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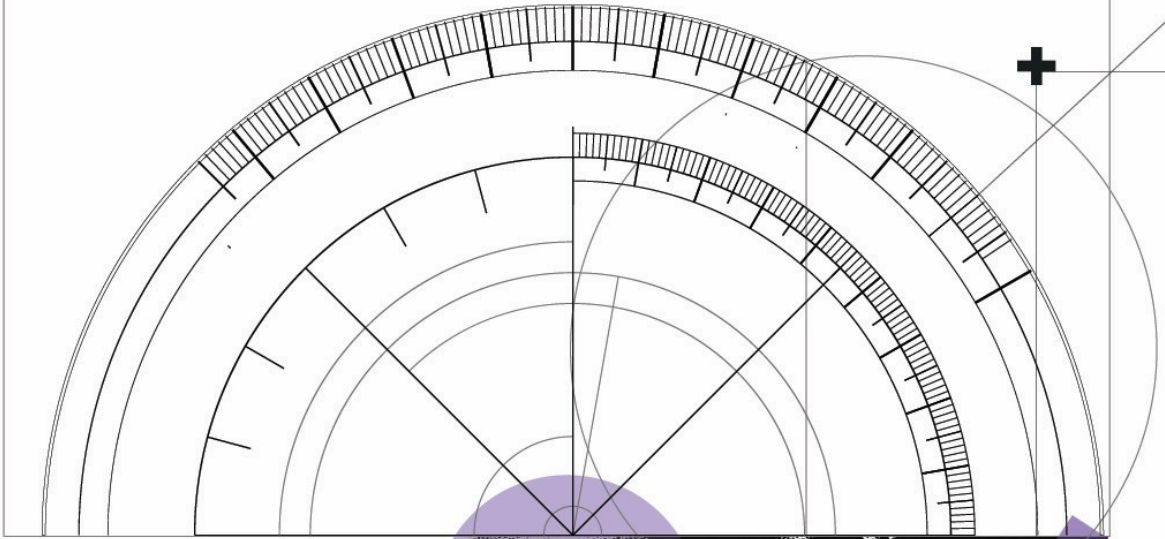


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Introduction

Welcome to the ninth edition of *Knighted: An Interdisciplinary Journal of Undergraduate Research*! This year's issue showcases nine outstanding papers by Middle Georgia State University undergraduates whose work spans literature, education, communication studies, psychology, information technology, sport psychology, history, and political science. These scholars have investigated timely and enduring questions about identity, power, resistance, technological influence, and civic trust—fulfilling the Council for Undergraduate Research's call for “an original intellectual or creative contribution” to their disciplines. Questions of gender and identity anchor several essays, including analyses of marriage and manhood in Shakespeare, competing masculinities in Peter Benchley's *Jaws*, and the rise of women's leadership within South Africa's anti-apartheid movements from 1950 to 1965. Other contributors examine the power of communication and technology: one experimental study tests whether autism-related TikTok content influences self-diagnosis, while another analyzes the strategic framing and coalition building that drove the *Obergefell v. Hodges* campaign. A survey of artificial intelligence as a tool of scientific discovery explores machine learning's reach from animal communication to ancient manuscripts to antibiotic development, and a sport psychology case study documents how guided imagery improved a basketball player's shooting performance and confidence. Rounding out the issue are a review of evidence-based interventions for speech and language impairment in elementary schools and a data-driven study of how partisanship, race, and education shaped Americans' trust in the 2020 vote count. Together, these essays illuminate the creativity, curiosity, and scholarly rigor of MGA's student researchers. We invite you to explore their contributions and be inspired by their work. Never benighted, always be Knighted!

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Mission

Knighited: An Interdisciplinary Journal of Undergraduate Research seeks to highlight the diverse array of fine undergraduate work being done across a wide variety of disciplines at Middle Georgia State University. The University's mission statement calls attention to "lifelong learners whose scholarship and careers enhance the region," and we believe that *Knighited* does precisely that by providing a public venue for students to demonstrate their research skills. By going through the process of submission and peer review, students get an in-depth feel for the craft of scholarly research.

Submission Guidelines

Students may submit original work that was completed as an undergraduate at Middle Georgia State University. Original research projects, including those developed in collaboration with faculty mentors, are welcome from all departments and disciplines. Faculty in the appropriate discipline will review all submissions. Typed manuscripts should be submitted as MSWord files to knighited@mga.edu. They should be double-spaced, with one-inch margins, and in 12 point, Times New Roman font. Illustrations, tables, and figure legends should be embedded within the text at the locations preferred by the authors. Citations should be formatted in the most recent editions of the citation style appropriate to their academic disciplines, e.g., MLA, Chicago, APA, etc. The chosen format must be used consistently throughout the manuscript. Each submission to the journal requires a faculty endorsement. Have the sponsoring faculty member email the editorial board at knighited@mga.edu.

Unmarried Men in Shakespeare

Sabrina Tingle

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Throughout Shakespeare's plays, there are many unmarried men and suitors who feel pressured to get married, and some who did not. Among them are Petruchio from *The Taming of the Shrew*, Benedick from *Much Ado About Nothing*, and Hal from the Henriad, which consists of *Richard II*; *Henry IV, Part 1*; *Henry IV, Part 2*; and *Henry V*. During the sixteenth century, when these plays were written and took place, men's marital status was important in determining their capabilities as men and leaders. In *The Taming of the Shrew*, Petruchio accepted this idea and rushed into a marriage to secure his position of power. On the other hand, Benedick was opposed to the idea of marriage altogether and criticized men for being in love. Finally, Hal did not show any specific regard to marriage until the very end of his tale. Through these men, Shakespeare shows that the idea of manhood and marriage in the sixteenth century was actually more complicated than it seemed. While some men were accepting of the idea, others resisted it, and some, like Hal, tried to find other ways to prove their capabilities as men. In the end, all three men give into the societal expectations and get married. Petruchio, Benedick, and Hal show that the connection between manhood and marriage was so strong that even those who were previously against the idea that men had to be married to be ideal men would end up aligning with the belief.

In Shakespeare's time, the ideal of manhood included marriage, so unmarried men were not as respected as married men. For example, "Normative models of manhood in domestic advice were also drawn from comparing two further sets of male stereotypes: the unmarried and the married" (Shepard 9). Standards for the ideal man were based on a man's domestic standing that men could not achieve unless married. For instance, "Men's role as head of the household was so important that it was regarded as an indicator of the ability to govern in the public world outside" (Foyster 4). If men could not prove they were man enough to head a family unit, then they were not seen as capable enough to hold power positions. This created pressure for them to get married because otherwise their masculinity was threatened and judged. This social expectation motivated single men to find a woman and settle down quickly, even if they did not necessarily want to.

In *The Taming of the Shrew*, Petruchio accepted the societal idea that men must be married to be in positions of power and respected, and he acts accordingly. At the start of the play, he is motivated to find a wife and settle down because his father has passed away and he needs to step up into his position. He understands that to reinforce his position of power he must get married. Hence, he goes to Padua in hopes of finding a wealthy wife. He says, "I come to wive it wealthily in Padua; / If wealthily, then happily in Padua" (1.2.74-75). Since he is eager to marry a wealthy woman, he agrees to pursue Katherine, a woman whom every other suitor disregards due to her fiery temper and lack of obedience.

Instead of being discouraged by her attitude, he sees it as a challenge to prove his masculinity. From then on, Petruchio is determined to tame Katherine because he wants to show his leadership of the household by controlling her. Once they are living together, he begins abusing her by starving her and

mentally tormenting her. To explain why he is mistreating her, he says, “Thus have I politicly begun my reign, / And 'tis my hope to end successfully” (4.1.182-183). He uses abusive tactics because he wants to make her obedient to him. His use of the words “politicly” and “reign” reveals his compliance with the patriarchal ideas at the time. In the sixteenth century, the political ideals for men “approached kingship in terms of paternal rule, through the analogy with the household” (Shepard 3). Petruchio understands the political aspect of his household management. He knows that men are expected to be the kings of their families and that they gain power because of it. Essentially, he tames Katherine to show he is the one in control of his family.

