall, Purple Air sensors in factory default settings accurately capture the trends in PM 2.5 concentrations throughout all seasons, but consistently overestimates the concentration values.

The same analyses are used for the Inner Harbor site. The algorithms' estimation of PM2.5 concentrations at the Inner Harbor follow the same trend as Lake Montebello's. CF\_1 was the least accurate in comparison to the EPA data, with the highest RMSE value of 11.889, while ALT\_CF3 was the most accurate, with the lowest RMSE value of 3.446. The correction factor applied to CF\_1 data improved results, but overall ALT\_CF3's estimations are still closer to the EPA reference values. This suggests the ALT\_CF3 yields more reliable data, aligning more closely with high quality FEM and FRM certified EPA data.

Figure 2



## Thermodynamic Influences

Tables 3 (Lake Montebello) and 4 (Inner Harbor) show Pearson correlation coefficient values, measuring linear correlations between thermodynamic variables (Relative Humidity, Temperature, Dew Point Temperature) and errors in Purple Air PM data. The highlighted boxes are the lowest correlation values for each season. The closer the value to zero, the less the algorithm's error is correlated with thermodynamic trends. Each algorithm has its strengths. The CF\_1 algorithm errors, for both the uncorrected and corrected datasets, have the weakest correlation with relative humidity for most seasons. The uncorrected CF\_1 algorithm has the weakest correlation with temperature at both locations in the winter, while the ALT\_CF3 algorithm has the weakest correlation with temperature at both locations in the spring. Corrected CF\_1 and ALT\_CF3 have similar and weak temperature correlations in the summer and fall. Uncorrected CF\_1 also has a weak correlation with dew point temperature in fall and winter at both locations, while the corrected CF\_1 algorithm is less affected by dew point temperature in the spring and summer. On the whole, relative humidity, temperature, and dew point temperature are all most correlated with Purple Air measurement error in the winter, at both locations and for all three algorithms.

**Table 3** Seasonal Correaltion Coefficients between Thermo-  
dynamic Vairables and Algorithum Error for Lake Montebello

Seasonal Correlation Coefficients for Lake Montebello			
Relative Humidity			
	CF_1 Uncorrected	CF_1_Corrected	ALT_CF3
Winter	-0.60	-0.60	-0.59
Spring	-0.52	-0.50	-0.52
Summer	0.11	-0.06	-0.07
Fall	-0.17	-0.26	-0.29
Temperature			
	CF_1 Uncorrected	CF_1_Corrected	ALT_CF3
Winter	-0.23	-0.32	-0.41
Spring	-0.16	0.21	0.15
Summer	0.15	-0.03	0.00
Fall	-0.08	-0.04	-0.13
Dew Point Temperature			
	CF_1 Uncorrected	CF_1_Corrected	ALT_CF3
Winter	-0.47	-0.53	-0.58
Spring	-0.43	-0.14	-0.20
Summer	0.18	-0.07	-0.05
Fall	-0.15	-0.16	-0.24

**Table 4** Seasonal Correaltion Coefficients between Thermo-  
dynamic Vairables and Algorithum Error for the Inner Harbor

Seasonal Correlation Coefficients for Inner Harbor			
Relative Humidity			
	CF_1 Uncorrected	CF_1_Corrected	ALT_CF3
Winter	-0.57	-0.58	-0.60
Spring	-0.47	-0.49	-0.52
Summer	0.08	-0.08	-0.03
Fall	-0.15	-0.26	-0.28
Temperature			
	CF_1 Uncorrected	CF_1_Corrected	ALT_CF3
Winter	-0.25	-0.35	-0.46
Spring	-0.17	0.15	0.02
Summer	0.18	0.10	0.13
Fall	-0.12	-0.10	-0.21
Dew Point Temperature			
	CF_1 Uncorrected	CF_1_Corrected	ALT_CF3
Winter	-0.48	-0.54	-0.62
Spring	-0.39	-0.16	-0.27
Summer	0.18	0.01	0.06
Fall	-0.17	-0.20	-0.30

**Discussion**

Purple Air’s accuracy in measuring PM2.5 concentrations is dependent on the algorithm its Plantower PMS5003 sensor uses. These results support previous research claiming that the CF\_1 algorithm greatly overestimates the PM 2.5 concentrations and that the Barkjohn et al. (2022) and ALT\_CF3 algorithms help to correct the overestimation

For both Lake Montebello and Inner Harbor, the time series plots comparing the Purple Air data to the EPA sensor, show that the PM 2.5 concentration values from ALT\_CF3 are much closer to the EPA values but some overestimation is still observed. Many factors can influence the difference between Purple Air and EPA values. For instance, the sensors are not collocated, therefore, they experience effects from their local environments. Additionally, there were gaps in the data used, particularly in the spring season, and a comprehensive analysis (e.g. decade-long comparison) is unavailable due to Purple Air sensors' relatively recent rise to popularity. The seasonal analyses of the thermodynamic variables' influence on algorithm error showed that each algorithm had its strengths. These observations illustrate how the different algorithms are tuned to environmental factors affecting their performance in varied atmospheric conditions. Future improvements can be made to the algorithm's assumption of particle density. However, the laser scattering technique has limitations; considering better measurement techniques which avoid overestimation may be beneficial, particularly in applications when particle mass is more important than the trends of particle mass over time.

# Conclusion

Future work should focus on increasing the number of Purple Air sensor collocations with EPA stations that provide FEM or FRM graded PM and meteorological data. More widespread collocations would yield more robust and comparable results that help refine correction algorithms and improve air quality monitoring outcomes.

Overall Purple Air sensors are reliable devices even when compared to FEM and FRM certified monitors. They are a valuable tool for monitoring air quality, particularly when examining trends over time. Their cost effectiveness and public data accessibility make them beneficial to the widespread provision of local air quality information. While the ALT\_CF3 has an improved accuracy over the default CF\_1 data when compared to EPA measurements, slight overestimations of PM<sub>2.5</sub> concentrations are still observed. It would be beneficial for Purple Air to take steps to further improve their open science policy by making their default CF\_1 algorithm public. This would help users better understand the causes of overestimation. Continued refinement of these algorithms, along with better sensor collocations and regional correction factors are necessary to ensure more reliable and consistent data from Purple Air sensors across diverse settings.

# References

- A. Dybwad, “Over 14,000 PurpleAir Air Quality Monitors Tested Against FEM/FRM Monitors,” PurpleAir, Inc., Aug. 30, 2023. <https://www2.purpleair.com/blogs/collaborations/over-14-000-purpleair-air-quality-monitors-tested-against-fem-frm-monitors> (accessed Aug. 11, 2024).
- “PurpleAir PA-II,” [www.aqmd.gov](http://www.aqmd.gov). <https://www.aqmd.gov/aq-spec/product/purpleair-pa-ii>
- “Digital universal particle concentration sensor PMS5003 series data manual,” 2016. Accessed: Aug. 12, 2024. [Online]. Available: [https://www.aqmd.gov/docs/default-source/aq-spec/resources-page/plantower-pms5003-manual\\_v2-3.pdf?sfvrsn=2](https://www.aqmd.gov/docs/default-source/aq-spec/resources-page/plantower-pms5003-manual_v2-3.pdf?sfvrsn=2)
- K. K. Barkjohn, A. L. Holder, S. G. Frederick, and A. L. Clements, “Correction and Accuracy of PurpleAir PM2.5 Measurements for Extreme Wildfire Smoke,” *Sensors*, vol. 22, no. 24, p. 9669, Dec. 2022, doi: <https://doi.org/10.3390/s22249669>.
- “Inhalable Particulate Matter and Health (PM2.5 and PM10) | California Air Resources Board,” [ww2.arb.ca.gov](http://ww2.arb.ca.gov). <https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health#:~:text=on%20particle%20size>.
- L. Wallace, “Cracking the code—Matching a proprietary algorithm for a low-cost sensor measuring PM1 and PM2.5,” *Science of the total environment*, vol. 893, pp. 164874–164874, Oct. 2023, doi: <https://doi.org/10.1016/j.scitotenv.2023.164874>.
- L. Wallace, “Intercomparison of PurpleAir Sensor Performance over Three Years Indoors and Outdoors at a Home: Bias, Precision, and Limit of Detection Using an Improved Algorithm for Calculating PM2.5,” *Sensors*, vol. 22, no. 7, p. 2755, Apr. 2022, doi: <https://doi.org/10.3390/s22072755>.
- “Pearson’s Correlation Coefficient: A Comprehensive Overview,” *Statistics Solutions*, Apr. 17, 2024. <https://www.statisticssolutions.com/free-resources/directory-of-statistical-analyses/pearsons-correlation-coefficient/#:%7E:text=High%20Degree%3A%20Values%20between%20C2%B1> (accessed Aug. 14, 2024).





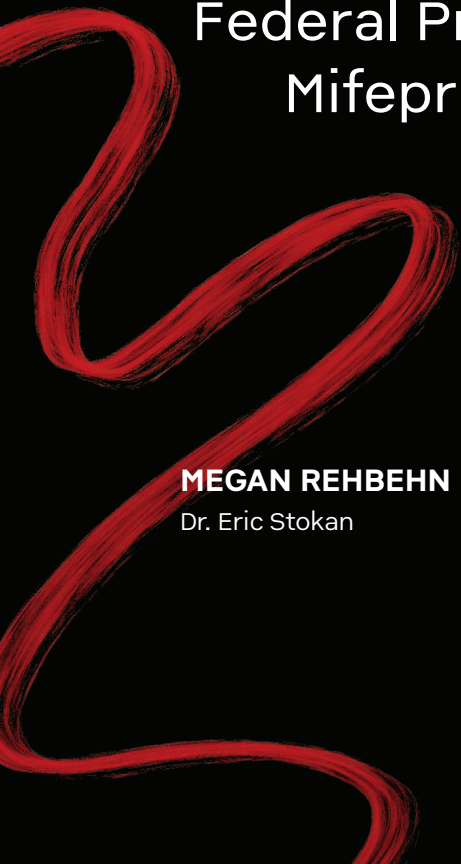
# 06

## Beyond Boundaries: The FDA's Authority and Federal Preemption of State Mifepristone Regulations

**MEGAN REHBEHN**

Dr. Eric Stokan

Department of  
Political Science



# Biography

**Megan Rehbehn** is a Political Science major who will graduate from UMBC in Spring 2025. She enjoys researching various political science topics including international relations and issues of domestic public policy. She is very excited to continue her research interests and goals when she begins the Public Policy Master's program at UMBC this year. She would like to thank her faculty mentor, Dr. Eric Stokan for supporting and encouraging her analytic endeavors and the rest of the Department of Political Science for their various contributions to her academic pursuits.

# Research Journey

This research project came to fruition out of an assignment for an intergovernmental relations course. The course tasked us with choosing a topic or concept of intergovernmental relations that we had discussed in class and conducting a research paper on that topic. Having already held a vital interest in experimenting with research design from a prior research methods course, and with the support of the course professor and my faculty mentor Dr. Eric Stokan, I chose to study a topic that inherently had quantitative data attached to its many facets - the federal preemption of specific state abortion medication restrictions. I was able to formulate an argument for the preemption of federal guidelines over specific state laws on a topic which I was already interested in, and 'play' with data and analytic methods all in one project. Using this mixed methods approach allowed me to exercise two distinct methods of analysis: quantitative, using governmental longitudinal data, and qualitative, using legal doctrine and precedent. The entire project was a learning experience in how data can be used and analyzed in different ways, which was very cool.

# Abstract

This paper explores the intersection of federal preemption doctrine and state-level abortion restrictions, specifically focusing on the regulation of Mifepristone, a widely used abortion medication. I argue that state-imposed restrictions on Mifepristone are preempted by the Federal Food, Drug, and Cosmetic Act (FDCA), enforced by the FDA, based on an analysis of precedent federal court cases on preemption. The analysis delves into the complex regulatory landscape shaped by significant legal milestones, including the 2022 *Dobbs v. Jackson Women's Health Organization* decision, which has profoundly influenced state-level legislation on reproductive healthcare.

Utilizing data from the Centers for Disease Prevention and Control's Abortion Surveillance System, the study categorizes states based on their Mifepristone restrictions and calculates the proportion of individuals compelled to seek abortion care outside their home states from 2012-2021. The findings highlight a marked increase in interstate travel for abortion services, particularly from states with stringent restrictions, underscoring the barriers these laws create against accessing safe and effective reproductive care.

The paper contributes to the discourse on the legal clashes between state sovereignty and federal mandates, offering insights into how federal preemption could serve as a legal basis for challenging state restrictions that not only contravene federal law but also significantly hinder access to healthcare. This analysis is crucial for understanding the broader implications of legal and regulatory strategies on public health and civil liberties in the context of American federalism.

# Introduction

The Supreme Court's 2022 decision to overturn *Roe v. Wade* and *Planned Parenthood of Southeastern Pennsylvania v. Casey* marked a pivotal shift in American legal and political history. This ruling tested the principles of American federalism by shifting authority over abortion laws from the federal government to individual states. By eliminating the federal constitutional right to abortion, the Court transferred regulatory power to state governments, leading to a diverse array of policies. Where a uniform federal standard once existed, states now enforce a patchwork of laws with varying degrees of restrictiveness. Amid this contentious policy environment, many states have imposed new barriers to abortion access through an intricate web of regulations. However, what if some of these state regulations disrupt the balance of power fundamental to American federalism? If these laws shift authority in ways that challenge this balance, what are the broader implications for individual rights and liberties?

This paper examines these critical questions through the lens of state safety-based regulations on mifepristone. It argues that individual liberties, which federalism is meant to protect, are undermined when access to essential healthcare services—such as abortion—is unequal. Unequal access to medication abortion deepens health disparities, undermines reproductive autonomy, and exacerbates socioeconomic inequalities, particularly for marginalized populations. By analyzing state-level restrictions on mifepristone, this paper reveals how regulatory fragmentation in a federal system threatens equitable healthcare access and potentially the efficacy of the American federal system.

First, in the context of decentralized abortion policy, this paper addresses conflicts in the U.S. federal system by drawing on the doctrine of preemption, which is when state law poses an obstacle to the accomplishment of federal goals (Adkins et al., 2023). It looks at federal agency discretion, specifically Federal Food and Drug Administration (FDA) pharmaceutical regulatory authority, and how

that authority compares to that of individual states. Specifically, it argues that state laws that restrict the use, access, and prescription of the abortion medication mifepristone based on purported safety concerns are preempted by federal law. This is accomplished by analyzing previous preemption cases from federal courts. These cases provide valuable pieces of guidance that are utilized to form the argument for FDA preemption of mifepristone restrictions.

Then, based on the argument of preemption, the corollary effects of safety-based mifepristone restrictions are examined by demonstrating how these specific restrictions precipitate the resulting exigency for abortion-related interstate travel. This is achieved using data from the Centers for Disease Prevention and Control Abortion Surveillance System which collects annual data on abortions in each state from 2012-2021. Specifically, states are placed into one of two categories, High-Risk or Low-Risk, based on the presence of specific mifepristone restrictions. In this study, the High-Risk categorization means that the state has specific safety-based restrictions on mifepristone which may precipitate forced interstate abortion travel. Then the proportion of Americans having to leave their home state to obtain abortion care in other, less restrictive states is calculated. The purpose of this analysis is to demonstrate how specific restrictions and laws translate directly into significant barriers to accessing safe and effective abortion care. As the data suggests, these restrictions do not stop abortions from occurring but only serve to make access more difficult for specific populations.

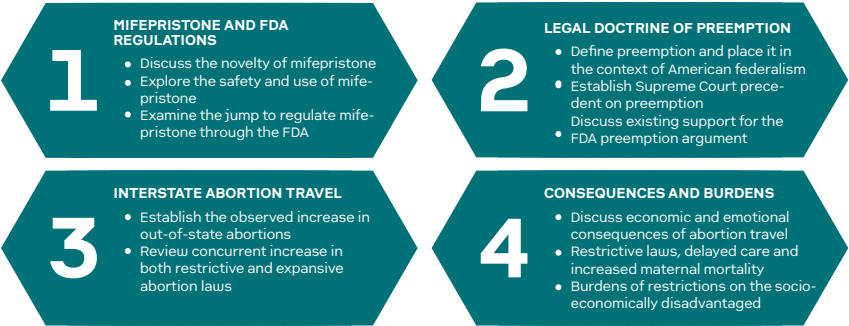
The data analyses demonstrate that individuals in High-Risk states are increasingly compelled to seek abortion care outside their home states, a trend that has been rising steadily since 2012. This migration is notably more pronounced in High-Risk states compared to Low-Risk states where the proportion of out-of-state abortions remains relatively stable and minimal.

To form the preemption argument and to apply it to the utilized data, it is important to review the relevant literature on Supreme Court preemption laws, the evolution of modern abortion legislation,

and the complexity of pharmaceutical law and regulation via the FDA. Thus, the objectives of the literature review are as follows:

1. Summarize the effects of the 2022 *Dobbs v. Jackson Women's Health Organization* on state-level abortion legislation.
2. Introduce the complex scheme of regulating medication abortion by both the FDA and states.
3. Analyze how the Supreme Court has previously used and interpreted obstacle preemption, which as previously discussed, is when state law poses an obstacle to the accomplishment of federal goals (CRS, 2019).

# Literature Review/Background



## Shift Toward Medication Abortion

Since its approval by the FDA in 2000, medication abortion has rapidly become the most common method of pregnancy termination in the United States, with 63% of terminations being medication abortions in 2023 (Guttmacher Institute, 2024). The trend toward medication abortion has been rising, with a 137% increase in use from 2012 to 2021 (CDC, 2023), underscoring its growing acceptance and preference as a safer alternative.

The FDA first approved this regimen in 2000 for use up to seven weeks of gestation (FDA, 2023), and the drug has since undergone rigorous scrutiny since its approval, initially conditioned on stringent safety measures. These safety measures included physician attestation to their ability to manage pregnancy-related complications and mandatory signing of a medication guide by both physicians and patients (Zettler et al., 2022).

Despite the regulatory challenges, clinical trials have demonstrated mifepristone's efficacy and safety. Data from U.S. trials revealed that 97% and 96% of participants experienced complete medication abortions with mifepristone and misoprostol and that severe adverse reactions were rare, highlighting the drug's safety profile compared to more invasive surgical abortions (Zettler et al., 2022).

## **Federal Regulation and State Restriction of Mifepristone**

Under the FDA Risk Evaluation and Mitigation Strategy (REMS) programs — which focus on preventing and managing specific serious drug risks (Manzo, 2023) — the FDA has set stringent guidelines for mifepristone. These include provider certification, completion of a prescriber agreement form, and detailed regulations for pharmacists dispensing the medication (FDA, 2023).

The American Civil Liberties Union (ACLU) challenged the mifepristone REMS requirements in 2017, arguing that they were unnecessary and violated substantive due process, equal protection rights, and the Administrative Procedure Act (Zettler et. al, 2022). Subsequently, the regulations requiring in-person dispensing and ingestion of mifepristone were removed, easing some regulatory burdens.

Despite its proven safety, fifteen states have imposed various additional restrictions on the use of abortifacient drugs, notably mifepristone (Guttmacher Institute, 2024). These state restrictions encompass provider qualification floors, mandatory in-person



visits for medication receipt, multiple visit requirements, and prohibitions on mail distribution of the medication, all arguably under the assumption that the drug poses numerous dangers. These discrepancies and contradictions between state and federal law culminate in a situation whereby state law poses an obstacle to the accomplishment of federal goals, otherwise known as preemption doctrine (CRS, 2019).

### **Federal Guidelines, State Laws, and the Supreme Court**

The Supreme Court has adjudicated numerous cases where it was argued that federal laws and regulations should supersede conflicting state laws. These cases typically center on whether federal law preempts state law, which can occur explicitly through clear legislative language, or implicitly, where the intent to preempt is inferred from federal law (Adkins et al., 2023). For instance, the landmark case *Wyeth v. Levine* addressed whether state law could mandate drug labeling that the FDA had not required. The Court ruled against impossibility preemption, which occurs when compliance with both federal and state regulations is not feasible (CRS, 2019). However, Supreme Court Justice Samuel Alito's dissent emphasized that state courts should not override FDA determinations of drug safety, underscoring the federal government's broad regulatory authority (Grossi & O'Connor, 2023).

In cases like *Mutual Pharmaceutical Co. Inc. v. Bartlett*, the Court found that federal law preempts state law claims against generic drug manufacturers for design defects, reflecting a stringent interpretation of federal preemption in the context of drug safety. Similarly, the Court has held that the FDA's approval of generic drugs preempts state law claims that challenge the adequacy of drug warnings, establishing a federal regulatory ceiling (*Mutual Pharmaceutical Co. V. Bartlett*:: 570 U.S. 472 (2013), 2013).

### **Legal Doctrines and Federal Preemption**

Obstacle preemption, a doctrine where state law is viewed as an impediment to federal objectives (Adkins et al., 2023), has been

pivotal in debates over state regulation of pharmaceuticals, including mifepristone. Scholars argue that FDA regulatory frameworks should preempt state laws that restrict access to mifepristone, suggesting that such preemption is essential to maintain uniformity in drug regulation (Zettler et al., 2022; Boumil, 2015; Grossi & O'Connor, 2023). Critics, however, caution against the broad application of preemption, noting potential negative consequences such as states banning other FDA-approved medications (Zettler et al., 2022). This ongoing legal debate underscores the complexities of federal preemption in pharmaceutical regulation (Adkins et al., 2023).

Legal experts Grossi and O'Connor advocate for a direct application of Supreme Court preemption precedents to argue that state restrictions on mifepristone should be preempted by FDA regulations. They posit that invoking the Supremacy Clause could solidify the constitutional basis for preemption in cases similar to the controversies following the *Dobbs* decision, which highlighted gaps in constitutional protections previously afforded by *Roe v. Wade*.

The reason this discussion is important is that such potentially preempted laws exacerbate existing inequities in accessing reproductive healthcare, lead to vague and unscientific medical guidelines, and potentially place women in needlessly perilous positions. One of the ways they do so is by requiring individuals to seek abortion care out-of-state which carries inherent costs and associated risks.

## **Incidence of Interstate Travel**

A marked increase in interstate travel has been documented in studies such as the Guttmacher Institutes Monthly Abortion Provision Study, which quantifies the extent to which people are traveling across state lines for abortion care following the June 2022 *Dobbs v. Jackson Women's Health* decision that ended *Roe*. The study, which leverages a monthly collection of data from samples of abortion providers, aims to produce timely estimates of clinician-provided abortions in states without total abortion bans. These researchers have found large increases in patients trav-

eling to states that border those with abortion bans and minimal increases in people traveling to states in regions of the country where abortion access remains largely protected (Maddow-Zimet et al., 2024). Specifically, the proportion of patients traveling to other states to obtain abortion care has doubled in recent years, reaching nearly one in five in the first half of 2023, compared with one in ten in 2020 (Maddow-Zimet et al., 2024).

The uptrend in abortion travel has occurred concurrently with an uptrend in restrictive abortion laws in some states as well as protective laws in others. For instance, Mayer et al. (2023) examine state actions following *Dobbs* and discuss the near-term implications of the decision for federalism and state governments. These researchers examine the impact of state constitutions and state courts, trigger laws and pre-existing laws, types of restrictions passed by states, and state policies that support reproductive rights to highlight the framework of American federalism, and its role in the reproductive policy arena. They conclude that the *Dobbs* decision opened a window for states to impose greater limits on reproductive options for women, but also created a greater demand for confirming reproductive rights (or expanding them) in states that had not yet enshrined reproductive rights in state statutes or state constitutions (Mayer et.al, 2023). Similarly, using a longitudinal database of reproductive health laws across the U.S. from 1994 to 2022, Roth and Lee (2023) sought to highlight trends in abortion-restrictive and abortion-supportive state laws. Their descriptive analysis found that pre-viability bans have become significantly more prevalent over time, along with other abortion-restrictive laws.

## **Economic and Emotional Consequences of Forced Abortion Travel**

The negative consequences of restrictive abortion laws and forced abortion travel are multifaceted, encompassing financial, emotional, and physical burdens. These costs are interconnected, compounding risks for those seeking care outside their home state. Forced abortion travel imposes significant financial barriers beyond the procedure

itself, including travel expenses, lost income, housing near the appointment site, and childcare. Studies show these costs often force individuals to delay or forgo essential expenses like rent, bills, and food, disproportionately affecting those below the poverty line (Karasek et al., 2016; Rosales, 2024; Wasser et al., 2024). While it has been repeatedly established that having had an abortion does not increase one's risk for adverse mental health symptoms like anxiety and depression (Charles et al., 2008; Major et al., 2000; Munk-Olsen et al., 2011; Biggs et al., 2017), several studies have found that the processes involved in forced abortion travel do lead to such adverse psychological symptoms (Wasser et al., 2024; Jerman et al., 2017; Riley et al., 2024).

### **Delayed Care and Increased Maternal Mortality**

Furthermore, forced travel often delays access to abortion, increasing gestational age at the time of the procedure (Jerman et al., 2017; Riley, et al., 2024; Velie, et al., 2024) and jeopardizing care for individuals with life-threatening pregnancy complications. The need to travel to obtain abortion care threatens the lives and well-being of pregnant people with preexisting or new onset maternal or fetal conditions, which makes the continuation of a pregnancy inherently dangerous. Since the Dobbs decision, numerous cases have been documented whereby pregnant patients requiring abortion care due to conditions such as premature rupture of membranes, amniotic fluid leaks, placental abruption, and ectopic pregnancy have been denied such care due to state abortion laws which are legally ambiguous, causing providers to err on the side of legal caution at the expense of the mother's health (Velie et al., 2024; Linton, 2023; Arey et al., 2022). In such situations, patients must either wait until they are considered sick enough to qualify legally for an abortion or travel to a less restrictive state to get emergent care.

Investigating the relationship between abortion restrictions, which may necessitate travel to obtain care, and maternal death in the U.S., researchers Vilda et al. (2021) found a link between two specific abortion restrictions and rates of maternal mortality. Their study

found that maternal mortality rates were significantly higher in states with the largest number of abortion restrictions, particularly the states with a licensed physician requirement had a 51% higher total maternal mortality rate compared with the states without such a restriction (Vilda et al., 2021). These findings suggest that restrictive abortion policies may exacerbate barriers to maternal healthcare, leading to worse health outcomes for pregnant individuals.

Given the increasing incidence of forced abortion travel and the substantial price it has on patients, it is vital to analyze the effects of existing state abortion policies, as they exacerbate health disparities, impose undue hardships on vulnerable populations, and have far-reaching implications for maternal health, economic stability, and overall well-being.

### **Economic Disparities in Abortion Access**

The consequences of such restrictions arguably fall most heavily on the shoulders of economically disadvantaged women. The link between socioeconomic status and pregnancy choices, including abortion, has been established repeatedly by several studies. These studies, which link abortion rates to socioeconomic status, find that poor women are more likely to obtain abortions, and are over-represented in abortion patient demographics. For instance, the Guttmacher Institute, which provides extensive data on abortion, found in a 2014 study on the characteristics of abortion patients, that half of US abortion patients live with incomes below the federal poverty threshold, compared with only 14% of the full population of US women aged 15–44. Further, women with family incomes less than 100% of the federal poverty level accounted for almost half of all abortion patients in 2014, and this group had the highest abortion rate of all groups examined by the researchers; 36.6 per 1000 (Jones and Jerman, 2017).

# Methods and Data Part One: Preemption Argument

Scholarly analyses of federal preemption, particularly as they pertain to federal regulations, have drawn predominantly on several key Supreme Court cases. These cases include *Wyeth v. Levine*, *Mutual Pharmaceutical Co. Inc. v. Bartlett*, *PLIVA, Inc. v. Mensing*, and *Geier v. American Honda Motor Co., Inc.*. However, while these cases offer a broad framework for the myriad of circumstances, nuances, and outcomes of preemption arguments, this paper turns to three lesser-known cases, two of which are pending adjudication at the time of this writing. These two are the cases of *GenBioPro v. Raynes et al.* (formerly known as *GenBioPro, Inc. v. Sorsaia et al.*) and *Bryant v. Stein*.

Then, to provide a model after which the preemption case is framed, this paper utilizes the third case, *Zogenix, Inc. v. Patrick*, a case filed in the United States District Court of Massachusetts by pharmaceutical manufacturer Zogenix, Inc. against the Governor of Massachusetts, Deval Patrick. In successfully arguing that two specific pharmaceutical regulations placed on the Zogenix, Inc. drug Zohydro by the state of Massachusetts frustrated federal statutory objectives in violation of the Supremacy Clause of the United States Constitution, this case provides insight on how a Supreme Court argument of FDA object preemption regarding state restrictions of mifepristone may fare. This examination will utilize a dual analytic and comparative approach.

## Foundational Arguments for FDA Preemption

The argument that state abortifacient restrictions based on overstated safety concerns being superseded by FDA regulations via obstacle preemption lies on the following foundation.

## Federal Supremacy and Regulatory Authority: The Role of the FDA in Drug Safety and Efficacy

First and foremost, the Supremacy Clause establishes federal supremacy when state and federal laws conflict. Second, federal agencies get their authority to issue regulations from laws enacted by Congress (Office of the Federal Register). Moreover, the federal regulation of food, drugs, cosmetics, biologics, medical products, and tobacco is legally mandated by the charter of the United States Congress (FDA, 2019). Third, the highly modernized nature of the FDA supports and accentuates its authority in scientific and medical decision-making. This is highlighted in The Federal Food, Drug, and Cosmetic Act (FDCA), the basic food and drug law of the U.S., which establishes the legal framework under which the FDA is obligated to ensure the safety and efficacy of drugs and medical devices for their intended uses and is notably the most extensive law of its kind in the world (FDA, 2023). Fourth, the FDA has gone far beyond the established norm or requirements of safety precautions as is evident by its placement of the abortifacient mifepristone into a REMS Program which to date was last modified on January 3, 2023. Mifepristone was placed in a REMS Program following the FDA determination that the available data and information support modification of the REMS to reduce the burden on the healthcare delivery system and to ensure the benefits of the product outweigh the risks (FDA, 2023).