Another aspect of proving superior masculinity through marriage that Petruchio understands is the importance of public performance. In her paper titled “Conformable Kate: Identity and Power in *The Taming of the Shrew*,” Helen R. Ball explains that marriage was the “primary public ritual” during the time the story took place. Therefore, it is “the ideal mechanism through which Petruchio can exert control” (1). By publicly taming Katherine, he is able to accomplish two things. The first is that she will follow those practices in private, and it becomes easier to tame her. Then, it also shows the men around him that he is capable of asserting control over her.

Petruchio utilizes public displays of his marriage to show his superiority by making Katherine show her submission to all the men. At the end of the play, all the male suitors who have finally married place bets on whose wife is the most obedient. They all take turns sending someone to ask their wives to come to them. The goal of their bet is to prove who is the best man because “husbands should govern their wives” (Shepard 3). Therefore, whoever governs their wives more effectively is the most ideal man. Everyone agrees that Petruchio's wife will fail to comply with his orders. They taunt him by saying things like, “I know her answer [...] / [...] She will not” (5.2.108-110). Against their judgments, Katherine is the only wife who follows her husband's order in the end. Her display of obedience shifts the men's regard for Petruchio as a man.

The men are amazed by Petruchio's authority over his wife and gain respect for him. Katherine's father, who holds the highest political position, literally rewards Petruchio for his success in taming his daughter. He says, “Now fair befall thee, good Petruchio! / The wager thou hast won, and I will add / Unto their losses twenty thousand crowns” (5.2.124-126). Before, Baptista did not portray much special regard for Petruchio. However, now he calls him "good Petruchio" and shows greater respect for him. Petruchio's ability to take control over his household is what makes him the most respected out of all the once-unmarried men in the play.

Unlike Petruchio, in *Much Ado About Nothing*, Benedick is against the idea of marriage. At the start of the play, he declares to his unmarried friend Claudio that he will never love or marry a woman. He says, “And the fine is, for the which I may go the finer, I will live a bachelor” (1.1.240-242). Essentially, he is content with being a bachelor forever. Throughout the first parts of the play, Benedick reiterates the same belief whenever his disdain for love is mentioned. He is questioned about his belief so often by the other men in the play because they all seem to adhere to the societal belief that men should get married. Still, he does not let their beliefs influence him. Benedick does not agree that marriage is what makes a man noble; instead, he sees love as a threat to masculinity.

Often, Benedick criticized men for how they acted once they fell in love. In Act 2, Scene 3, after learning that Claudio is courting a woman, he expresses that Claudio has become less of a man because he is in love. Benedick recounts that Claudio used to be a manly soldier, but he has let love turn him soft. Now, he speaks in sweet language that is uncharacteristic of a man. Benedick further states, “another man is a fool when he dedicates his behaviors to love” (2.3.9-10). While most men around him believe masculinity is greater through love and marriage, Benedick is of the complete opposite opinion. Benedick sees the soft actions of lovesick men as a loss of masculinity, calling them “fools.”

However, once other men directly criticize his belief, his attitude changes. One reason Benedick is motivated to love his rival Beatrice is because men criticized him for being too prideful and judged his masculinity. Noble man Don Pedro and Claudio play a trick on Benedick by letting him overhear them say Beatrice is madly in love with him, even though she is not. They call him out for being too prideful to accept her because of his disdain for love. After hearing this, Benedick says, “I did never think to marry. I must not seem proud” (2.3.230-231). Now, Benedick is determined to love Beatrice. To improve the men’s opinion of him, he is willing to act like one of those lovesick men he used to judge. Basically, he thinks he would be seen as a noble man if he were to take responsibility and protect the woman’s feelings. This shows that unmarried men could fall to the pressure of getting married as long as their masculinity was threatened by men around them.

His quest to prove his masculinity through protecting his future wife is furthered when Beatrice asks Benedick to challenge Claudio to a duel. At his own wedding, Claudio abandons his fiancée, who is Beatrice’s sister, based on rumors of her infidelity, and Beatrice turns to Benedick for help seeking revenge. After Beatrice and Benedick confess their love for one another, she asks him to challenge Claudio in a duel. In response to Benedick’s hesitation, she says, “Oh, that I were a man for his sake! Or that I had any friend would be a man for my sake!” (4.1.331-332). She calls him out for not being a proper man because a man would actually stand up for his lover. Once again, Benedick changes his mind once his masculinity is questioned, as he finally agrees to challenge his best friend.

While challenging Claudio, a shift in Benedick’s regard for unmarried men versus married men becomes apparent. When Claudio does not take his threats seriously, Benedick leaves and says, “Fare you well, boy” (5.1.197). By calling him “boy,” Benedick is showing his loss of respect for the man. Benedick feels that he is superior as a man and Claudio is a mere boy because Claudio disrespected his potential wife and did not protect her, unlike Benedick. Before, Benedick thought men lost masculinity in marriage and even specifically judged Claudio for it, which supported his belief that unmarried men were more ideal. In a complete turn, he begins criticizing Claudio for abandoning his marriage and not being a good husband, showing that he now agrees with society that married men who lead their households properly are more noble.

Benedick does not just prove he is a more ideal man than Claudio in his own mind, but to others as well. Professor of English Dr. Paul Innes compares Benedick and Claudio as different representations of patriarchy. He insists that Benedick aligns himself with the patriarchy through his marriage because it “makes Benedick party to the plotting to force Claudio and Don Pedro to make up for the damage they have caused” (Innes 26). Essentially, his marriage led him to challenging Claudio, which made him part of the

plan to punish him. Now, Claudio is beneath Benedick in everyone's eyes because Benedick was willing to defend his future wife, while Claudio is about to be punished for not defending his potential one.

Another display of Benedick becoming the more ideal man through marriage is everyone's approval of him. At the end of the play, Benedick finally asks Beatrice's father's blessing to marry her. Beatrice shows greater respect for him because she accepts his proposal, likely due to the fact that he acted as a good husband by challenging Claudio for her. When Don Pedro questions how Benedick feels now that he is engaged, he asks, "How dost thou, Benedick, the married man?" (5.4.103). Previously, the men would have taunted him about his marital status and how he switched up so quickly. However, after recognizing him as a married man, they have stopped making fun of him. Along with Beatrice, they have begun to take him seriously as a man and no longer question his ability to be a proper head of the household.

In *Henry IV*, Part 1, Prince Hal is not respected as a man because of his bachelor lifestyle, in which he neglects his noble responsibilities. His own father, the king, thinks he is a failure due to his loose lifestyle. The king sees Northumberland's son, Hotspur, as the more ideal man. Regarding Hotspur, the king says, "Whilst I, by looking on the praise of him, / See riot and dishonor stain the brow / Of my young Harry" (1.1.83-85). Hotspur is successful in battles, leads with passion, and is married, all of which Hal is not. Since Hal is not serious about his responsibilities and shows no sign of settling down, his abilities as a man and leader are questioned. Overall, he is not seen as capable of being a ruler by anyone.

Unlike Benedick and Petruchio, Hal does not show any specific feelings toward marriage, and being single does not seem to affect his perception of his own masculinity initially. To explain why he continues to live his bachelor life and ignores people's judgments, Hal says, "So when this loose behavior I throw off / And pay the debt I never promised, / By how much better than my word I am / By so much shall I falsify men's hopes" (1 *Henry IV* 1.2.193-196). Hal believes that if he acts lowly and hides now, then people will not have as many expectations for him when he is king. Then, when he deems the time is right, he can step up and shock them with his capabilities. Here, he acknowledges a societal standard where he has to stop messing around and get serious about his responsibilities in order to be king someday, and he uses it to his advantage.