While the theoretical argument of FDA preemption of state mifepristone restrictions makes legal sense and could hold as an argument in supposition, one must apply the argument to the reality of constitutional law in practice. There exist three specific cases that highlight the legal strength, validity, and standing of an FDA preemption argument, all of which demonstrate the superseding role of REMS program determinations over state laws that directly contradict them. Here is where I will discuss the cases of *GenBioPro v. Raynes et al.* and *Bryant v. Stein*. These two cases which, at the time of writing, are still in adjudication in the Fourth Circuit Appellate Court and the District Court of North Carolina respectively, directly

address the argument of FDA preemption of mifepristone. This analysis aims to demonstrate the strengths and weaknesses of such an argument while highlighting the soundness of FDA preemption of specifically safety-based state drug restrictions. Then, I review the case of *Zogenix, Inc. v. Patrick*, which brings into consideration many of the principal arguments I wish to make in the argument of FDA preemption of mifepristone and acts as a model of the exact argument I aim to make in this paper.

### **GenBioPro v. Raynes et al. and Bryant v. Stein: An Application of FDA Preemption of State Mifepristone Restrictions**

The ongoing cases of *GenBioPro v. Raynes et al.* and *Bryant v. Stein* offer salient examples of how the arguments of FDA preemption have fared in the judicial system concerning mifepristone. I will first discuss the case of *GenBioPro v. Raynes et al.*, followed by *Bryant v. Stein*. While these are two separate cases being argued in two separate court systems, they are interconnected in several ways. Most notably, both Courts contend that state drug laws that directly contradict or disregard the REMS programs of FDA-approved drugs are preempted by the congressional mandate given to the FDA under the FDCA. Additionally, the connection between these two cases is demonstrated in the fact that proceedings in *Bryant v. Stein* are, at the time of this writing, in abeyance pending a decision in *GenBioPro v. Raynes et al.*

The bilateral contention, that state drug laws that directly contradict or disregard the REMS programs of FDA-approved drugs are preempted, is specifically applied to in-person prescribing, dispensing, and administration of mifepristone in the two cases. These state bans on telehealth, as articulated by the overseeing judges, are based on concerns over the safety of the drug. By specifically noting that such laws, which are in contradiction with the drugs REMS program, are preempted, both cases establish that additional safety-based, contradictory regulations are likewise preempted. This precedent thus serves to address the application of this paper's specific claim.



In September 2022, following the Supreme Court *Dobbs* decision, West Virginia passed the Unborn Child Protection Act (UCPA) (W. Va. Code § 16-2R-1 et seq) which made “the act of performing, inducing, or attempting to perform or induce an abortion” illegal in the state (2 W. Va. Code § 16-2R-3). The UCPA also stipulated punishments for current and former medical practitioners who violate the UCPA: (1) medical providers found to have knowingly performed an abortion with the express intent to violate the law would have their medical licenses revoked (W. Va. Code § 16-2R-7), and (2) if a formerly licensed medical professional or any other person “knowingly and willfully performs, induces, or attempts to perform or induce an abortion,” they are guilty of a felony and subject to imprisonment for “not less than three nor more than 10 years” (W. Va. Code § 61-2-8(a), (b)).

In response to the UCPA, which makes the principal use of mifepristone illegal, GenBioPro, Inc. filed suit in the Fourth Circuit Court on January 25, 2023, alleging that the UCPA and prior restrictions violate the Supremacy and Commerce Clauses (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)). In their suit, GenBioPro, Inc. makes the argument that (1) the Food and Drug Administration Amendments Act of 2007 (FDAAA) commanded the FDA to consider access in promulgating a REMS for mifepristone; (2) pursuant to that authority, the REMS the FDA promulgated determined a standard of accessibility for the drug; and (3) West Virginia’s abortion laws conflict with this standard (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)). Both defendants, Prosecuting Attorney of Putnam County Mark Sorsaia and Attorney General of West Virginia Patrick Morrissey, filed subsequent motions to dismiss based on their claim that GenBioPro, Inc. had misinterpreted the Supremacy and Commerce Clauses.

In considering the Defendant’s motions to dismiss the Plaintiff’s claims of preemption, United States District Judge Robert C. Chambers reached a key conclusion. After ruling out the validity of Plaintiff’s claims of obstacle and field preemption, Judge Chambers

contended that the Plaintiff did indeed have a case for impossibility preemption, specifically with regard to the ban on telehealth for prescription of mifepristone.

What is noteworthy about these decisions is that they emphasize the strength and validity of the argument for FDA preemption of safety-based restrictions of mifepristone while considering and excluding the validity of other preemption arguments. Judge Chambers excluded the possibility of obstacle preemption based on the fact that GenBioPro, Inc. is not a licensed medical professional under either West Virginia Code § 30-3-1 et seq. or § 30-14-1 et seq., and thus is not caught between obeying state and federal law in a manner which would offend the Supremacy Clause (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)). Specifically, the Court found that the UCPA is a restriction on the incidence of abortion rather than a state directive in direct conflict with the logistical REMS regulations, and noted that the Supreme Court has repeatedly indicated that similarly broad state regulations are not preempted by intricate federal regulatory systems (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)).

The Court then rejected the possibility of field preemption, which “occurs when federal law occupies a ‘field’ of regulation so comprehensively that it has left no room for supplementary state legislation” (*Murphy*, 138 S. Ct. at 1480 (quoting *R.J. Reynolds Tobacco Co. v. Durham Cty.*, 479 U.S. 130, 140, 107 S.Ct. 499, 93 L.Ed.2d 449 (1986))). The Court agreed with Defendant Morrissey, who pointed to the FDCA’s 1962 Express Saving Clause, demonstrating Congressional intent for state law to play a complementary role in the field of health and safety (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)).

The express exclusions of obstacle and field preemption were made on the basis that the UCPA did not directly conflict with the logistical REMS regulations and that the Court agrees that the 1962 Saving Clause has foreclosed any argument for complete field

preemption. However, the Court did find that one specific restriction, on prescribing, dispensing, and administration of mifepristone via telemedicine, was “unambiguously preempted by the 2023 REMS” (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)) under impossibility preemption. In other words, in dictating the manner in which mifepristone may be prescribed, West Virginia attempted to assume a role that Congress has allocated to the FDA (21 U.S.C. § 355-1(f)(3)(C)). The Court specifically noted that “a licensed medical professional prescribing mifepristone could not comply with both the access determination made by the FDA and the access determination made by West Virginia as to telehealth” (*GenBioPro, Inc. v. Sorsaia et al.* No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)).

Of note, in *GenBioPro, Inc. v. Sorsaia et al.* the Court regarded the telehealth provision as a provision on access to the drug, specifically noting that the Defendants “have not disputed the safety of the mifepristone REMS, nor could they” (*GenBioPro, Inc. v. Sorsaia et al.*, No. 3:2023cv00058 - Document 66 (S.D.W. Va. 2023)). However, as will be discussed in a later section, I argue that in-person requirements, which ban the use of telehealth as a means of obtaining mifepristone, are implemented on the basis that the drug is unsafe, thus requiring the exigence of a medical provider to physically watch the patient ingest the drug.

Similar to the case of *GenBioPro v. Raynes et al.* is the case of *Bryant v. Stein*. In fact, at the time of this writing, *Bryant v. Stein* has been placed in abeyance pending a decision by the court in *GenBioPro, Inc. v. Raynes et al.* No. 23-2194. In the case of *Bryant v. Stein*, the Plaintiff, Amy Bryant, MD, filed suit against the Attorney General for the State of North Carolina, asserting that state laws that regulated the use and distribution of mifepristone were preempted by federal law (*Bryant v. Stein*, 1:23-cv-00077, U.S. District Court for the Middle District of North Carolina (2024)). Following a motion to dismiss made by the defendant intervenors, both parties consented to cross-motions for summary judgment. In her summary judgment, Chief Judge Catherine C. Eagles of the North Carolina District

Court held that (1) North Carolina laws regulating mifepristone and requiring an in-person seventy-two-hour advance consultation, use of an ultrasound, an in-person examination, blood type testing, and non-fatal adverse event reporting to state health authorities were not preempted, but (2) North Carolina laws regulating mifepristone that prohibited health care providers other than physicians from prescribing the drug, required in-person prescribing, dispensing, and administering, mandated the scheduling of an in-person follow-up appointment, and required non-fatal adverse event reporting to the Food and Drug Administration were preempted (*Bryant v. Stein*, 1:23-cv-00077, U.S. District Court for the Middle District of North Carolina (2024)).

Within the context of justifying the Court's opinion, Judge Eagles specifically regarded the in-person prescribing, dispensing, and administering of mifepristone as a safety restriction, which she adds "frustrate[s] the congressional goal of establishing a comprehensive regulatory framework under which the FDA determines conditions for safe drug distribution that do not create unnecessary burdens on the healthcare system or patient access" (*Bryant v. Stein*, 1:23-cv-00077, U.S. District Court for the Middle District of North Carolina (2024)) and are thus preempted. Crucial to the argument made in a later section, the Court also categorized the North Carolina law that prohibits healthcare providers other than physicians from prescribing the drug as a safety-based provision that is also preempted.

These two ongoing cases provide clarity in the interpretation of the Supremacy Clause concerning compliance with FDA REMS programs, specifically state safety-based restrictions of mifepristone. They also underscore the principle that, under the Supremacy Clause, federal law, particularly the FDA's REMS program, takes precedence over state laws when the latter obstruct the FDA's determinations on drug safety and accessibility. By establishing the validity of the Plaintiff's claims of impossibility preemption, the courts emphasize the importance of maintaining uniform

national standards for drug regulation to prevent fragmented and burdensome state-level interventions that could hinder patient access to critical medications.

### **Case Study: Zogenix v. Patrick**

#### **Parallel Legal Precedents: Zogenix v. Patrick**

In the case of *Zogenix v. Patrick*, Zogenix, Inc. argued that the State of Massachusetts, and specifically its then-Governor Deval Patrick's actions – which effectively banned Zogenix, Inc.'s drug, Zohydro, in the state – was unconstitutional and preempted under implied obstacle preemption. Essentially, Zogenix, Inc. argued that the state was prohibited from banning the drug.

### **Comparative Legal Analysis**

This case parallels that of the mifepristone preemption argument in three distinct ways. First, mifepristone and Zohydro were both drugs newly approved by the FDA, were both pharmaceutically novel, and thus valuable for their respective purposes. Second, both had REMS programs implemented at their approvals which contained specific conditions on prescriptions. Third, both Zohydro and mifepristone were restricted or banned by states that used arguments of safety concerns as their justifications.

Specifically, several months after the FDA approved Zohydro, a public health emergency was declared in Massachusetts by Governor Deval Patrick (Massachusetts Department of Public Health, 2014) who also authorized the MA Department of Public Health to “prohibit the prescribing and dispensing of Zohydro ER until DPH determined that adequate measures to safeguard against diversion, overdose, and misuse had been implemented” (*Zogenix, Inc. v. Patrick*, 2014) due primarily to rising fears of the expanding opioid epidemic within the state (Costello, 2018).

In response to Governor Patrick's restrictions on Zohydro, Zogenix, Inc. filed a complaint in the District Court of Massachusetts, seeking a preliminary injunction against what they saw as an unconsti-

tutional violation of the Supremacy Clause (CIVIL ACTION NO. 14-11689-RWZ (D. Mass. Jul. 8, 2014)). The injunction was granted by Judge Rya Zobel, who stated that the ban was likely unconstitutional as it would obstruct the FDA's congressionally given charge. Moreover, she added that the state was substituting its own judgments for that of the FDA and would require Zogenix to return to the FDA for another approval (CIVIL ACTION NO. 14-11689-RWZ (D. Mass. Jul. 8, 2014)).

In her ruling on the case, Judge Zobel cited the Supremacy Clause which provides that the Constitution and the laws of the United States “shall be the supreme Law of the Land . . . any Thing in the Constitution or Laws of any State to the Contrary notwithstanding” (U.S. Const., Art. VI, cl. 2) and added that due to this Clause, “state law that conflicts with federal law is ‘without effect.’” (*Cipollone v. Liggett Grp., Inc.*, 505 U.S. 504, 516 (1992) (quoting *Maryland v. Louisiana*, 451 U.S. 725, 746 (1981))). Moreover, she held that the Federal Food, Drug, and Cosmetic Act created the FDA and charged it with “promot[ing] the public health by promptly and efficiently reviewing clinical research and taking appropriate action on the marketing of regulated products in a timely manner” (21 U.S.C. § 393(b)(1)) and that Congress required the FDA to “protect the public health” by making sure that “drugs are safe and effective” (Id. § 393(b)(2)(B)).

Based on this congressional mandate, Judge Zobel concluded that when the Commonwealth of Massachusetts “interposed its own conclusion about Zohydro ER’s safety and effectiveness by virtue of DPH’s emergency order” (District Court of Massachusetts CIVIL ACTION NO. 14-11689-RWZ), it stood as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress (District Court of Massachusetts CIVIL ACTION NO. 14-11689-RWZ; *Hines v. Davidowitz*, 312 U.S. 52, 67 (1941)). She added that if the Commonwealth were able to countermand the FDA’s determinations and substitute its own

requirements, it would undermine the FDA's ability to make drugs available to promote and protect public health (District Court of Massachusetts CIVIL ACTION NO. 14-11689-RWZ).

In addition to Governor Deval's personal attempts to restrict the use of Zohydro, he also commandeered the Massachusetts Board of Registration in Medicine and the Massachusetts Board of Registration in Pharmacy (BORIP) to place several contingencies on the prescription and dispensing practices of the drug which Judge Zobel also ruled as acting as functional bans, and thus were preempted.

The likeness of the Zohydro and mifepristone cases are unmistakable. However, only one of the two drugs lists addiction, abuse, death, inappropriate prescribing, misuse, and overdose as known outcomes of the drug. Ironically, the REMS for the more objectively lethal drug has markedly less stringent guidelines.

The similarities in the public and political skepticism of the FDA's decisions to approve the two respective drugs based on safety concerns, despite both being carefully regulated and studied by the FDA, provide exceptionally fertile ground to lay the foundation for the argument of object preemption, which this paper contends mirrors that of *Zogenix v. Patrick*.

### **Zogenix and Obstacle Preemption Summary**

By ruling that the Commonwealth of Massachusetts, the Board of Registration in Medicine, and the Board of Registration in Pharmacy imposed their own conclusion about Zohydro's safety and effectiveness and obstructed the FDA's congressionally given charge, Judge Zobel created a precedent. Moreover, in clarifying the Supreme Court's stance on the use of object preemption with respect to the FDCA, she explicitly states that the Supreme Court has not rejected this type of argument (See *Wyeth v. Levine*, 555 U.S. 555, 573 (2009)). Judge Zobel explained that *Wyeth* simply concluded that Congress did not view state tort suits as an obstacle to achieving the FDA's purposes.

The arguments and decisions made in *Zogenix v. Patrick* advance exceedingly important contributions to the theoretical argument of the FDA/FDCA preemption of mifepristone and should serve as the predominant model for prospective cases. While *Zogenix v. Patrick* was not a Supreme Court case, its implications resonate deeply and set a compelling precedent for future litigation.

The three cases discussed (*GenBioPro v. Raynes et al.*, *Bryant v. Stein*, and *Zogenix v. Patrick*) help provide a firm basis for my argument for the preemption of state safety-based mifepristone restrictions. *GenBioPro v. Raynes et al.* establishes that arguments for state provisions on mifepristone, which are based on the safety of the drug and its REMS program, are indeed preempted. *Bryant v. Stein* confirms the judicial position that state safety-based provisions that are contradictory to the drug's REMS program – specifically referencing the laws on in-person prescribing, dispensing, and administering of mifepristone and the law that prohibits healthcare providers other than physicians from prescribing the drug – hinder Congress's objective of creating a thorough regulatory system in which the FDA sets conditions for safe drug distribution without imposing undue burdens on the healthcare system or limiting patient access. Finally, *Zogenix v. Patrick* serves as a structural parallel to the argument this paper aims to make, that is, of the obstacle preemption of mifepristone. Thus, *GenBioPro v. Raynes et al.* and *Bryant v. Stein* act as applicable supplementary and complementary precedents that can be applied to a *Zogenix v. Patrick* style argument.

Now that I have posited a strong case for the FDA/FDCA preemption of state mifepristone restrictions which are based on safety concerns, I turn to the analysis of the corporeal effects these specific restrictions have on abortion-seeking Americans living in restrictive states. In the next section, I use those state laws on the use of mifepristone, which are imposed on the basis of safety, and as I argue are thus preempted, to demonstrate how states with those specific laws have created a chilling and observable phenomenon whereby pregnant individuals are forced to seek abortion care needlessly far from home and at a considerable cost.



# Methods and Data Part Two: Quantitative Data on Abortion Travel

To reiterate, the case made in this article for FDA/FDCA preemption of state mifepristone restrictions applies to those restrictions which are implemented on the basis of safety; that is, the drug requires additional state-imposed restrictions to ensure safe use, either beyond what the drugs REMS has mandated, or in direct contradiction of the REMS. The purpose of this part of the analysis is to display and emphasize one of the substantial impacts these laws have on Americans seeking abortion care, particularly in states that are more restrictive with their abortion laws. Since my argument is based on the existence of such safety-related restrictions, those are the restrictions this analysis considers when placing states into their respective binary categories.

To analyze the effects of safety-based restrictions on mifepristone, states were first divided into one of two categories based on the presence of three specific restrictions on the use and prescription of mifepristone in the state's constitution. Since the argument made in this paper is that of FDA/FDCA object preemption based on claims of safety concerns, the three particular restrictions are those that were implemented solely based on safety considerations. These restrictions are as follows: (1) In-person requirements, which ban the use of telehealth as a means of obtaining mifepristone. These bans are implemented on the basis that the drug is unsafe, thus requiring the exigence of a medical provider to physically watch the patient ingest the drug; (2) The restriction of abortion providers to only those that have specific transfer agreements and/or admitting privileges at local hospitals or medical centers. This restriction infers that the drug is recognizably unsafe to the degree that patients may require hospitalization, thus necessitating the need for prescribing providers to have special agreements with local hospitals; (3) Edicts on the qualifications of mifepristone prescribers. Specifically, these

laws mandate that only physicians licensed within that state may prescribe mifepristone, as opposed to mid-level providers such as nurse practitioners (NPs) or physician assistants (PA-Cs).

In determining which states contained all three restrictions, data was drawn from the Center for Reproductive Rights State Legislation Tracker, which provides the laws pertaining to abortion care in each state, in real-time. The database was used to narrow the list of states down to thirteen states. Then, the presence and status (in effect vs not in effect) of the restriction triad in each of these states' constitutions was verified. See Table I below for the list of thirteen states.

**Table 1. High Risk State Abortion Laws**

State	TRAP Law	In-Person Requirement	Provider Requirement
Alabama	§26-23E-4(c)	§26-23E-2: (7)	§26-23E-4 (2023)
Arkansas	§20-16-1504(d)	§§20-16-203, 20-16-1504,	§5-61-101.
Florida	§59A-9.023., 390.012	§390.011(d)(2)	§390.011
Iowa	§146B.2(3)	§653-13.10(3)	§653--13.10
Indiana	§16-34-2-4.5	§16-34-2-1(a)(1); id. §16-34-2-1(d)	§16-34-2-4.5; id. §16-34-2-1
Kentucky	§216B.0435.	§311.728	§311.75
Louisiana	§40:1061.10	§40:1061.11	§1061.10
Mississippi	§41-75-1(f)	§41-41-107(3)	§41-41-107
Missouri	§188.080	§188.021	§188.020
Oklahoma	§63-1-748	§63-1-729.1	§63-1-731
Tennessee	§39-15-202	§63-6-241	§39-15-201(c)
Texas	§171.002;25	§171.063	§171.003
Wisconsin	§253.095(2)	§940.15(5), 253.105(2)	§940.15(5)

The categorization of states into one of two groups acts as the primary dependent variable and is called State Risk Status. The two possible categories of the binary variable are (1) High-Risk States, which are the states that are more likely to experience the various negative externalities of mifepristone restrictions, including the need to travel to obtain abortion care, whereas (2) Low-Risk States are those that are less likely experience the various negative externalities of mifepristone restrictions. The determining factor of which category a state was placed in was the presence and enactment of all three of the previously identified restrictions. The thirteen states identified as having this triad were placed in the High-Risk State group, and the remaining thirty-seven states were placed in the Low-Risk State group.

However, it is important to note that simply because a state did not qualify for High-Risk status in this study does not mean the state is not restrictive. For example, West Virginia is a particularly restrictive state wherein the state has a total ban on abortion and claims its pre-*Roe* criminal abortion ban is enforceable although the ban is currently enjoined (*Abortion Laws by State West Virginia*, n.d.). Even so, the state does not qualify for High-Risk status in this study as it only contains two of the three necessary provisions. Specifically, the West Virginia Constitution contains provisions on telehealth bans for the prescription of mifepristone (§30-14-12d(g)(5)), and on abortion providers having admitting privileges at West Virginia hospitals (§16-2R-3(g)). However, absent from the WV constitution is any law that specifies that only physicians can provide abortion care. Thus, for the purpose of this study, West Virginia does not meet the requirements to be placed in the High-Risk group, despite being a known highly restrictive state. Similarly, the qualification as Low-Risk does not necessarily indicate that the state does not impose restrictive abortion laws, only that the state does not contain the three (arguably preempted) provisions noted here. Thus, the absence of the three restrictions and the categorization as Low-Risk is not meant to create a binary of generally restrictive states and generally non-restrictive states but instead is meant to study the effects of states that have the three provisions against those that don't have all three provisions.

Next, data on in-state vs. out-of-state abortions from the years 2012 to 2021 were provided and accessed using the CDC's Abortion Surveillance System. To obtain descriptive statistics and to perform comparative linear analysis, it was necessary to clean and reorganize the raw data, which covered reported abortion statistics in the United States from 2012 to 2021. This dataset, comprising over 26,000 observations, documented both the locations of service (where the abortion occurred) and the locations of residence (the state where the patient resided) for over 6 million abortions in the country.

Of note, the CDC Abortion Surveillance System is a voluntary system of data collection whereby states are not mandated to report their statistics on abortion. The states and cities that have opted out of participating in the system are California, the District of Columbia, Maryland, New Hampshire, New Jersey, New York, and New York City. For this reason, these states and cities are not represented in the following data analysis. However, none of these states or cities qualify for High-Risk State status. Thus, their exclusion from the data does not have an impact on the accuracy of the data obtained from the High-Risk State group.

From the raw dataset, which graphed *Area of Clinical Service* by *Area of Residence* for each year, the following independent variables were created: *State 1* is where the person lives; *State 2* is where the abortion occurred; *Abort* is equal to the number of abortions in State 2 who live in State 1 (number of abortions obtained in a state by residents of that state); *Total By Residence* is equal to the number of abortions obtained by in-state residents (regardless of where they obtained it); *Total By Location* is equal to the total number of abortions occurring in a state (by both residents and nonresidents of that state); *Out of state* is equal to the number of abortions which State 1 residents obtain out of state, and *Out of state* proportion is the proportion of abortions occurring out of State 1 by State 1 residents. The dependent variable is called High-Risk and is a binary variable based on the presence of the three laws. See Appendix I for the full list of variables.

To analyze the two groups of my dependent variable and to analyze the effects of the presence of the three abortion restrictions, descriptive statistics were obtained to establish a baseline headcount of abortions performed each year for each independent variable. However, in this case, since datasets with unequal inputs are being compared (High-Risk States vs Low-Risk States), proportions are utilized to obtain a more representative picture of how the two groups compare. In this instance, proportionality is a more optimal metric because it helps normalize the data, accounting for variations in size and scale across the different groups. In this case, the condition is that there exists great variation in the number of states in the High-Risk group and the number of states in the Low-Risk group. Thus, in discussing the descriptive statistics, proportionality between the two groups is described.

Next, linear regression models were performed on both groups (High-Risk and Low-Risk) to demonstrate the relationship between out-of-state abortion proportion and year. Finally, t-tests were performed for each year to determine if there was a significant difference in the average number of people having to travel out of their home state to obtain abortion care based on the presence of the three restrictions for each year. Moreover, certain years saw higher numbers of restrictions implemented in certain states, thus qualifying them for high-risk status. It is expected that this group of states will have an increased proportion of people having to travel out of state in the years since such legislation was passed. Thus, it is hypothesized that due to the presence of the three restrictive laws, High-Risk States will have a higher proportion of out-of-state vs in-state abortions than those in Low-Risk States, despite the ratio of high-risk to low-risk being 13:30.

# Empirical Data Analysis and Discussion

## Descriptive Statistics

**Table II** Descriptive Statistics of Abortion Totals

Variables	Observations	Mean	SD	Min	Max
Abort	439	10,527.43	13,050.61	0	74,944
Total by Residents	439	11,443.25	13,170.13	0	75,370
Total by Location	439	11,590.53	13,937.41	31	79,817
Out-of-State	439	915.82	1,434.42	0	11,109

Table II provides the raw descriptive statistics on abortion data from 2012 to 2021. However, data from thirty-four states are represented in the Low-Risk group whereas only thirteen states are represented in the High-Risk group. Therefore, raw numbers of abortions are substantially higher across all independent variables for the Low-Risk States. Proportions, however, demonstrate two distinct patterns. While proportions of out-of-state abortions remain well within the 4-6% range in the Low-Risk States, out-of-tate abortions in the High-Risk States group are elevated in the 10-40% range. Moreover, it is evident that an upward trend exists in these High-Risk State proportions, whereas the Low-Risk State group remains largely flat in comparison.

Figure I

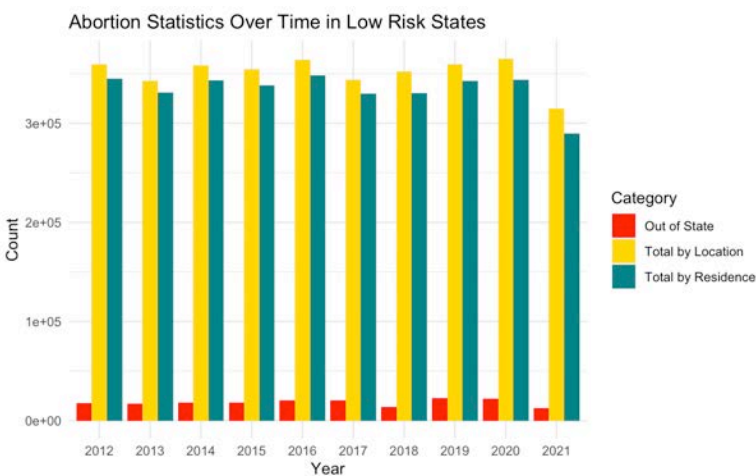
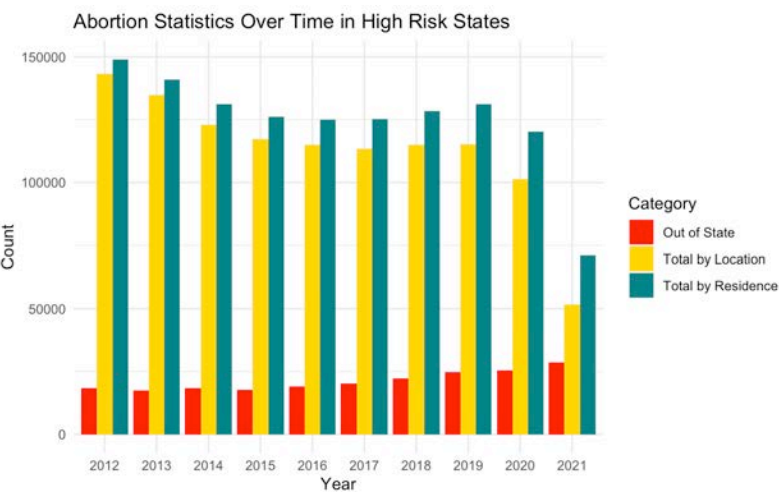


Figure II

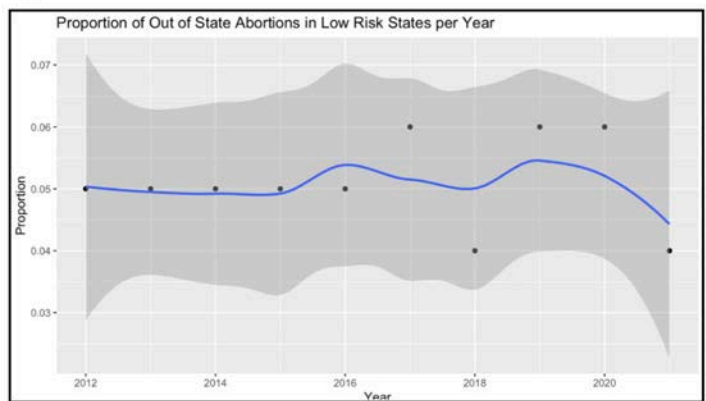


## Linear Regression

Linear regression analysis was conducted to explore the relationship between the proportion of out-of-state abortions and time (measured in years) across two distinct groups: High-Risk and Low-Risk States. The analysis aimed to determine how this relationship varies between groups with different risk profiles.

The Low-Risk table (Figure III) presents the linear regression results on the year and proportion of out-of-state abortions in Low-Risk States. The analysis shows that each year, the proportion of out-of-state abortions increases by about 10.204 units. The positive slope suggests a slight growing trend in out-of-state abortions.