Essentially, Hal's lifestyle and masculinity are all a performance. English Professor Dr. Fayaz Kabani argues that "Hal should be regarded as a teenaged male navigating the contradictory discourses of early modern masculinity in order to perform an integrated, consistent masculinity for his audience" (Kabani 1). This assertion is supported by Hal's character because he is controlling people's view of his masculinity through calculated measures. While it is not fair to say that Hal did not care about his past life at all, it was still part of an overall plan regardless. Basically, Hal does not make it explicitly clear what his own stance on marriage or masculinity is, but he does show that other people's view of it has played a role in how he portrays his own.

When he finally decides to prove his masculinity and capability to lead, he does so through means other than marriage in *Henry IV*, Part 1. The first method is when he steps up to organize and lead attacks against Hotspur in defense of his father when Hotspur revolts. After Hal kills Hotspur and leads them to victory, the king tells him, "And since this business so fair is done, / Let us not leave till all our own be won" (5.5.44-45). By killing Hotspur, Hal has shown his father that he can take responsibility for his noble

duties. Here, Hal has replaced Hotspur as the ideal man by proving he is more capable, and his father trusts him to continue his leadership alongside him in the future.

Later, in *Henry IV*, Part 2, Hal secures his father's and other people's trust in his ability to lead by denouncing his bachelor lifestyle. At Hal's coronation as king, Falstaff approaches Hal looking for recognition. Instead, Hal says, "I know thee not, old man" (5.5.47). This public denial and banishment of Falstaff is an intentional performance of Hal's masculinity. This performance proves effective because at the end of the scene, Lancaster and the Chief Justice agree that Hal handled the situation well and are hopeful for his success in the future (5.5.91-101). At this point, Hal has gained the trust of most people and has established himself as the ideal man and ruler.

Hal managed to gain the utmost respect and became the ideal man in everyone's eyes without having to get married. Instead, he relied on actual displays of authority, like killing Hotspur and banishing Falstaff, to prove his masculinity. In fact, marriage was not even a significant part of why he was seen as not being ideal. Yes, his single status was part of his bachelor lifestyle, but the play did not specifically emphasize marriage. The pressure put on him was not exactly to get married so he could rule; it was simply to get serious about his responsibilities as a whole. By examining only *Henry IV*, Part 1 and *Henry IV*, Part 2, it appears that Shakespeare was making a point through Hal that marriage was not necessary to hold power positions and have respect as a man.

However, considering the final play in the Henriad, *Henry V*, the previous message about marriage shifts. In this play, as king, Hal leads the British in battle against the French. In the end, the British win, and Hal has again proved that he is an ideal man and capable of leading. The play does not conclude here, though; instead, Hal chooses to assert his dominance over the French in an additional way. He tells the French king, "Yet leave our cousin Katherine here with us. / She is our capital demand" (5.2.96-97). Hal, the man who previously never considered marriage as necessary to secure his position or showed interest in it for himself, suddenly wants a wife. He does not stop here; once he gets her father's blessing, he says, "Now welcome, Kate, and bear me witness all / That here I kiss her as my sovereign queen" (5.2.343-344). This public display resembles his performances of masculinity in the previous plays. Essentially, Hal now agrees with the historical idea that marriage is part of being a man in a power position. His marriage is his final public establishment of his status as the ideal man and ruler.

Petruchio, Benedick, and Hal show that while marriage is not necessary to increase masculinity or maintain some power, it is the only way to become the superior and ideal man. In Petruchio's case, he did not require a wife to keep his power because he would still have had all of his father's property regardless. However, the only way he gained superiority over the other men was through his public taming of Katherine. Then, for Benedick, much of his respect came from the fact that he was willing to challenge Claudio. Therefore, it is possible that he did not have to actually get married to prove his masculinity. However, he probably would not have been able to show he was superior to Claudio without his marriage, because it was Benedick's proof that he himself was a more loyal husband that accomplished that. Finally, Hal had already proved his masculinity through other means without having to get married. Still, to reach the full status of the ideal man, he felt the need to get married. In the end, the societal idea of needing a wife pushed the men to get married, even if they had not wanted to before.

Through the three men, Shakespeare shows that all men are likely to align themselves with the societal idea that marriage is necessary for men to be seen as ideal and capable, given how strong that idea was. The men represent the different attitudes that unmarried men had regarding manhood and marriage. Petruchio represented an unmarried man who was accepting of the expectations. He knew he would gain power and respect if he got married and tamed his wife, so he did. On the other hand, Benedick showed that not every man embraced the idea, and some would have resisted it. At first, he was against marriage and thought love made married men lesser than unmarried ones. However, his eventual conformity shows that no matter how opposed men were to marriage, threats to their masculinity could overpower their resolve. Finally, Hal represented an unmarried man who did not care about marriage at first but would eventually align himself with the expectation. Hal was able to gain power and respect without a wife. Yet, in the end, he still felt he had to get married to solidify his superior position as a man. Overall, their portrayal suggests that pressure to be the “ideal man” had a great impact on men and their identities. Unmarried men at the time were constantly having to prove their masculinity through performance, and marriage was one of the clearest ways to do it.

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Speech and Language Impairment in Elementary Education: Characteristics, Impact, and Evidence-Based Instructional Implications

Alexis Monroy and Jada Aldana

SECOND PLACE, INTERDISCIPLINARY CONFERENCE BEST PAPERS

Abstract

Speech or language impairment (SLI) is a common yet often underestimated disability affecting elementary-age children. Defined under IDEA, SLI includes difficulties in speech production, phonological processing, and expressive and receptive language. This article examines its characteristics, prevalence, and educational impact, highlighting evidence-based instructional implications. Research indicates that SLI frequently co-occurs with reading difficulties, learning disabilities, and behavioral challenges. Effective intervention requires collaborative, multimodal approaches, including total communication and rich language modeling across settings. Practitioner insights emphasize the importance of individualized, relationship-centered support in improving speech clarity and communicative confidence. Implications include the need for stronger teacher preparation, more inclusive instructional practices, and broader outcome measures that focus on real-world communication.

Keywords: speech and language impairment, elementary education, phonological processing, total communication, instructional implications, evidence-based intervention

Speech or language impairment (SLI) is a verbal disability classified under the Individuals with Disabilities Education Act (IDEA). Like many disability categories, SLI is frequently subject to stereotyping and misrepresentation, which often reduces complex individual experiences to oversimplified assumptions. It is important to recognize that disabilities are not monolithic, nor are the individuals who live with them. Having a speech impairment can profoundly affect a person's livelihood and social interactions (Roepke, 2023); however, it should not determine how individuals are perceived or treated in educational or social contexts. A diagnosis is not intended to confine individuals to a predetermined category but rather to provide a framework for delivering equitable support and improved quality of life.

Although this article centers on speech and language impairment, cross-references with other disability categories are noted throughout, as SLI frequently co-occurs with conditions such as autism spectrum disorder, hearing impairments, and behavioral difficulties (Diken et al., 2025; Hearnshaw et al., 2019; Koç Akran, 2025). The overarching goal of this article is to deepen practitioner understanding of SLI and to challenge subconscious bias and uncritical acceptance of stereotypes—beginning with how disability is defined.

Definitions

The modern conceptualization of SLI moves beyond surface misarticulations to identify the underlying deficit, a shift that is critical for effective intervention (Roepke, 2023). The impairment can be characterized by deficits across three primary domains.