Figure III



$$\text{Regression Equation} = 10.204x + 2015.98$$
$$p\text{value} = 0.9456$$

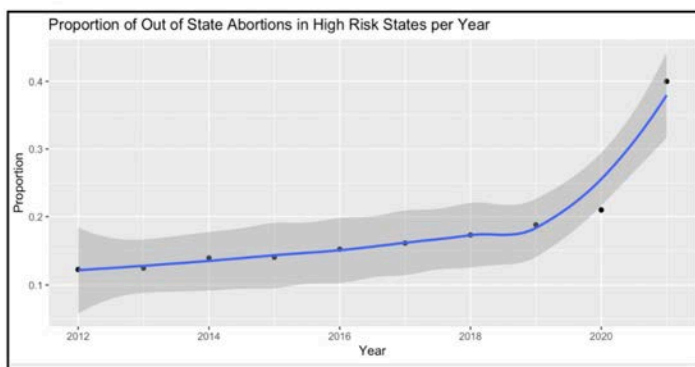
However, the regression analysis for Figure III, representing the proportion of out-of-state abortions in states with minimal abortion restrictions, yielded a high p-value ( $p = 0.9456$ ). This high p-value indicates that the relationship between the year and the proportion of out-of-state abortions, as described by the slope of 10.204, is not



statistically significant. Therefore, we cannot confidently assert that there is a meaningful or reliable trend over time based on this data. The results suggest that the observed changes in the proportion of out-of-state abortions might be due to random variation rather than a true underlying effect of the year.

The High-Risk table (Figure IV) demonstrates a slope of 28.65, which is significantly steeper than that of the first equation, suggesting a much stronger positive relationship between year and proportion. The much steeper slope compared to the first equation indicates a faster rate of increase in out-of-state abortions each year. This suggests that as restrictions tighten or persist, a significantly larger number of individuals are seeking abortions out of state. These results yielded a statistically significant p-value of 0.0084.

**Figure IV**



$$\text{Regression Equation} = 28.65x + 2011.317$$

$$p\text{value} = 0.008492$$

The second group of states (with strict restrictions) shows a significantly steeper increase in the proportion of out-of-state abortions. This could be interpreted as an indicator that stricter abortion laws are driving residents to seek services elsewhere at a faster and increasing rate compared to states with fewer restrictions. This analysis suggests a clear and growing divide in abortion access between states with differing legal landscapes regarding abortion, illustrating the real-world impacts of legislation on individual behavior and interstate healthcare dynamics.

Difference of Means Test

**Table III** Difference in Means: Proportion of Out of State Abortions Based on State Risk Status

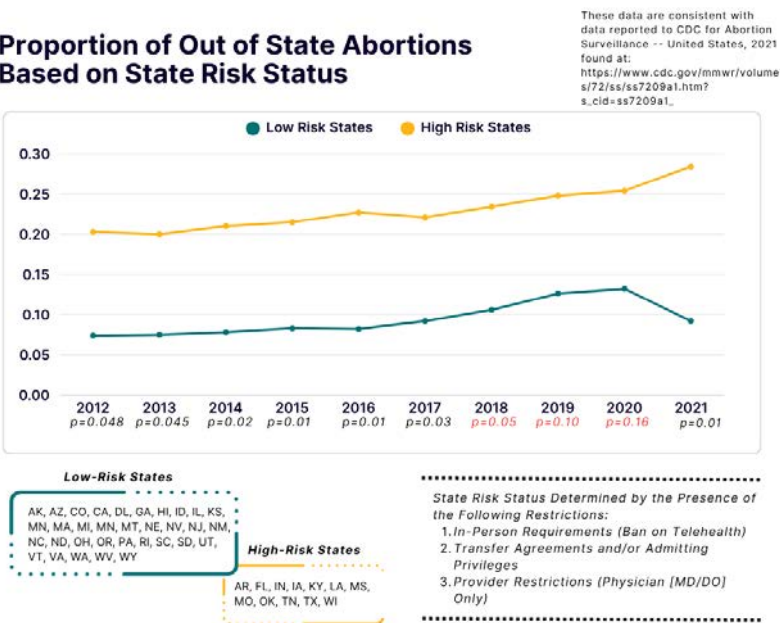
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
High Risk States	0.203	0.2	0.21	0.21	0.227	0.221	0.234	0.248	0.254	0.284
Low Risk States	0.074	0.075	0.078	0.083	0.082	0.092	0.106	0.126	0.132	0.092
<i>p-value</i>	0.048	0.045	0.028	0.019	0.013	0.034	0.051	0.109	0.165	0.027

As seen in Table III, taken collectively, there is a large, statistically significant difference between the proportion of residents having to travel out of state to receive abortion care in High versus Low-Risk States. This is demonstrated in the stark variance between the mean number of abortion travelers in each group over ten years. However, it is noteworthy to mention that three of the t-tests (2018, 2019, and 2020) conducted did not yield statistically significant results. Despite this, when considering the collective data, a substantial and statistically significant difference emerges between the proportion of residents needing to travel out of state for abortion care in High-Risk versus Low-Risk States. The proportion of people having to travel out of state to obtain abortion care in High-Risk States is more than double that in Low-Risk States. Specifically, on average, 22% (0.2296) of abortion seekers in High-Risk States had to travel outside of their home state to obtain care whereas an average of only 9% (0.094) of abortion seekers had to do the same in Low-Risk States.

Moreover, while proportions for both High-Risk and Low-Risk States had overall increasing trends between 2012 and 2021, there were 2 points (years) in which the two groups gravitated in diverging directions in tandem. This was first seen in 2016, during which time the proportion of High-Risk States increased from 0.215 to 0.227 (+1.2%) whereas the proportion of Low-Risk States decreased from 0.083 to 0.082 (-0.1%).

However, both the steepest incline and decline in proportions occurred in 2021 with High-Risk States climbing from 0.254 in 2020 to 0.284 in 2021 (+3%) and proportions in Low-Risk States dropping from 0.132 in 2020 to 0.092 in 2021 (-4%). This contrast can be seen in Figure V which plots the proportion points comparatively.

Figure V



The divergence in means between the two groups demonstrates the direct impact that in-person requirements, transfer agreement/admitting privileges laws, and restrictions on provider qualifications have on people seeking abortions in the High-Risk States. Based on these results, these individuals are more than twice as likely to have to travel out of their home state to obtain care based solely on restrictions that are founded on opinions that directly contradict federal guidelines. Moreover, one-third of people who may be seeking abortion care (people between the ages of twelve and fifty who can become pregnant as per the U.S. Census) reside in the thirteen states identified as High Risk (U.S. Census, 2021). One-third of Americans who are capable of getting pregnant are being restricted access to healthcare, including the medical management of spontaneous miscarriage, as the result of laws that may very well be unconstitutional.

The noticeable increase in polarity between the two groups which occurred between 2020 and 2021 can be explained by the political landscape of the 2020 COVID-19 pandemic, during which time many governors and state legislators pursued one of two diametrically opposed courses of action: either protecting access to reproductive health care or attempting to ban abortion (Guttmacher Institute, 2020). During the early months of the COVID-19 pandemic, twelve states banned or restricted abortion access under elective-procedure restrictions (Carson & Carter, 2023). Of these twelve states, eight are classified as High-Risk in this study.

Moreover, it is clear that the amount of abortions obtained in the United States yearly since 2012 is not trending down. This indicates that these restrictions are not only ineffective at curbing abortion rates in the U.S. but that they create inequities for the people living within the High-Risk States.

# Discussion

The presence of the three restrictions identified as indicating a High-Risk status in states indicates that a substantial disjuncture exists both horizontally between states and vertically between state governments and the federal government. The data demonstrates that individuals in High-Risk States are increasingly compelled to seek abortion care outside their home states, a trend that has been rising steadily over the years. This migration is notably more pronounced in High-Risk States compared to Low-Risk States where the proportion of out-of-state abortions remains relatively stable and minimal.

When the Supreme Court re-distributed authority to enact abortion laws to individual states, it enabled state lawmakers to re-litigate the federal government's own settled science and undermine its supremacy. Such a disruption in this balance of intergovernmental authority places the American federal system at risk of setting precedents that lead to fragmented national policies, compromised equal protection and unequal citizen treatment, and the potential for increased tensions between state and federal authorities.

While a strength of the American federal system is in its ability to create a standard of rights and protections across all states, disparities in such rights and protections which are founded on overt contradictions to federal objectives ultimately undermine this uniformity, creating fragmented legal landscapes that erode equitable access to justice and essential services.

The disjuncture evidenced in this study, specifically within the realm of health and safety guidelines, presents an additional problem for the future of public health in the United States. An important question to ask is: What message are states sending to their residents when they enact laws that imply that the agency tasked by Congress to protect public health, including the insurance of the safety, efficacy, and security of pharmaceuticals, is incompetent and its guidelines invalid?

Situations like this, where conservative states are allowed to substitute their own unsubstantiated reasonings for that of evidence-based, independently-backed federal guidelines, sow the seeds for future public health crises whereby uniform adherence to federal health-related guidelines is rejected by a minority of states, thus risking the health of the whole nation.

This paper does not aim to argue that states don't have a right to disagree with federal guidelines on certain subjects, but it does assert that when these disagreements are based on unscientific conjecture and opinion within the realm of scientific topics, they risk undermining the integrity of evidence-based policymaking and jeopardizing public health and safety. States should not be able to enact policies that (a) unfairly target one group of people and (b) are based on disinformation which contradicts both the federal government and the majority of other states. As demonstrated in the above data, these types of policies have tangible effects, and in the case of mifepristone restrictions, are discriminatory as they target a specific population of people. Moreover, we see that they may be ultimately ineffective on a broader scale.

## Conclusion

In sum, this paper argued that state mifepristone restrictions based on safety concerns are preempted. Using Judge Zobel's words in her ruling in the case of *Zogenix, Inc. v. Patrick*, when states interpose their own conclusions about a drug's safety and effectiveness, they stand as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress. Thus, states that use arguments of safety concerns via TRAP laws, in-person requirements, and/or provider qualification restrictions to obstruct access to mifepristone should be considered preempted by federal law under the Supremacy Clause of the United States Constitution.

Based on these findings, this paper offers the following public policy recommendations. First, states identified as High-Risk should consider reevaluating and potentially revising restrictive abortion laws that contravene federal guidelines and disproportionately impact residents' access to care. The goal should be to align more closely with evidence-based practices that uphold constitutional rights. Second, cooperation between states should be enhanced to ensure that residents from High-Risk States have lower barriers when seeking care in neighboring states. This could involve policy agreements that facilitate cross-state healthcare provision without penalizing providers or patients. Third, states should invest in public health campaigns to educate residents about their rights and available services related to reproductive healthcare. This should aim to reduce the stigma and misinformation surrounding abortion care. Last, states should prepare for potential legal challenges to restrictive laws by ensuring that state policies are robustly justified and grounded in scientific evidence, aligning with federal standards to withstand constitutional scrutiny.

Adopting these recommendations could foster an environment where access to abortion and reproductive health services is equitable and aligned with federal guidelines, ensuring that all individuals, regardless of their state of residence, can access the care they need without undue burden. This approach not only supports public health and individual rights but also aligns with broader societal values of fairness and justice.

# References

- Abortion Laws by State West Virginia. (n.d.). Center for Reproductive Rights. Retrieved January 9, 2025, from <https://reproductiverights.org/maps/state/west-virginia/>
- Abortion; penalty, W. Va. Code §61-2-8 (2025). <https://code.wvlegislature.gov/61-2-8/>
- Abortion - surgical Information. (n.d.). Mount Sinai. Retrieved April 6, 2024, from <https://www.mountsinai.org/health-library/surgery/abortion-surgical>
- Adkins, B., Pepper, A., & Sykes, J. (2023, May 18). Federal Preemption: A Legal Primer. FAS Project on Government Secrecy. Retrieved April 6, 2024, from <https://sgp.fas.org/crs/misc/R45825.pdf>
- After Roe Fell: Abortion Laws by State. (n.d.). Center for Reproductive Rights. Retrieved April 6, 2024, from <https://reproductiverights.org/maps/abortion-laws-by-state/>
- American Bar Association. Federal Preemption of State and Local Law Chapter 1. (1-33). <https://www.americanbar.org/content/dam/aba-cms-dotorg/products/inv/book/210871015/Chapter%201.pdf>
- Arey, W., Lerma, K., Beasley, A., Harper, L., Moayed, G., & White, K. (2022). A preview of the dangerous future of abortion bans—Texas Senate Bill 8. *New England Journal of Medicine*, 387(5), 388–390. <https://doi.org/10.1056/NEJMp2207423>
- Biggs MA, Upadhyay UD, McCulloch CE, et al. Women's mental health and wellbeing 5 years after receiving or being denied an abortion: a prospective, longitudinal cohort study. *JAMA Psychiatry* 2017;74(2):169–78. <https://doi.org/10.1001/jamapsychiatry.2016.3478>
- Boumil, M. (2015). FDA approval of drugs and devices: Preemption of state laws for “parallel” tort claims. *Journal of Health Care Law & Policy*, 18(1).
- Bryant v. Stein - Health Care Litigation Tracker. (2024, December 4). Health Care Litigation Tracker. Retrieved January 8, 2025, from <https://litigationtracker.law.georgetown.edu/litigation/bryant-v-stein/>



- Cable, J. K., & Grider, M. H. (2023, May 1). Physiology, Progesterone. National Library of Medicine. <https://www.ncbi.nlm.nih.gov/books/NBK558960/#:~:text=Progesterone%20is%20an%20endogenous%20steroid,the%20later%20phase%20of%20pregnancy>
- Carson S, Carter SK. Abortion as a Public Health Risk in COVID-19 Antiabortion Legislation. *J Health Polit Policy Law*. 2023 Aug 1;48(4):545-568. doi: 10.1215/03616878-10449950. PMID: 36693183.
- CDCs Abortion Surveillance System FAQs | CDC. (2023, November 21). Centers for Disease Control and Prevention. Retrieved April 6, 2024, from [https://www.cdc.gov/reproductivehealth/data\\_stats/abortion.htm](https://www.cdc.gov/reproductivehealth/data_stats/abortion.htm)
- Charles VE, Polis CB, Sridhara SK, et al. Abortion and long-term mental health outcomes: a systematic review of the evidence. *Contraception* 2008;78(6):436-50. <https://doi.org/10.1016/j.contraception.2008.07.005>
- Cipollone v. Liggett Grp., Inc., 505 U.S. 504, 516 (1992)
- Costello, T. A. (2018). QUITTING COLD TURKEY?: FEDERAL PREEMPTION DOCTRINE AND STATE BANS ON FDA-APPROVED DRUGS. *The William and Mary Bill of Rights Journal*, 26(3), 839-864.
- Department of Public Health. Bureau of Substance Abuse Services. (April 2014). Opioid Overdose Response Strategies in Massachusetts. (1-11).
- FDA Provides Facts About Zohydro. (2014, April 30). FDA. Retrieved May 9, 2024, from <https://www.fda.gov/drugs/information-drug-class/fda-provides-facts-about-zohydro#about>
- FDA Related Laws, Regulations, and Guidances. (2023, July 31). FDA. Retrieved May 9, 2024, from <https://www.fda.gov/drugs/cder-small-business-in-dustry-assistance-sbia/fda-related-laws-regulations-and-guidances>
- FDA's Legal Authority. (2019, April 24). FDA. Retrieved May 9, 2024, from <https://www.fda.gov/about-fda/changes-science-law-and-regulatory-authorities/fdas-legal-authority>
- GenBioPro, Inc. v. Sorsaia et al, No. 3:2023cv00058 - Docu-