Speech Sound Production (Articulation). This domain is characterized by difficulty in producing specific sounds clearly and consistently. As Roepke (2023) notes, even when a child exhibits unclear speech, the underlying difficulty may not be purely motor in nature. Articulation challenges can mask a

concurrent deficit in phonological processing, which complicates both assessment and intervention planning.

Phonological Processing. Roepke (2023) describes phonological processing as the cognitive capacity to mentally manipulate, store, and organize the sounds of language—the foundational skill underlying both speech production and literacy development. A child with a phonological processing deficit may exhibit a disorganized internal representation of sounds, making all subsequent language tasks, from speaking to reading, considerably more challenging (Roepke, 2023).

Language and Communication. This domain encompasses difficulties in acquiring and applying the rules of language across semantic, syntactic, and pragmatic dimensions. As evidenced by research on total communication approaches—the philosophy that encourages using every possible method to communicate, such as signing, gestures, facial expressions, body language, and writing—SLI can be “complex,” limiting a child’s ability to “say more words or share more ideas,” regardless of the communication modality employed (Luckins et al., 2025, p. 9).

Taken together, for elementary-age students, SLI is best understood as a significant limitation in the effective production or comprehension of verbal messages, most often rooted in deficits of sound perception, phonological processing, and subsequent expressive language ability (Hearnshaw et al., 2019; Roepke, 2023; Walquist-Sørli et al., 2024).

Disability Characteristics

The characteristics of speech and language impairment (SLI) during the elementary years are diverse and frequently overlap with behavioral and academic difficulties. Research suggests these traits are broadly situated across perceptual, expressive, and social-emotional domains.

A key feature of Speech Sound Disorder (SSD) is a deficit in auditory processing. Children with SSD often demonstrate greater difficulty “hearing the difference between similar speech sounds” compared to typically developing peers, which inherently impedes the development of clear, consistent speech production (Hearnshaw et al., 2019, p. 1). Roepke (2023) emphasizes that this may reflect a core phonological processing deficit rather than a simple motor or articulatory impairment, necessitating specialized, nonverbal assessment approaches to accurately identify the root cause.

Although the most observable characteristic is atypical speech production—including late talking, mispronunciation, and voice irregularities—the primary expressive challenge is often functional communication (Koç Akran, 2025). Using total communication frameworks, researchers have found that even when students employ augmentative modalities like signing or devices, the intervention goal remains the same: supporting more complex expressive output, such as sharing ideas and using longer sentences (Luckins et al., 2025). This difficulty with complexity often prompts students to adopt alternative strategies; for instance, approximately 74% of students with SLI prefer written over spoken communication (Koç Akran, 2025).

Furthermore, these impairments rarely present in isolation. The inability to clearly express needs or emotions frequently manifests as frustration, social isolation, and classroom disruptions (Diken et al., 2025). Koç Akran (2025) notes that students often report feelings of loneliness, as communication barriers

create a hesitancy to engage verbally, leading to social withdrawal. Consequently, a comprehensive assessment framework must extend beyond surface-level speech to encompass cognitive, behavioral, and social-communicative functioning (Ilic-Savic & Petrovic-Lazic, 2023).

Incidence

The prevalence of SLI in elementary-age children is substantial, though frequently underestimated due to the wide variability in presentation. Nationally, approximately 1 in 14 U.S. children between the ages of 3 and 17 experienced a voice, speech, or language disorder in the past year (National Institute on Deafness and Other Communication Disorders [NIDCD], 2025). The prevalence is highest in the 3- to 6-year-old age group at 10.8%, a critical developmental window in which foundational literacy skills emerge.

The data underscore a high rate of comorbidity. National estimates show co-occurring communication disorders in 33.9% of children ages 3 to 10 and 25.2% in those ages 11 to 17 (NIDCD, 2025). Woods et al. (2023) identified such a significant overlap between learning disabilities and speech impairments among students with Individualized Education Programs (IEPs) that the pattern warrants national examination. This link is particularly critical for academic success; Walquist-Sørli et al. (2024) established that early speech-sound difficulties are significant risk factors for later reading failure, especially when a child exhibits both speech and other language weaknesses.

Despite the high need for intensive and collaborative intervention involving parents and educators (Kunnari et al., 2024), access remains inequitable. While more than half of affected children receive services, the NIDCD (2025) reports that boys are more likely than girls to receive support, and White children access services at higher rates than Black or Hispanic children. This inequity, compounded by the fact that untreated SLI acts as a catalyst for long-term behavioral and academic struggles, makes the identification and treatment of these disorders an urgent priority for policymakers and clinicians alike (Diken et al., 2025; Woods et al., 2023).

Disability Impact

The impact of SLI on elementary students extends far beyond the immediate difficulty of clear communication, critically affecting academic achievement, psychosocial well-being, and overall quality of life.

Academic Impact

The most profound long-term academic consequence of SLI is its effect on literacy development. Walquist-Sørli et al. (2024) confirmed that children with severe or persistent speech difficulties are significantly more likely to struggle with vocabulary, grammar, and reading fluency. Because effective reading is heavily reliant on phonological processing—the very skill most often impaired in SSD—this difficulty is foundational rather than peripheral. Woods et al. (2023) found that while students receiving IEP services may show slightly lower initial reading scores, a positive trend emerges in later grades, with IEP services associated with a significantly positive boost in reading performance. This finding demonstrates that sustainable, multi-year support is essential and that quick-fix approaches are not realistic (Woods et al., 2023).

Furthermore, the narrow focus of much intervention research may obscure the full academic impact of SLI. McCormack et al. (2024) found that nearly all studies measure only “Body Function” outcomes, such as clearer speech production, while neglecting “Participation” outcomes, such as real-world social and academic engagement. This gap in measurement makes it difficult to fully quantify the positive effects of successful intervention on a student’s overall educational trajectory and communicative development.

Psychosocial and Behavioral Impact

SLI profoundly affects a child’s non-academic life, particularly self-concept and social integration. Ilic-Savic and Petrovic-Lazic (2023) demonstrated that speech or voice problems significantly diminish a child’s overall quality of life across social, functional, and emotional domains, with children reporting elevated worry, self-consciousness, and frustration related to their communication difficulties. These findings highlight that speech impairments are not merely technical challenges; they “deeply impact a child’s social life, feelings, and daily activities” (Ilic-Savic & Petrovic-Lazic, 2023, p. 89).

Communication challenges can lead to active avoidance of speaking. Koç Akran (2025) found that students who rely on writing rather than speaking frequently report feelings of loneliness and reduced peer engagement, further exacerbating social isolation and diminishing classroom participation (Diken et al., 2025). The need for structured social-emotional support and opportunities for low-pressure interaction is therefore critical to reducing communication-related anxiety (Koç Akran, 2025). As Diken et al. (2025) noted, the frustration arising from an inability to communicate needs or emotions effectively can manifest as behavioral disruptions, making the disability’s impact visible not only to the student but to the entire classroom community.

Instructional Implications

Verbal communication is foundational to classroom learning, and when this capacity is impaired, the effects permeate every aspect of a student’s educational experience. Effective instruction for students with SLI requires a transformation from traditional drill-based therapy to a comprehensive, collaborative, and inclusive educational approach.

Instruction must begin with an accurate assessment that captures the underlying deficit rather than the surface error. Roepke (2023) recommends that assessments focus on phonological processing rather than clear articulation alone, which can produce misleading results for students with SSD. In practice, this means incorporating listening-only tasks for phonological awareness and using instruments such as the Syllable Repetition Task to assess a child’s sound memory without requiring clear speech output. Hearnshaw et al. (2019) further indicate that assessment must examine both how children produce sounds and how they perceive and process them, and that intervention planning must be guided by this dual production-perception profile.