- ment 66 (S.D.W. Va. 2023).  
file:///Users/meganrehbehn/  
Downloads/GenBioPro%20  
Inc%20v%20Sorsaia.html
- Grossi, P., & O'Connor, D.  
(2023, March 15). FDA Pre-  
emption of Conflicting State  
Drug Regulation and the  
Looming Battle over Abor-  
tion Medications. *Journal  
of Law and the Biosciences*,  
10(1), 1-45. [https://academ-  
ic.oup.com/jlb/article/10/1/  
lsad005/7078178](https://academic.oup.com/jlb/article/10/1/lsad005/7078178)
- Historical Abortion Law  
Timeline: 1850 to Today.  
(n.d.). Planned Parenthood  
Action Fund. Retrieved  
April 6, 2024, from [https://  
www.plannedparent-  
hoodaction.org/issues/  
abortion/abortion-cen-  
tral-history-reproduc-  
tive-health-care-america/his-  
torical-abortion-law-time-  
line-1850-today](https://www.plannedparent-hoodaction.org/issues/abortion/abortion-cen-tral-history-reproduc-tive-health-care-america/his-torical-abortion-law-time-line-1850-today)
- Information about Mifepristone  
for Medical Termination  
of Pregnancy Through Ten  
Weeks Gestation. (2023,  
March 23). FDA. Retrieved  
May 9, 2024, from [https://  
www.fda.gov/drugs/postmar-  
ket-drug-safety-informa-  
tion-patients-and-providers/  
information-about-mife-  
pristone-medical-ter-  
mination-pregnan-  
cy-through-ten-weeks-ges-  
tation](https://www.fda.gov/drugs/postmar-ket-drug-safety-informa-tion-patients-and-providers/information-about-mife-pristone-medical-ter-mination-pregnan-cy-through-ten-weeks-ges-tation)
- Jerman, J., Frohwirth, L.,  
Kavanaugh, M.L. and  
Blades, N. (2017), Barriers  
to Abortion Care and Their  
Consequences For Patients  
Traveling for Services: Qual-  
itative Findings from Two  
States. *Perspect Sex Repro  
H*, 49: 95-102. [https://doi.  
org/10.1363/psrh.12024](https://doi.org/10.1363/psrh.12024)
- Jones, R. K., Ph.D., & Jerman,  
J., M.P.H. (2017). Popula-  
tion group abortion rates  
and lifetime incidence of  
abortion: United states,  
2008–2014. *American  
Journal of Public Health*,  
107(12), 1904-1909.  
[doi:https://doi.org/10.2105/  
AJPH.2017.304042](https://doi.org/10.2105/AJPH.2017.304042)
- Karasek, D., Roberts, S. C. M., &  
Weitz, T. A. (2016). Abor-  
tion Patients' Experience  
and Perceptions of Waiting  
Periods: Survey Evidence  
before Arizona's Two-visit  
24-hour Mandatory Wait-  
ing Period Law. *Women's  
Health Issues*, 26(1), 60–66.  
[https://doi.org/10.1016/j.  
whi.2015.10.004](https://doi.org/10.1016/j.whi.2015.10.004)
- Linton, C. (2023, March 7).  
Texas women file lawsuit  
over state's abortion ban,  
saying the law put their lives  
at risk. *CBS News*. [https://  
www.cbsnews.com/news/  
texas-abortion-bans-law-  
suit-center-for-re-  
productive-rights-to-  
day-2023-03-07/](https://www.cbsnews.com/news/texas-abortion-bans-law-suit-center-for-re-productive-rights-to-day-2023-03-07/)

- Liu, E., Shen, W. (2022, July 20). The Hyde Amendment: An Overview. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/IF/IF12167>
- Maddow-Zimet I, Philbin J, DoCampo I and Jones RK, Monthly Abortion Provision Study, updated Dec. 18, 2024, <https://osf.io/k4x7t/>.
- Major B, Cozzarelli C, Cooper ML, et al. Psychological responses of women after first-trimester abortion. *Arch Gen Psychiatry* 2000;57(8):777–84. <https://doi.org/10.1001/archpsyc.57.8.777>
- Manzo, C. (2023, May 25). Risk Evaluation and Mitigation Strategies (REMS). FDA. <https://www.fda.gov/drugs/our-perspective/risk-evaluation-and-mitigation-strategies-rems>
- Mayer, M. K., Morris, J. C., Aistrup, J. A., Anderson, R. B., & Kenter, R. C. (2023). Dobbs, American Federalism, and State Abortion Policymaking: Restrictive Policies Alongside Expansion of Reproductive Rights. *Publius*, 53(3), 378–404. <https://doi.org/10.1093/publius/pjad012>
- Medication Abortion. (n.d.). Guttmacher Institute. Retrieved April 6, 2024, from <https://www.guttmacher.org/state-policy/explore/medication-abortion>
- Monthly abortion provision study. Guttmacher Institute. (2025, January 17). <https://www.guttmacher.org/monthly-abortion-provision-study>
- Munk-Olsen T, Laursen TM, Pedersen CB, et al. Induced first-trimester abortion and risk of mental disorder. *N Engl J Med* 2011;364(4):332–9. <https://doi.org/10.1056/NEJMoa0905882>
- Murphy v. National Collegiate Athletic Association, 138 S. Ct. 1461 (2018)
- Mutual Pharmaceutical Co. v. Bartlett :: 570 U.S. 472 (2013). (2013, June 24). Justia US Supreme Court Center. Retrieved April 6, 2024, from <https://supreme.justia.com/cases/federal/us/570/472/>
- Nash, E. (2021, October 4). For the First Time Ever, U.S. States Enacted More Than 100 Abortion Restrictions in a Single Year. Guttmacher Institute. <https://www.guttmacher.org/article/2021/10/first-time-ever-us-states-enacted-more-100-abortion-restrictions-single-year>

O'Brian, N. A. (2020). Before Reagan: The Development of Abortion's Partisan Divide. *Perspectives on Politics*, 18(4), 1031–1047. <https://doi.org/10.1017/S1537592719003840>

PUBLIC HEALTH ADVISORY MASSACHUSETTS HEALTH OFFICIALS ISSUE ADVISORY TO PUBLIC AND HEALTH CARE PROVIDERS ON. (2014, March 28). Mass. gov. Retrieved May 9, 2024, from <https://www.mass.gov/doc/advisory-to-public-and-health-care-providers-on-opiate-overdose/download>

Questions and Answers on Mifepristone for Medical Termination of Pregnancy Through Ten Weeks Gestation. (2023, September 1). FDA. Retrieved April 6, 2024, from <https://www.fda.gov/drugs/postmarket-drug-safety-information-patients-and-providers/questions-and-answers-mifepristone-medical-termination-pregnancy-through-ten-weeks-gestation>

Ravitz, J. (2016, June 23). The surprising history of abortion in the U.S. CNN. Retrieved May 9, 2024, from <https://www.cnn.com/2016/06/23/health/>

[abortion-history-in-united-states/index.html](https://www.fda.gov/oc/abortion-history-in-united-states/index.html)

Riley, T., Fiastro, A. E., Benson, L. S., Khattar, A., Prager, S., & Godfrey, E. M. (2024). Abortion Provision and Delays to Care in a Clinic Network in Washington State After Dobbs. *JAMA Network Open*, 7(5), e2413847-. <https://doi.org/10.1001/jamanetworkopen.2024.13847>

Risk Evaluation and Mitigation Strategy (REMS) for Opioid Analgesics. (2023, November 14). FDA. Retrieved May 9, 2024, from <https://www.fda.gov/drugs/information-drug-class/opioid-analgesic-risk-evaluation-and-mitigation-strategy-rem>s

Roe v. Wade: Behind the Case That Established the Legal Right to Abortion. (n.d.). Planned Parenthood Action Fund. Retrieved April 6, 2024, from <https://www.plannedparenthoodaction.org/issues/abortion/roe-v-wade/roe-v-wade-behind-case-established-legal-right-abortion>

- Rosales, H. (2024, June 13). 171000 Traveled for Abortions Last Year. See Where They Went. *The New York Times*. <https://www.nytimes.com/interactive/2024/06/13/us/abortion-state-laws-ban-travel.html>
- Roth, L. M., & Lee, J. H. (2023). Undue Burdens: State Abortion Laws in the United States, 1994–2022. *Journal of Health Politics, Policy and Law*, 48(4), 511–543. <https://doi.org/10.1215/03616878-10449905>
- Skinner, D. (2012). The Politics of Medical Necessity in American Abortion Debates. *Politics & Gender*, 8(1), 1–24. <https://doi.org/10.1017/S1743923X12000050>
- State Bans on Abortion Throughout Pregnancy. (n.d.). Guttmacher Institute. Retrieved April 6, 2024, from <https://www.guttmacher.org/state-policy/explore/state-policies-later-abortions>
- State Policy Trends 2020: Reproductive Health and Rights in a Year Like No Other. (2020, December 14). Guttmacher Institute. Retrieved May 9, 2024, from <https://www.guttmacher.org/article/2020/12/state-policy-trends-2020-reproductive-health-and-rights-year-no-other>
- The Rulemaking Process. (n.d.). Federal Register. Retrieved May 9, 2024, from [https://www.federalregister.gov/uploads/2011/01/the\\_rulemaking\\_process.pdf](https://www.federalregister.gov/uploads/2011/01/the_rulemaking_process.pdf)
- 21 U.S. Code § 355–1 - Risk evaluation and mitigation strategies | U.S. Code | US Law | LII / Legal Information Institute. (n.d.). Law. Cornell.Edu. Retrieved January 8, 2025, from <https://www.law.cornell.edu/uscode/text/21/355-1>
- Unborn Child Protection Act, W. Va. Code § 16-2R-1 et seq (2025). <https://code.wvlegislature.gov/16-2R/>
- U.S. Census Bureau (2021). State Profiles 2020 Census. Retrieved from [<https://www.census.gov/library/stories/state-by-state.html>].
- U.S. Const. art. VI, cl. 2.
- UNITED STATES DISTRICT COURT DISTRICT OF MASSACHUSETTS CIVIL ACTION NO. 14-11689-RWZ ZOGENIX, INC. v. DEVAL PATRICK, (2014, April 15). United States District Court for the District of Massachusetts. Retrieved May 9, 2024, from <https://www.mad.uscourts.gov/training/pdf/zohydro.pdf>

- Velie, A., Costas, E., & Alfonsi, S. (2024, November 3). Texas women facing pregnancy complications are forced to travel out of state for care. CBS News. <https://www.cbsnews.com/news/texas-abortion-law-impact-pregnant-women-60-minutes/>
- Vilda, D., Wallace, M. E., Daniel, C., Evans, M. G., Stoecker, C., & Theall, K. P. (2021). State Abortion Policies and Maternal Death in the United States, 2015–2018. *American Journal of Public Health* (1971), 111(9), 1696–1704. <https://doi.org/10.2105/AJPH.2021.306396>
- Wasser O, Ralph LJ, Kaller S, Biggs MA. Catastrophic Health Expenditures for In-State and Out-of-State Abortion Care. *JAMA Network Open*. 2024;7(11):e2444146. doi:10.1001/jamanetworkopen.2024.44146
- Winny, A. (2022, October 26). A Brief History of Abortion in the U.S. | Hopkins Bloomberg Public Health Magazine. Hopkins Bloomberg Public Health Magazine. Retrieved May 9, 2024, from <https://magazine.publichealth.jhu.edu/2022/brief-history-abortion-us>
- W. Va. Code § 61-2-8(a), (b) (2023)
- Wyeth v. Levine, 555 U.S. 555, 573 (2009)
- Zettler, P. J., Beckmeyer, A., Brown, B. L., & Sarpatwari, A. (2022). Mifepristone, preemption, and public health federalism. *Journal of Law and the Biosciences*, 9(2), Article lsac037. <https://doi.org/10.1093/jlb/lsac037>
- Zogenix, Inc. v. Patrick, CIVIL ACTION NO. 14-11689-RWZ. (2014, July 8). Casetext. Retrieved May 9, 2024, from <https://casetext.com/case/zogenix-inc-v-patrick>
- Zogenix, Inc. v. Patrick, No. 14-11689-RWZ (D. Mass. Apr. 15, 2014).





# 07

## Toward Linguistic Inclusivity in Audio Deepfake Research

**WHITNEY FILS-AIME**

Dr. Christine Mallinson

Division of Research and  
Creative Achievement





# Biography

**Whitney Fils-Aime** is an undergraduate senior studying linguistics at Georgetown University. Her commitment to equitable access to information inspired her to participate in this project because she recognizes non-English speakers are at higher risks of falling for audio deepfake attacks. After graduating in May 2025, she plans to pursue a masters in Language and Communication. She would like to thank Dr. Christine Mallinson and Chloe Evered at UMBC for their tremendous support and opportunities that they have provided her.

# Research Journey

This summer, I had the privilege of participating in a REU (Research Experiences for Undergraduates) program at UMBC where I worked with a team of experts in linguistics, data science, and machine learning to study detection and discernment of audio deepfakes. This includes the limited research on multilingual and multimodal deepfakes leaving non-English speakers vulnerable to fake audio attacks. Throughout the project, I identified critical gaps in existing research on audio deepfakes and the importance of addressing language diversity in deepfake detection. I gratefully acknowledge the support of the National Science Foundation which has supported this work through Awards #2210011 and #2346473.

# Abstract

There are over 7,000 languages in the world, yet Standard American English (SAE) predominates as the language used in research on audio deepfakes: natural-sounding speech generated using artificial intelligence (AI) methods that have notoriously been used as tools for fraud and deception. Deepfakes, in multiple languages, have also been identified as a tool in the propagation of misinformation around the world. In a review of the literature conducted for this paper, I found that research regarding audio deepfake detection in languages other than SAE is scarce, which leaves researchers to face a lack of tools to address this global challenge. I further identify several key gaps in existing literature on audio deepfakes, including a lack of datasets in languages other than English or multilingual datasets and the prevalence of digital barriers that make it difficult to access these datasets. Further, I identified an even greater dearth of research on deepfakes in languages in non-spoken modalities, e.g. signed languages. With more than 300 signed languages around the world and over 70 million individuals who use them (Rastgoo et al., 2021), a lack of attention to these languages in deepfake research is another dimension that underscores a lack of linguistic diversity in AI research and limits the development of deepfake detection methods.