Instructional strategies must be frequent, collaborative, multisensory, and focused on functional language growth. For example, teachers can incorporate visual supports such as picture schedules, labeled diagrams, and graphic organizers to reinforce vocabulary and comprehension, as well as structured routines like turn-and-talk or sentence stems (e.g., “I agree because...”) to support expressive language in low-pressure contexts. During literacy instruction, explicit phonological awareness activities such as

segmenting and blending sounds using manipulatives like Elkonin boxes or sound chips can strengthen both speech production and early reading skills. For students with complex communication needs, the Total Communication approach—integrating speech, signing, augmentative devices, picture boards, and hands-on activities—has demonstrated effectiveness in improving expressive skills and vocabulary (Luckins et al., 2025). In practice, this may include pairing spoken directions with gestures or visual icons, or using AAC devices alongside verbal modeling to support comprehension and expression. Luckins et al. (2025) describe how “using all channels together” and “adding modes of communication to speech has the potential to strengthen the message” (p. 3), providing students with multiple pathways for interaction and the opportunity to build communicative confidence through instructor modeling.

A critical and often overlooked instructional element is the quality of the language model provided by adults. Sun et al. (2025) found that, among 75 speech-language pathologists (SLPs) working with 281 kindergartners, children demonstrated greater learning gains when clinicians used richer, more linguistically complex speech rather than simplified language. This finding carries direct implications for all educators: students with SLI require rich, varied language input to develop vocabulary and grammatical competence. Modeling complex, natural speech is not only appropriate for students with SLI but also necessary.

Effective interventions, including articulation practice and phonological awareness training, are most successful when they are frequent and involve parents and educators in a coordinated, sustained support structure (Kunnari et al., 2024). Early intervention must simultaneously address sound production and foundational language skills to reduce the long-term risk of reading difficulties (Walquist-Sørli et al., 2024). Instructional planning must therefore involve the SLP, general educator, and family members working as a continuous team with a clear and consistent plan (Kunnari et al., 2024).

The general education classroom plays an indispensable role in mitigating the social and academic impact of SLI. Diken et al. (2025) found that teachers frequently reported feeling unprepared to identify or support students with communication difficulties due to insufficient professional training. The most urgent instructional implication is therefore the need for improved teacher preparation, including the integration of digital tools (e.g., AAC apps, speech-to-text software), professional development in communication disorders, and co-teaching or consultation models that connect daily classroom instruction with SLP support. Teachers must also be prepared to recognize and address communication avoidance behaviors, including students’ tendency to rely on writing rather than speaking. Instructional accommodations should include visual supports (e.g., picture schedules, graphic organizers), varied teaching modalities (e.g., partner talk, written response options), and structured opportunities for low-pressure social communication (e.g., small-group discussion, turn-and-talk routines) to reduce anxiety and foster participation (Koç Akran, 2025).

Ultimately, the success of classroom instruction should not be measured solely by improved speech clarity but by participation outcomes—the degree to which students are able to communicate and engage in real-life educational and social contexts, including peer interactions and classroom discussion (McCormack et al., 2024). This requires educators to intentionally design environments in which functional communication is valued, scaffolded, and celebrated.

Practitioner Perspectives

The research-based strategies described above are not merely theoretical constructs; they reflect the daily realities navigated by practitioners working across educational, clinical, and family contexts. The lived experiences of this article's authors illuminate how the evidence base manifests in practice and reinforce the case for individualized, relationship-centered approaches to instruction.

The first author, Alexis Monroy, navigates the complexities of SLI both at home and in the classroom. As the parent of two autistic children—one who is largely nonverbal and receives school-based SLP services, and one who receives private speech therapy—Monroy observes how communication challenges manifest in distinct and individualized ways even within the same family. Her son's progress reflects the value of Total Communication strategies and collaborative, school-based support, while her daughter's trajectory illustrates the role of targeted private intervention. In her professional role as an educator, Monroy observes similar differentiation among students receiving classroom-based services, reinforcing the necessity of moving beyond one-size-fits-all approaches to meet each child's unique communicative profile. Her dual perspective as parent and practitioner underscores that a student's success depends on an educator's willingness to move beyond traditional drill-and-practice and embrace a model that meets each child where they are.

The second author, Jada Aldana, draws on her experience with her seven-year-old nephew, whose intervention trajectory illustrates the complementary relationship between targeted therapy and collaborative home support. Although broad multimodal strategies such as Total Communication are highly effective for many students, her nephew's progress was initially best supported through intensive, focused work on articulation and phonetic skill development. A pivotal element in his success was the transparency and active partnership of his SLP, who modeled home reinforcement strategies that extended therapeutic gains into daily interactions. Consistent weekly support enabled measurable growth in both speech clarity and social confidence, providing a concrete illustration of the central argument advanced in this article: effective instruction is defined not by a single method but by the intentional alignment of accurate assessment, evidence-based strategy, and sustained relational support.

Summary and Conclusion

Speech and language impairment in elementary school students represents a complex disability with significant and far-reaching educational consequences. The research reviewed confirms that SLI is rarely an isolated articulation issue; rather, it is deeply intertwined with underlying cognitive processes, particularly phonological processing and speech perception, and produces severe secondary academic and psychosocial consequences (Hearnshaw et al., 2019; Roepke, 2023).

Several critical findings emerge from this review. First, early, persistent speech-sound difficulties constitute an elevated risk factor for later struggles with reading, vocabulary, and grammar, underscoring the need for early, dual-focused intervention targeting both sound production and language development (Walquist-Sørli et al., 2024). Second, SLI significantly diminishes a child's social comfort, emotional well-being, and overall quality of life, contributing to frustration, isolation, and, at times, behavioral difficulties (Diken et al., 2025; Ilic-Savic & Petrovic-Lazic, 2023). Third, the academic benefits of IEP services are not

immediate but accrue over time, with significant reading gains emerging in later grades—compelling evidence that sustained, adaptive, long-term support is the most effective model (Woods et al., 2023). Fourth, the most effective instructional approaches, whether Total Communication (Luckins et al., 2025) or evidence-based phonological therapies (Kunnari et al., 2024), depend on consistent, collaborative teamwork among SLPs, general educators, and families.

Moving forward, the instructional focus must shift from perfecting sound production to facilitating functional communication and genuine social participation. This transformation requires clinicians to employ sophisticated assessments targeting phonological processing (Roepke, 2023), teachers to receive substantive preparation for integrating technology and inclusive strategies into their classrooms (Diken et al., 2025), and all involved adults to provide rich, complex language models that support ongoing linguistic development (Sun et al., 2025). By adopting this comprehensive, whole-child approach, educational professionals can ensure that interventions not only improve speech clarity but, most importantly, support each child’s long-term academic success and full participation in school and social life.

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**Strategic Communications by LGBTQ+ Advocacy Groups
During the *Obergefell v. Hodges* Campaign
Candace Robards**

THIRD PLACE, INTERDISCIPLINARY CONFERENCE BEST PAPERS

The landmark Supreme Court decision in *Obergefell v. Hodges* (2015) marked a pivotal moment in the struggle for LGBTQ+ rights in the United States, legalizing same-sex marriage nationwide. While the ruling itself was judicial, the path to victory was paved by years of strategic communication and layered advocacy. LGBTQ+ organizations and their allies employed a complex campaign that combined legal argumentation, coalition building, and media outreach to influence both the Court and public opinion. These efforts were not reactive but part of a deliberate, long-term strategy to reframe marriage equality within the broader context of civil rights, build diverse alliances, and shape cultural narratives. During the *Obergefell v. Hodges* campaign, LGBTQ+ advocacy groups employed strategic communications by framing marriage equality as a civil rights issue, mobilizing diverse coalitions through amicus briefs, and leveraging media narratives to shift public opinion and shape legal outcomes, ultimately changing the national conversation around LGBTQ+ rights.