# Introduction

Audio deepfakes are AI-generated or AI-edited speech made to sound real (Khanjani et al., 2023). With the rapid progression in fake audio generation replicating how humans speak naturally (Li et al., 2024) has also come the use of this advanced technology to execute crimes and propagate deception and misinformation. In January 2024, thousands of U.S. voters in New Hampshire received a fake call made with AI impersonating President Joe Biden urging them not to vote in the primary election. Scam calls that use deepfake audio are a problem occurring not only in the U.S., but around the world as well. Deepfake audio does not only occur in English, and all listeners are susceptible to falling victim to scams and deception caused by fake audio. To counteract these attacks, research is needed to expand detection techniques in all languages, especially languages other than English. At the same time, everyday listeners around the world need to be aware of and have the ability to spot deepfakes. Thus far, however, there is only limited research and awareness training with respect to audio deepfakes in languages other than English.

All speech training systems require “sentence”-sized audio samples and text in order to develop models that can generate fake speech. Training models to generate or detect synthetic speech based on deep learning becomes infeasible when it comes to low-resource languages because models require a greater amount of training. For this reason, most current text-to-speech (TTS) models are designed for English (Han et al., 2024; Mei et al., 2024; Azizah, 2024; Yamoah et al., 2023; Divekar et al., 2019; Wester et al., 2016), since the amount of speech available for other languages is limited (Casanova et al., 2022). The insufficient amount of available data to train high quality TTS systems results in unnatural speech (e.g. breath, pause, and pitch), limited diversity in accent variation, and low audio quality (e.g. nasal, echoey, muffled, or other distortions to the audio) to be produced by the model.

Increasingly, deepfakes are being augmented to sound more natural and human-like as possible, to the point that they are becoming nearly indistinguishable from human speech (Mei et al., 2024; Wester et al., 2016; Guo et al., 2021; Cong et al., 2021; Mitsui et al., 2023; Zhang et al., 2024; Borsos et al., 2023). Researchers are also attempting to bolster detection models to keep pace with deepfake generation. The rapid advancements made in speech synthesis in English cannot keep pace with fake speech generated from limited data in other languages (Li et al., 2024). The noticeable difference in quality between the two is a consequence of researchers not producing novel audio in different languages and making them publicly available for others to use and create synthetic audio. As a result, not only does this discourage research on deepfakes in languages other than English, as noted earlier, but it also makes it difficult to identify the linguistic features to look out for when confronted with advanced deepfake audio in other languages. These compounding issues leave speakers of low-resourced languages more vulnerable to attacks, further indicating the need to invest in recording real speech of other languages and investing in deepfake detection methods in languages other than English.

This paper explores three main challenges in research on audio deepfakes. First is the notable scarcity in linguistic diversity, for particularly non-English and signed languages, in audio deepfake detection research. Second is the insufficient amount of attention given to researching deepfakes in languages in non-spoken modalities, with a related question being the under-exploration of innovative techniques for audio deepfake detection that people who are blind may be able to utilize that could improve traditional audio deepfake discernment and detection methods. Third is the challenge of accessing audio deepfake data, including data that is difficult to locate and dataset gatekeeping, which poses an additional hurdle. Research on audio deepfakes can be improved with greater attention to each of these challenges, namely by increasing attention to global linguistic diversity and creating accessible datasets, including those with languages other than English and with signed languages.

# Limited Linguistic Diversity in Research on Audio Deepfake Detection

In this section, I begin by describing the linguistic landscape with regard to research on audio deepfake detection and its limitations with regard to linguistic diversity. One common way audio deepfakes are weaponized is in attacks on automatic speaker verification (ASV) systems. An overwhelming majority of research has been done and continues to be done on automatic speech verification in English, but little to no research has been done on the issue with regard to languages other than English, as Saleem (2019) points out with regard to Urdu ASV systems. Systems built for languages other than English are vulnerable to audio attacks. In fact, low resource languages may have even greater susceptibility to attacks given the lack of public datasets available online for investigating methods of detection on that specific language. Across the field, literature on audio deepfake detection reveals that English-only and (typically Mandarin) Chinese-only datasets are the most prevalent languages included in these studies (Müller, 2024). The overwhelming concentration of studies on English and Chinese datasets can create detection models that are limited in their effectiveness and applicability to other global languages.

The relatively scant number of these studies underscores the need for greater attention to the proper recording and collection of data in other languages so they can be used for further research. Techniques for audio deepfake detection for one language typically do not translate well to other languages, hence the necessity for research and different techniques for languages other than English. As Saleem (et al., 2019) has noted, “The techniques used for English ASV can be different from those of Urdu ASV. This is due to fundamental differences in the nature of these two languages on a phoneme level...since the structure of these two languages vary differently, a single configuration of a given algorithm cannot be

used for both the languages” (pg. 1). To mitigate this issue, some researchers (Saleem, 2019; Nekvinda & Dušek, 2020) have begun to create their own non-English datasets to bridge the gap between English and their target language for audio deepfake detection.

In addition to a concentration on just a few languages, few corpora exist that are also multilingual (e.g. Common Voice and CMU Wilderness Multilingual Speech Dataset). They are also less robust in nature. Casanova (2022) remarks that most multilingual datasets contain a little over an hour of speech, and as a result, training models based on Deep Learning are infeasible, whereas popular English-only datasets like LJ Speech contain approximately 24 hours of speech. Multilingual datasets that do contain over 10 hours of speech commonly either: (1) contain a variety of languages in its corpus with the 10 hours divided between each one, subsequently resulting in even less hours usable from each language; or (2) are dedicated datasets that do contain tens of hours of audio, but they are the only or one of very few datasets that exist to provide this content and therefore cannot match the countless hours of English-only repositories. Due to these limitations, researchers are largely left to use alternative data sources, such as mining audio clips from YouTube or news outlets (Black, 2019) in order to obtain their target data. On occasion, the data itself cannot be used as-is, due to the audio’s length and misalignment of audio and text. Furthermore, methods that are typically used to resolve these types of challenges in building community driven TTS datasets tend to result in lower recording quality and naturalness, which in effect, impacts the effectiveness of TTS models themselves (Munir et al., 2019).

# A Review of Papers with Audio Deepfake Datasets in Spoken Languages other than English

As noted in the prior section, a key gap in existing literature surrounding audio deepfake research is the poor representation of the thousands of languages and language varieties that are used around the world. Abundant papers and online corpora containing audio deepfake datasets predominantly consist of over thousands of hours of audio in English—and, of those, generally the variety known as Standard American English.

In order to understand the scale of the linguistic limitations in audio deepfake research, I carried out a review of the literature to find papers that present audio deepfake research using datasets with languages other than English. To begin, I used Google Scholar, a search engine for finding scholarly literature, to search for papers. Search queries included “audio deepfake discernment”, “audio deepfake detection”, “multilingual tts detection”, and “multilingual deepfake dataset”. I also used “audio deepfakes in X language” in hopes of finding more data – that is, I replaced X with languages that I have already found, such as Chinese, Japanese, Urdu, and Portuguese. I extended my search to include other high-resource languages like Spanish, French, and Korean, but inputting a specific language did not yield any relevant results. In fact, I had more success scouring through a paper’s references section, whose work was almost applicable for what I sought, rather than inserting different keywords in a search engine. My methodology did include papers that had data from English in addition to data from another language within the same dataset. I also decided to include in my searches papers with datasets that contained only real speech, papers that included datasets of only AI generated speech, and papers with datasets containing both, since real speech can be used to generate synthetic audio. In order to avoid confusion, I have decided to not

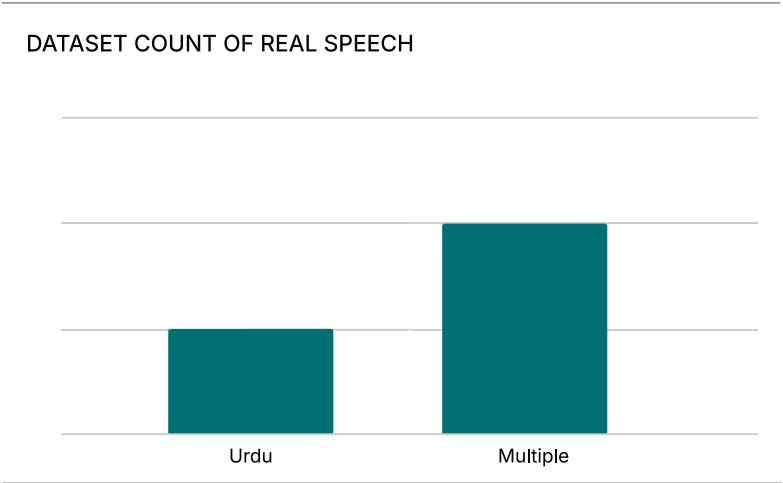
add one mixed dataset that contains real and fake audio in Arabic (Nekvinda, 2020) since it applies to both graphs bringing the total count of papers found to 14 which is low compared to the 100 I have found with English-only data.

I excluded English-only datasets and papers that did not provide a link to the dataset used in their experiment. I also excluded papers that had: (1) broken links leading to websites that no longer exist, a common obstacle; and (2) papers where access to the dataset must be requested by completing a Google Form. I submitted six forms and received zero responses; it is not clear whether the lack of response is due to oversight or a denied request. Most forms ask for the requester's: name; position; affiliate institution; and intended purpose for accessing the dataset, noted either a short answer or multiple-choice response with the two answers generally being along the lines of (a) for own interest, or (b) a study that will be published. Finally, I excluded papers with widely used datasets such as ASVspoof, LJSpeech, and LibriSpeech ASR corpus, because they typically require downloading over 2-15Gb of WAV files in order to access the audio.

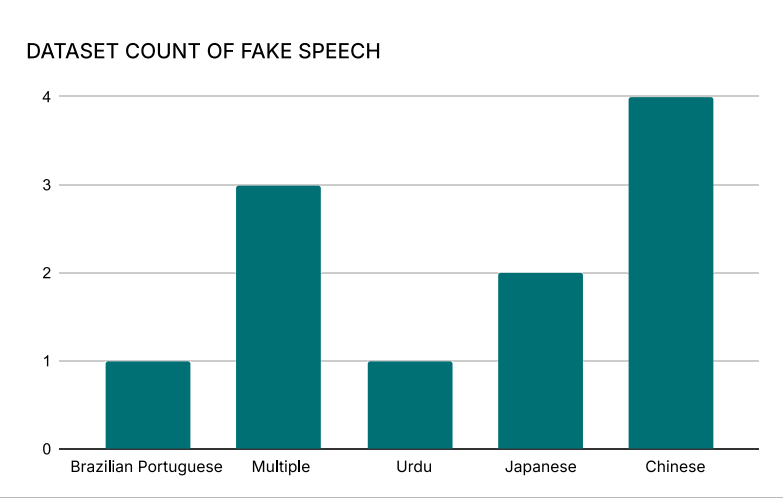
After applying my criteria, the search yielded 3 results, as displayed in Figure 1. Of the 3 papers, one contained data in Urdu and two papers had multiple languages within one dataset. These followed common trends found in multilingual datasets, with short audio samples and limited languages. The label "Multiple" is used to designate these studies or repositories that contain audio samples in more than one language within their dataset. As shown in Figure 2, my search criteria has also yielded 11 works that include fake speech but compared to English-only datasets the results are still not enough. From the 11, four contained data in Chinese, two in Japanese, and one of each in Brazilian Portuguese and Urdu. Three papers had multiple languages within one dataset. Similar to Figure 1, these datasets contained short audio samples.



**Figure 1.** Papers with datasets in languages other than English containing real speech



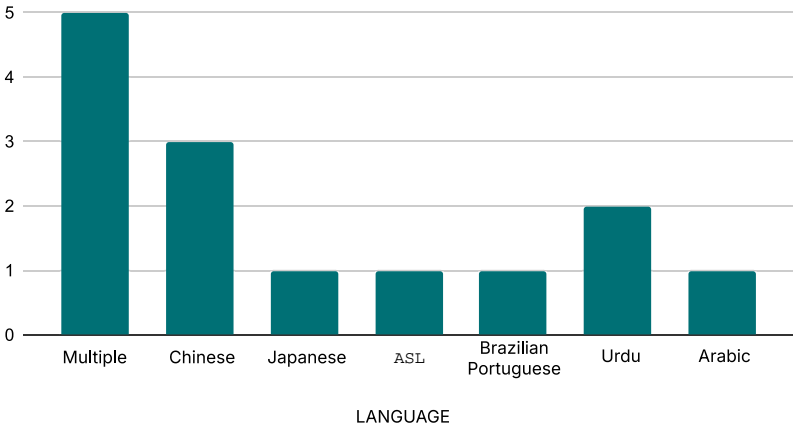
**Figure 2.** Papers with datasets in languages other than English containing fake speech



The small number of papers found clearly demonstrate the crucial need for further research into non-English audio deepfakes and their current absence in existing literature. Recording real speech is a start, however, more languages and more hours need to be documented in order for models to become generalizable and create realistic sounding speech. The same can be said for existing datasets and corpora that contain fake speech, to identify the anomalies that tend to be present in audio deepfakes of that language.

---

**DATASET COUNT**



# How Greater Linguistic Inclusion Can Advance Deepfake Detection and Improve Human Discernment

Valuable insight is currently being lost due to a lack of linguistic diversity in audio deepfake detection. The same can be said for limitations in methods to increase human perception. Incorporating general perceptible linguistic principles to improve listeners' ability to differentiate real from fake speech may not be practical across

various languages, leaving a large population of people vulnerable to exploitation by spoofed audio attacks unless these detection methods are individualized for specific a language.

In one study, Han et al. (2024) examined perceptual differences and similarities between how blind and sighted individuals perceive real and spoofed audio. They found that the sighted group outperformed blind individuals when detecting deepfake-generated audio, whereas the blind group excelled in detecting TTS generated audio. Participants were tasked with listening to 63 audio clips; one real, one fake, and to determine its authenticity. Afterwards, a semi-structured interview was conducted. It was found that blind participants assess for key linguistic traits of human language that are generally absent in TTS. All 12 participants shared that they prioritized listening for linguistic features such as speaker's accent; vocal inflection; liveliness (e.g. breath and pause); emotion; and disfluencies, miscues, or errors; as well as acoustic properties such as audio quality, echo, and reverberation, in order to discern whether the voice was a real human. Specific cues that participants used to detect real or spoofed audio were human sounds (e.g. filler words, lip-smacking, breathing), pausing, emotion, and audio quality. In comparison, sighted participants tended to evaluate whether the speech could realistically be produced by an abstract talking head. The mental model for sighted people relied more on if the facial expression aligned with the speech whereas blind people used TTS as their reference point. Results thus demonstrated differences between sighted and blind individuals in terms of how they approach discernment of fake versus real audio. By the same token, blind individuals and others who cannot rely on visual cues to identify audio-visual deepfakes must depend solely on audio, which is concerning given that the quality of spoofed audio continues to improve greatly. As a result, additional research is warranted, with a clear need for more research centered on blind individuals to ensure that they are not particularly susceptible to deception from fake audio.