LGBTQ+ advocacy groups strategically framed same-sex marriage as a civil rights issue to align their cause with broader constitutional principles and historical struggles for equality. This framing emphasized the Fourteenth Amendment's Equal Protection and Due Process Clauses, arguing that denying marriage rights to same-sex couples violated fundamental liberties (Harvard Law Review, 2015). Advocates for marriage equality strategically framed *Obergefell v. Hodges* as a constitutional milestone, drawing compelling parallels to landmark civil rights cases like *Loving v. Virginia* to underscore the continuity of equal protection jurisprudence (Harvard Law Review, 2015). This framing positioned same-sex marriage not as a novel right but as a logical extension of established constitutional principles, particularly the Fourteenth Amendment's guarantees. Scholars such as Hoffman (2015) and Miller (2022) emphasized how the Court's recognition of marriage as a fundamental right reflected both doctrinal consistency and evolving social norms. Intersectional coalitions, as analyzed by Gonzalez and Chavez (2020), further complicated this narrative by highlighting the paradoxes of rights-based advocacy, especially within LGBTQ+ and immigrant communities. Khuu (2017) explored how interest convergence theory shaped judicial receptivity to LGBTQ+ claims, while Mills (2016) documented the rhetorical strategies deployed in amicus briefs to align marriage equality with broader civil rights discourse. Empirical studies by Mallory et al. (2016) and recent data from the Pew Research Center (2025) reveal that *Obergefell* not only advanced legal recognition but also contributed to the well-being and social acceptance of LGBTQ+ individuals, reinforcing the case's constitutional and cultural significance.

Complementing this legal strategy were emotional and dignity-based appeals that shaped both courtroom rhetoric and public advocacy. Campaigns and legal briefs emphasized themes of love, commitment, and the human need for belonging, framing same-sex marriage as a matter of personal dignity and familial legitimacy. Miller (2022) highlights how the Supreme Court's majority opinion adopted this

tone, affirming that same-sex couples are entitled to “equal dignity in the eyes of the law.” This stylistic shift reflected the success of advocacy messaging that humanized LGBTQ+ relationships and reframed legal recognition as a moral imperative. These appeals resonated with broader public narratives of fairness and inclusion, helping to cultivate empathy and support across diverse communities (Harvard Law Review, 2015; Gonzalez & Chavez, 2020). As Pew Research Center (2025) data suggest, this emotional framing contributed to growing societal acceptance, reinforcing the idea that marriage equality affirms not just legal rights but the inherent worth of LGBTQ+ individuals and their families.

Advocacy groups supporting marriage equality employed strategic legal language designed to resonate with judicial sensibilities, emphasizing constitutional precedent while aligning with evolving societal values. By invoking established doctrines of equal protection and fundamental rights, these groups crafted arguments that bridged the divide between legal formalism and public sentiment. Khuu (2017) illustrates how interest convergence theory informed this approach, suggesting that legal success often hinges on aligning marginalized claims with dominant institutional interests. The rhetorical precision found in *amicus curiae* briefs, as analyzed by Mills (2016), further demonstrates how advocates tailored their language to appeal to the Court's interpretive frameworks, reinforcing the legitimacy of same-sex marriage within existing legal paradigms. Miller (2022) and Hoffman (2015) highlight how the Court's majority opinion mirrored this strategic tone, blending doctrinal reasoning with emotionally resonant language that affirmed both legal and human dignity. This synthesis of precedent and persuasion not only advanced the constitutional case for marriage equality but also reflected broader cultural shifts toward inclusion and recognition (Harvard Law Review, 2015; Gonzalez & Chavez, 2020). As public opinion evolved, documented by Pew Research Center (2025), the legal language of advocacy helped translate abstract principles into compelling narratives that shaped both jurisprudence and national discourse.

A central strategy in the *Obergefell v. Hodges* campaign was the mobilization of a diverse coalition of interest groups, ranging from religious organizations and corporations to medical associations and civil rights advocates. These groups submitted *amicus curiae* briefs, or “friend-of-the-court” documents, that offered a multifaceted array of perspectives in support of marriage equality, reinforcing its legitimacy across legal, moral, and social domains. Mills (2016) provides a detailed analysis of how these briefs strategically framed same-sex marriage as consistent with constitutional values and public welfare, helping to persuade the Court by demonstrating widespread institutional support. Gonzalez and Chavez (2020) highlight the paradoxes and power of such coalition building, especially when navigating intersecting identities and political interests within LGBTQ+ and immigrant communities. This broad-based mobilization reflected a deliberate effort to align legal arguments with societal values, a tactic that Khuu (2017) connects to interest convergence theory, suggesting that legal victories often emerge when marginalized claims resonate with dominant institutional priorities. The success of this strategy is evident not only in the Court's favorable ruling but also in the broader cultural shift toward acceptance, as documented by Pew Research Center (2025) and affirmed by the emotional and constitutional rhetoric embedded in the majority opinion (Harvard Law Review, 2015; Miller, 2022).

The strategic deployment of *amicus curiae* briefs was a cornerstone of coalition advocacy in *Obergefell v. Hodges*, allowing interest groups to present arguments that resonated with the Court's values

and interpretive frameworks. Mills (2016), in her analysis of 28 such briefs, found that contributors—from religious institutions to corporate entities—carefully tailored their rhetoric to blend constitutional reasoning with compelling personal narratives. This dual approach reinforced the legitimacy of marriage equality by grounding it in both legal precedent and lived experience. The use of constitutional language helped situate same-sex marriage within the broader tradition of civil rights jurisprudence, while emotionally resonant storytelling humanized LGBTQ+ families and underscored the real-world implications of legal recognition. These briefs served not only as legal supplements but also as cultural artifacts, reflecting the evolving consensus among influential sectors of society. As Gonzalez and Chavez (2020) note, such coalition efforts often navigate complex intersections of identity and institutional interest, yet in this case they coalesced around a shared commitment to dignity and equality. The persuasive power of these briefs contributed to the Court's majority opinion, which echoed both the doctrinal and emotional tones advanced by advocates (Miller, 2022; Harvard Law Review, 2015).

The *Obergefell v. Hodges* campaign was strengthened by intersectional alliances that brought together LGBTQ+ organizations with immigrant rights, racial justice, and women's advocacy groups. These coalitions presented a unified front that reflected the interconnectedness of social justice movements and expanded the campaign's reach across diverse communities. Gonzalez and Chavez (2020) describe these alliances as “paradoxical yet powerful,” noting that while rights-based movements often face internal tensions, their collaboration can amplify collective impact. By aligning marriage equality with broader struggles for dignity and inclusion, these groups helped frame the issue as not only a constitutional matter but also a shared moral imperative. This strategic unity was reflected in amicus briefs and public messaging that emphasized common values such as fairness, family, and freedom (Mills, 2016; Harvard Law Review, 2015). Khoo (2017) adds that such coalitions can foster interest convergence, making it more likely that courts and institutions will respond favorably when marginalized claims align with dominant societal interests. As Miller (2022) and Hoffman (2015) observed, the Court's opinion echoed this broader narrative, affirming the dignity of same-sex couples in language that resonated with multiple movements. These alliances not only legitimized the legal arguments but also helped shift public opinion, as reflected in Pew Research Center's (2025) findings on growing acceptance of LGBTQ+ individuals across demographic lines.

The coordinated efforts of diverse advocacy groups in the *Obergefell v. Hodges* campaign exemplified strategic unity in both messaging and mobilization. By aligning constitutional arguments with emotionally resonant narratives, these coalitions helped normalize LGBTQ+ experiences and counter opposition rooted in tradition or moral panic. This unified messaging, reflected in legal briefs, public campaigns, and media discourse, reinforced the legitimacy of marriage equality as both a legal right and a social norm. As Mallory et al. (2016) found in their research for the Williams Institute, such strategic cohesion contributed to measurable improvements in the well-being and social acceptance of LGBTQ+ adults following the ruling. The campaign's success was not only legal but cultural, demonstrating how coordinated rhetoric and coalition building can reshape public perception and institutional response. Miller (2022) and Hoffman (2015) observed that the Supreme Court's majority opinion mirrored this strategic tone, blending doctrinal reasoning with affirmations of dignity and love. Gonzalez and Chavez (2020)

further emphasized that intersectional alliances, despite their internal complexities, played a crucial role in amplifying shared values and expanding the reach of advocacy. Together, these efforts illustrate how strategic unity across movements and messages can transform both law and lived experience.

Advocacy groups supporting marriage equality strategically harnessed media to shape public opinion and build momentum leading up to *Obergefell v. Hodges*. Through storytelling, social media campaigns, and targeted messaging, they humanized LGBTQ+ families and reframed the legal debate around themes of love, dignity, and equality. Hoffman (2015) emphasizes that personal stories of same-sex couples, shared across news outlets and digital platforms, made the abstract constitutional arguments emotionally compelling and relatable to a broader audience. These narratives helped shift the conversation from legal technicalities to lived experiences, fostering empathy and public support. By amplifying visibility, media became a powerful tool for advocacy, bridging the gap between courtroom rhetoric and cultural resonance.

Timing and messaging were equally critical to the success of this media strategy. Advocacy groups carefully synchronized their campaigns with key legal milestones, such as oral arguments, Supreme Court deliberations, and public rallies. Messaging was crafted to evoke optimism, justice, and inevitability, creating a sense that marriage equality was not only legally sound but morally urgent. According to Pew Research Center (2025), this strategic framing contributed to a growing perception that LGBTQ+ rights were part of a broader civil rights continuum. By aligning media narratives with moments of heightened public attention, advocates maximized impact and reinforced the legitimacy of their cause in both legal and cultural spheres.

The influence of this coordinated media strategy extended beyond the courtroom, contributing to measurable shifts in public sentiment. Mallory et al. (2016) reported a significant increase in happiness and life satisfaction among LGBTQ+ adults following the *Obergefell* decision, suggesting that strategic communications played a role in fostering social acceptance and psychological well-being. These findings underscore the power of advocacy messaging not only to win legal battles but also to transform cultural attitudes. As seen throughout the campaign, media was not merely a vehicle for information—it was a catalyst for empathy, solidarity, and systemic change.

The success of *Obergefell v. Hodges* was not solely the result of legal argumentation but the culmination of a carefully orchestrated communication strategy by LGBTQ+ advocacy groups. By framing marriage equality as a civil rights issue, these organizations aligned their cause with enduring constitutional values and historical struggles for justice. Through coalition building and the strategic use of amicus briefs, they amplified diverse voices and demonstrated widespread support for same-sex marriage. Their media campaigns humanized LGBTQ+ families and reshaped public opinion, creating a cultural climate conducive to legal change. Together, these efforts demonstrate how strategic communication can affect not only the outcome of a Supreme Court case but also the national discourse on equality and inclusion.

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Hunting Identity: Masculinity and Heroism in Peter Benchley's *Jaws*

Abbi Adams

The water off Amity looks calm, but something stirs beneath it. In Peter Benchley's *Jaws* (1974), the ocean's surface becomes a deceptive image of control, concealing violence that cannot be fully seen or contained. Best known for its great white shark—whose fin cutting through the waves became a symbol of American fear—the novel is often read as a suspense thriller about a predator lurking below. Yet the greater danger lies not only in what swims beneath the surface but in what emerges within the men who set out to hunt it. Set in the fictional coastal town of Amity Island, the story follows police chief Martin Brody as shark attacks disrupt the summer tourism season and push the town into crisis. As civic leaders debate how to respond and public panic escalates, Brody must balance safety with economic survival. Once the decision is made to pursue the shark offshore, the narrative shifts from municipal crisis to human confrontation, where Brody, Quint, and Hooper become central figures in a struggle over authority and expertise. Through them, Benchley stages a conflict among competing forms of masculine identity. This essay argues that *Jaws* exposes masculinity as performative and unstable, revealing heroism as a contingent practice shaped by fear, competition, and crisis.

From the opening attack sequence, Benchley frames the shark as both a literal threat and a symbolic disorder that resists human understanding. He describes the violence in disorienting terms: "The water was laced with blood and shreds of flesh, and the fish could not sort signal from substance" (Benchley 12). The shark becomes more than an animal; it embodies uncontrollable instinct and chaos beyond interpretation. As the crisis intensifies, Brody, Quint, and Hooper emerge as competing forms of masculine authority—civic leadership, physical toughness, and scientific expertise. Their decision to hunt the shark becomes a struggle over legitimacy: who has authority, whose knowledge counts, and what kind of strength matters in crisis. As James Penner notes, the 1970s produced widespread uncertainty about masculine identity (211), and Benchley channels this instability through escalating conflict among the men. Once offshore, these tensions sharpen as danger strips away social order, revealing that each man's version of heroism depends on unstable claims to control. By the novel's end, the true threat is not only the shark but the conflicting constructions of masculinity it reveals—suggesting that heroism is defined less by mastery than by its breakdown in moments of crisis.

This internal struggle becomes most apparent in the shark's role as both creature and catalyst, sharpening the novel's exploration of heroism and masculinity. In Benchley's novel, the shark functions simultaneously as a literal predator and a symbolic force that resists human control, testing the limits of the men's authority and identity. Beryl Francis argues that Benchley reshaped public perceptions of sharks by turning them into embodiments of cultural fear and societal anxiety (47). This symbolic instability is reinforced through the shark's unsettling independence, as Benchley notes, "Twice [the shark] had sounded, compelled neither to attack nor move away" (210), emphasizing its refusal to behave according to human expectations of purpose or direction. At other moments, its movements similarly defy legibility, as it "moved like something that did not need to hurry, because nothing could escape it" (Benchley 211), a

description that further resists any attempt to frame the animal within human systems of intention or urgency. Its unpredictability undermines assumptions of dominance and control and begins to expose cracks in the men's confidence, particularly in Quint's carefully maintained stoicism, described as "not fear, not true alarm, but rather a look of uneasy concern—as if, in a game, the rules had been changed without warning, or the stakes raised" (Benchley 305). In this moment, the shark becomes an external expression of internal instability, reflecting the erosion of certainty beneath Quint's hardened persona and forcing the men to confront the limits of control, judgment, and courage.

This tension aligns with Quint's broader worldview, in which mastery over the sea is always conditional; as he insists, "The ocean doesn't give a damn about you or your plans. It just is" (Benchley 282), a belief that frames the shark encounter as a direct challenge to human authority rather than an exception to it. David Robinson similarly notes that the shark's ecological indifference and disregard for human systems expose the provisional nature of human authority, making it a crucible for evaluating masculine ideals (59). Hooper's response further complicates this dynamic: his awe—"That fish is a beauty. It's the kind of thing that makes you believe in a god. It shows you what nature can do when she sets her mind to it" (Benchley 255)—introduces reverence where Quint expresses hostility, revealing competing emotional and philosophical responses to power. Across these perspectives, the shark becomes the shared object through which authority, belief, and masculinity are tested. Ultimately, it functions as a force of reckoning that exposes the moral and existential stakes beneath the hunt while destabilizing the masculine identities it confronts.