# Discussion for Broader Linguistic Representation

In addition to limitations on the inclusion of languages other than English in audio deepfake detection, there is also a gap in the inclusion of languages in non-spoken modalities—e.g. signed languages. Signed languages are typically visual and gestural in their modality, but they can also incorporate spoken utterances and researchers face an unrealized opportunity to increase the capacity for deepfake discernment for signed languages. Training and strengthening algorithmic detection models tends to be the focal point of most papers on deepfake detection, which overlooks the importance of investing in increasing human discernment capability by increasing individuals’ perceptual abilities. Some research highlights the importance of understanding differences in how humans perceive audio cues of fake versus real speech.

Minimal exposure to linguistically diverse data sets up algorithmic models to develop systemic biases against languages and language varieties that it was not exposed to during training. In Desai et al. (2024), an analysis of 101 works discussing sign language in AI—including reviews, theses, and non-English works—found that sign language AI research is “over focused on perceived communication barriers for Deaf individuals” and characterized by “a lack of use of representative datasets, use of annotations lacking linguistic foundations, and development of methods that build on flawed models” (pg. 54). Findings demonstrate the crucial need to put Deaf people at the forefront of the conversation in sign language AI research in order to properly inform and address the challenges users of sign language may have in distinguishing between real or fake signing.

Similarly, Naeem et al. (2024) discuss the challenges in current sign language datasets used for deepfake detection. These limitations include: (1) a small number of videos; (2) too much variability (background, environment, subject positioning, posture or angle); (3) poor lighting; (4) poor video quality (not high definition).

The authors then explored how these issues severely impact the performance of a model in deepfake detection. The authors took approximately 500 videos for model training, plus an additional 100 for evaluating the model, and analyzed the quality of the produced sign languages to determine their linguistic accuracy. Because of the realism of the videos, they found that sign language deepfakes are difficult to identify, both by machine learning models and by an expert sign language interpreter. This challenge leaves users of sign language vulnerable to fake videos.

## Conclusion

This paper reviewed key gaps in existing literature on audio deepfakes. Standard American English and Chinese dominate in audio deepfake research, resulting in linguistic bias that poses significant threats to the efficacy and generalizability of traditional models for audio deepfake detection. Low-resource languages, and signed languages in particular, have often been overlooked in research and are at a heightened disadvantage. Additionally, while some multilingual datasets do exist, the amount of hours per language substantially falls below the number of hours available in English datasets, forcing researchers to opt for suboptimal data not originally intended to be used for deepfake research. A lack of attention towards signed languages unfairly privileges spoken languages in audio deepfake research that must be ameliorated with tailored detection methods that are specific to a visual-gestural modality. Altogether, these gaps can be partially addressed by creating and sharing publicly available datasets, without any barriers that hinder access by users, on languages other than the main ones that have been used in audio deepfake detection research and datasets thus far. Doing so will foster greater linguistic inclusivity and accessibility and the development of more robust and effective models for audio deepfake detection.

# References

- Ardila, R., Branson, M., Davis, K., Kohler, M., Meyer, J., Henretty, M., Morais, R., Saunders, L., Tyers, F., & Weber, G. (2020.). Common Voice: A Massively-Multilingual Speech Corpus. Common Voice Mozilla. [https://commonvoice.mozilla.org/en?gad\\_source=1&gclid=C-j0KCQjwi5q3BhCiARIsAJCfuZmeKfDQXrhj9jkZey-MEHsGIWCLSJL\\_DcN-FujPQTx1M2\\_S7zp9d\\_S2oaAtFyEALw\\_wcB](https://commonvoice.mozilla.org/en?gad_source=1&gclid=C-j0KCQjwi5q3BhCiARIsAJCfuZmeKfDQXrhj9jkZey-MEHsGIWCLSJL_DcN-FujPQTx1M2_S7zp9d_S2oaAtFyEALw_wcB)
- Azizah, K. (2024). Zero-Shot Voice Cloning Text-to-Speech for Dysphonia Disorder Speakers. *IEEE Access*, 12, 63528-63547.
- Black, A. W. (2019). CMU Wilderness Multilingual Speech Dataset. *IEEE Xplore*, 5971-5975. <https://doi.org/10.1109/ICASSP.2019.8683536>
- Borsos, Z., Sharifi, M., Vincent, D., Kharitonov, E., Zeghidour, N., & Tagliasacchi, M. (2023). SoundStorm: Efficient Parallel Audio Generation. *ArXiv*. <https://doi.org/10.48550/arXiv.2305.09636>
- Casanova, E., Candido Junior, A., Shulby, C., Santos de Oliveira, F., Paulo Teixeira, J., Antonelli Ponti, M., & Aluísio, S. (2022). TTS-Portuguese Corpus: A corpus for speech synthesis in Brazilian Portuguese. *Springer Link*, 56, 1043-1055. <https://doi.org/10.1007/s10579-021-09570-4>
- Cong, J., Yang, S., Hu, N., Li, G., Xie, L., & Su, D. (2021). Controllable Context-aware Conversational Speech Synthesis Jian Cong. *ArXiv*. <https://doi.org/10.48550/arXiv.2106.10828>
- Desai, A., Meulder, M.D., Hochgesang, J., Kocab, A., & Lu, A.X. (2024). Systemic Biases in Sign Language AI Research: A Deaf-Led Call to Reevaluate Research Agendas. *arXiv*, abs/2403.02563. <https://doi.org/10.48550/arXiv.2403.02563>
- Divekar, R. R., Mou, X., Chen, L., Gatti de Bayser, M., Alberio Guerra, M., & Su, H. (2019). Embodied Conversational AI Agents in a Multi-modal Multi-agent Competitive Dialogue. *International Joint Conferences on Artificial Intelligence Organization*. <https://doi.org/10.24963/ijcai.2019/940>

- Guo, H., Zhang, S., Soong, F.K., He, L., & Xie, L. (2020). Conversational End-to-End TTS for Voice Agents. 2021 IEEE Spoken Language Technology Workshop (SLT), 403-409.
- Han, C., Mitra, P., & Masum Billah, S. (2024). Uncovering Human Traits in Determining Real and Spoofed Audio: Insights from Blind and Sighted Individuals. ACM Digital Library. <https://doi.org/10.1145/3613904.3642817>
- Ito, K., & Johnson, L. (2017). The LJ Speech Dataset. Keith Ito. <https://keithito.com/LJ-Speech-Dataset/>
- Khanjani, Z., Watson, G., & Janeja, V. P. (2023). Audio deepfakes: A survey. *Frontiers in Big Data*, 5. <https://doi.org/10.3389/fdata.2022.1001063>
- Li, H., Zhu, X., Xue, L., Song, Y., Chen, Y., & Xie, L. (2023). Spontts: Modeling and Transferring Spontaneous Style for TTS. ICASSP 2024 - 2024 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 12171-12175.
- Mei, K., Liu, Z., Du, H., Li, H., Ai, Y., & Chen, L. (2019). Considering Temporal Connection between Turns for Conversational Speech Synthesis. *IEEE Xplore*, 11426-11430. <https://doi.org/10.1109/ICASSP48485.2024.104488356>
- Mitsui, K., Hono, Y., & Sawada, K. (2023). Towards human-like spoken dialogue generation between AI agents from written dialogue. *ArXiv*, abs/2310.01088.
- Müller, N. M., Kawa, P., Herng Choong, W., Casanova, E., Gölge, E., Müller, T., Syga, P., Sperl, P., & Böttinger, K. (2024). MLAAD: The Multi-Language Audio Anti-Spoofing Dataset. *arXiv*. <https://doi.org/10.48550/arXiv.2401.09512>
- Naeem, S., Khan, M. R., Riyyan Tariq, U., Dhall, A., Ivan Colon, C., & Al-Nashash, H. (2024). Generation and Detection of Sign Language Deepfakes - A Linguistic and Visual Analysis. *arXiv*. <https://doi.org/10.48550/arXiv.2404.01438>
- (n.d.). ASVspoof Automatic Speaker Verification and Spoofing Countermeasures Challenge. *Asvspoof*. <https://www.asvspoof.org/>
- Nekvinda, T., & Dušek, O. (2020). One Model, Many Languages: Meta-learn-

- ing for Multilingual Text-to-Speech. ArXiv. <https://doi.org/10.48550/arXiv.2008.00768>
- Panayotov, V., Chen, G., Povey, D., & Khudanpur, S. (n.d.). LibriSpeech ASR corpus. OpenSLR. <https://www.openslr.org/12>
- Rastgoo, R., Kiani, K., & Escalera, S. (2021). Sign Language Recognition: A Deep Survey. *Expert Systems With Applications*, 164. <https://doi.org/10.1016/j.eswa.2020.113794>
- Saleem, S., Dilawari, A., Ghani Khan, M.U., & Husnain, M.I. (2019). Voice Conversion and Spoofed Voice Detection from Parallel English and Urdu Corpus using Cyclic GANs. 2019 International Conference on Robotics and Automation in Industry (ICRAI), 1-6. <https://doi.org/10.1109/ICRAI47710.2019.8967385>
- Sheza Munir, Wassay Sajjad, Mukeet Raza, Emaan Abbas, Abdul Hameed Azeemi, Ihsan Ayyub Qazi, and Agha Ali Raza. 2024. Deepfake Defense: Constructing and Evaluating a Specialized Urdu Deepfake Audio Dataset. In *Findings of the Association for Computational Linguistics ACL 2024*, 14470–14480. <https://aclanthology.org/2024.findings-acl.861/>
- Wester, M., Watts, O., & Henter, G. E. (2016). Evaluating comprehension of natural and synthetic conversational speech. In *Speech Prosody 2016* (pp. 766-770) [http://www.isca-speech.org/archive/sp2016/pdfs\\_stamped/41.pdf](http://www.isca-speech.org/archive/sp2016/pdfs_stamped/41.pdf)
- Yamoah, K. A., Fuseini, H. B., Adjepon-Yamoah, D. E., & Asamoah, D. (2023, December 7). Evaluating Deepfake Speech and ASV Systems on African Accents. OpenReview. <https://openreview.net/forum?id=j26ZkJ7w64>
- Zhang, D., Li, Z., Wang, P., Zhou, Y., & Qiu, X. (2024). SpeechAgents: Human-Communication Simulation with Multi-Modal Multi-Agent Systems. ArXiv. <https://doi.org/10.48550/arXiv.2401.03945>



# Editor and Designer Biographies

**Parvata Kirthivasan** is serving as the senior CAHSS editor for the UMBC Review's 26th issue. Parvata is a Sociology major with minors in Gender and Women's Studies and Print Media looking to graduate from UMBC in May 2026. Parvata has learned a lot about the academic writing process and all the hard work that comes with. They have been grateful for the chance to learn from reading and handling academic papers pooled from UMBC's wide array of undergraduate researchers spanning across disciplines. They would like to thank the other editors - Chris Bispels, Phoenix Bryant, and Caroline Orndorff - who put in so much of their time poring over papers, reaching out to countless peer reviewers, all to bring this journal to life with their hard work and passion. Parvata would also like to express their gratitude for the Review's graphic designer, Shomapti Hussain, who is responsible for making this book look like something you would want on your shelves! They also want to note that the UMBC Review is indebted to Dr. April Householder, Dr. Ian Anson, and Ms. Laura Schraven for their guidance and support.

**Chris Bispels** is serving as the senior STEM editor for the UMBC Review's 26th issue. Chris is a Mathematics major with minors in Computer Science, Philosophy, and Statistics, plus German, Philosophy of Logic and Sciences, and Honors College certificates. Chris plans to pursue graduate school in mathematics after graduating from UMBC in Spring 2025. Chris has learned a lot about the academic writing process by seeing it from the editing side, and has enjoyed reading the exciting research being conducted at this great institution across various fields. He would like to thank his fellow editors, Parvata Kirthivasan, Phoenix Bryant, and Caroline Orndorff, for all of their hard work and dedication to the Review, and Shomapti Hussain, the graphic designer who made everything look outstanding. Chris would also like to express his gratitude for the UMBC Review's graphic designer, Shomapti Hussain, who brought the journal to life with their creative vision. They also want to note that UMBC Review could not have been possible without the advice and support of Dr. April Householder, Dr. Ian Anson, and Ms. Laura Schraven.

**Phoenix Bryant** is serving as the junior STEM editor for the UMBC Review's 26th issue. Phoenix is a Biological Sciences major with a minor in Psychology. Phoenix has learned a lot about the editing process, as well as how to be a better writer and communicator, through being an editor. She would like to thank her fellow editors, Parvata Kirthivasan, Chris Bispels, and Caroline Orndorff, for all of their dedication and aid to the Review. Phoenix would also like to express her absolute gratitude for the UMBC Review's graphic designer, Shomapti Hussain, who made the journal look beautiful. Phoenix would also like to thank the UMBC Review's advisors, Dr. April Householder, Dr. Ian Anson, and Ms. Laura Schraven, for their constant support and contributions throughout this process.

**Caroline Orndorff** is serving as the junior CAHSS editor for the UMBC Review's 26th issue. Caroline is an English major on the Communications & Technology track with a minor in Writing, looking to graduate from UMBC in December 2025. Caroline has enjoyed approaching research as an editor rather than a writer. She has been able to improve her writing skills by reading and interacting with academic writing outside her field of study. She also has enjoyed learning about a variety of topics that she would have never been exposed to if not for the UMBC Review. Caroline would like to thank her fellow editors, Chris Bispels, Parvata Kirthivasan, and Phoenix Bryant, for their hard work, team effort, and encouragement. She would also like to express gratitude for the UMBC Review's graphic designer, Shomapti Hussain, who so beautifully illustrated this

year's edition. Finally, Caroline would like to thank the UMBC Review's advisors, Dr. April Householder, Dr. Ian Anson, and Ms. Laura Schraven, for their constant support and guidance throughout this process.

**Shomapti Hussain** had the pleasure of designing the 26th edition of the UMBC Review. Shomapti is pursuing a Bachelor of Fine Arts Degree in Graphic Design with a minor in Acting. She currently works as a designer at commonvision, UMBC's design and print center. This journal's edition emphasizes the importance of student impact and how their voices are expressions of progression which are collated and intertwined together. The focus of the cover is an apple which can be representative of various concepts such as wisdom, education, growth, research, and development. The dissection of the apple is an encouragement to take a further, in depth look at something past its surface. It aligns with the goals of each author and their hard work to expand, investigate, and dissect into each of their research. Shomapti is grateful to be mentored by her visual arts advisor Ms. Laura Schraven who has offered valuable guidance and resources. She would like to thank the editors Chris Bispels, Phoenix Bryant, Parvata Kirthivasan, and Caroline Orndorff for all their hard work and for putting this journal together. She would also like to thank Dr. April Householder and Ian Anson for all the support they have provided.





Office Of Undergraduate  
Research and Prestigious Scholarships  
[ur.umbc.edu](http://ur.umbc.edu)

UMBC Honors College  
1000 Hilltop Circle  
Baltimore, MD 21250