The character who most fully embodies the dangers of traditional masculine ideals is Quint, a hardened fisherman whose identity contrasts sharply with the shark's indifference and Hooper's measured awe. Quint represents a form of hypermasculinity rooted in endurance, physical labor, and stoic self-reliance. His working-class background shapes a worldview in which survival depends on strength, experience, and the ability to endure violence without hesitation. This philosophy is articulated through his own blunt logic about life at sea: "You gotta be tough. Out here, the sea don't care if you live or die" (Benchley 229). His obsessive pursuit of the shark is inseparable from a lifetime shaped by seafaring labor, danger, and loss. Benchley emphasizes this hardened identity through physical description: "His skin was permanently browned and creased by wind and salt and sun. He gazed off the stern, rarely blinking, his eyes fixed on the slick" (232)—a portrait of a man physically and emotionally shaped by the conditions of his work. Quint's understanding of heroism is grounded in a belief that value is proven through endurance and force, echoing Armengol's argument that American literature often links masculinity with violence while also exposing its ethical costs (81).

Quint's interactions with Brody and Hooper further reveal the instability beneath this masculine code. Brody notes the dynamic between them: "Brody was fascinated to see Quint press, and pleased to see Hooper squirm, but he didn't know why Quint was doing it. Maybe Quint got ornery when he was bored and wasn't catching fish" (250–251). This moment highlights how Quint's aggression extends beyond necessity, functioning instead as a performative assertion of control and superiority. His need to dominate others parallels his need to dominate the shark, revealing a masculinity sustained through confrontation rather than reflection. As Valsecchi et al. explain, traditional masculinity privileges dominance, physical

strength, and emotional restraint (146), a framework Quint both embodies and pushes to extremes. Raftery similarly observes that *Jaws* operates as “an allegory for whatever scared or angered the reader,” with the shark reflecting broader anxieties about instability in both nature and social order (par. 9). Within this context, Quint’s fixation on control appears increasingly fragile rather than invulnerable.

This instability becomes fully visible in the climactic shark hunt aboard the *Orca*, where physical strength alone proves insufficient. Benchley stages the encounter as a test of competing forms of knowledge and authority, where courage, strategy, and adaptability are all required. Quint initially asserts control through force, yet his aggression quickly becomes counterproductive: “Quint turned back in time to see the gray-brown shape of the fish as it pulled away from the boat and began to dive. He dropped the harpoon and, in a fit of rage, snatched up the rifle and emptied the clip into the water behind the fish” (256). His reaction demonstrates how instinctive violence replaces strategy, undermining his effectiveness. Earlier in the novel, this reliance on force is already framed as almost reflexive, as Quint insists that “when it’s time to kill, you don’t think—you act” (Benchley 238), a philosophy that ultimately leaves him unprepared for an adversary that cannot be controlled through action alone. By the time Quint is pulled beneath the surface by the shark, Benchley makes clear that his uncompromising reliance on force cannot withstand the unpredictability of nature.

In contrast to Quint’s reliance on aggression and physical force, Hooper represents a different model of masculinity grounded in knowledge, observation, and scientific reasoning. As an oceanographer, Hooper’s authority is rooted in professional expertise and systematic inquiry rather than physical dominance. From the outset of the investigation, he approaches the crisis through data collection and analysis: “I’ll take water samples here in East Hampton. I’ll try to find out how other fish are behaving—if anything extraordinary is around, or if anything that should be here isn’t” (Benchley 97). His methodical response contrasts sharply with impulsive action, emphasizing observation and evidence as tools for understanding danger. This epistemological stance is reinforced by his insistence that “you don’t just react—you have to understand what you’re looking at before you can explain it” (Benchley 104), a principle that positions knowledge itself as a form of restraint and control. Unlike Quint, whose authority is derived from physical endurance and lived experience at sea, Hooper’s credibility depends on intellectual rigor and ethical awareness. This moral dimension emerges when he directly challenges Quint’s practices: “Look, Quint, the point is that these dolphins are in danger of being wiped out, extinguished. And what you’re doing speeds up the process” (Benchley 243), revealing that his scientific perspective is inseparable from concern about ecological responsibility and harm.

Hooper’s role becomes even more significant during the climactic shark hunt aboard the *Orca*, where his expertise complements Brody’s cautious leadership and contrasts with Quint’s escalating aggression. His attention to the shark’s size, behavior, and movement reflects a reliance on analysis rather than instinct: “It’s unique, at least in this hemisphere. And even though people have filmed great whites before, no one’s ever filmed a twenty-foot white swimming in the open ocean” (Benchley 266). In this moment, Benchley positions heroism as something that extends beyond physical courage to include interpretation, strategy, and informed judgment. Gregory Phipps argues that Hooper’s professional identity situates masculinity within broader social and cultural systems, linking intellectual authority to ethical

responsibility (95, 97). Even in crisis, Hooper's responses remain observational and calibrated rather than reactive, reinforcing the idea that control can be achieved through understanding rather than domination. In contrast to Quint's rigid reliance on strength, Hooper embodies a more flexible and collaborative form of masculinity shaped by adaptation and critical thinking—one that reflects the cultural shifts of the 1970s, when traditional assumptions about male authority were increasingly questioned.

Brody represents the novel's most integrative masculine model, combining Quint's physical courage and Hooper's rational expertise while grounding both in ethical responsibility and relational awareness. Unlike the other men, his authority is not rooted in specialization or dominance but in his position as a civic leader and family man. Early in the novel, his insecurity surfaces in response to Ellen's attention to Hooper: "Brody was groping for something with which to re-establish his parity with, if not superiority to, the younger man, and what he settled for was reverse snobbism, an attitude not uncommon to year-round residents of resort communities" (Benchley 95). This "reverse snobbism" exposes his vulnerability and need for social validation, revealing a masculinity defined more by self-awareness than assertion. Rather than externalizing insecurity through aggression, as Quint does, Brody internalizes it and reflects on it, establishing him as a recognizable "Everyman" whose authority is grounded in moral judgment rather than superiority. This psychological pressure intensifies later as he feels "fighting anger and confusion, and he was losing. He felt threatened, as if an intruder had come into his home possessing subtle, intangible weapons he could not cope with..." (Benchley 135), illustrating how masculinity in the novel is shaped not only by physical danger but also by emotional and relational instability. At another point, his sense of responsibility is framed in explicitly civic terms, as he recognizes that "people were depending on him to do something right, even if he wasn't sure what that was yet" (Benchley 142), reinforcing his role as a figure defined by obligation rather than mastery.

As the novel progresses, Brody's leadership emerges from his ability to synthesize the contrasting approaches of Quint and Hooper while remaining grounded in responsibility to others. Benchley establishes this foundation early through Brody's modest ambitions—"to be chief of the Amity force, to have sons to take duck-shooting in the fall, to save enough money to take a real vacation every second or third year" (Benchley 23)—which emphasize stability, family, and community over ambition or dominance. Unlike Quint's experiential authority or Hooper's scientific expertise, Brody occupies a mediating position shaped by social responsibility and practical judgment. As Gregory Phipps notes, class and professional identity intersect with gender in shaping how masculinity is performed and evaluated (95). This mediating role becomes central during the shark crisis, where Brody's decisions rely on ethical reasoning rather than force alone. Even in the final confrontation, he survives not through mastery but through endurance and resolve, insisting, "It's a feeling. I can't explain it. But giving up isn't an answer. It doesn't put an end to anything" (Benchley 294). His survival underscores that heroism in *Jaws* is defined less by control than by persistence and moral commitment to others.

Brody's masculinity is further shaped by relational tension, particularly through his marriage to Ellen and her entanglement with Hooper, which intensifies his self-doubt and emotional awareness. His private uncertainty—"he was tempted to cancel the trip, to return to Amity and discover the truth about Hooper and Ellen. But suppose the worst was true" (Benchley 269)—reveals how deeply his sense of

identity is tied to trust, intimacy, and fear of displacement. These moments of insecurity do not weaken his character but instead deepen his role as a reflective Everyman whose heroism is defined by emotional intelligence as much as action. In this way, Brody ultimately unites the novel's competing masculine models without fully embodying any single one, suggesting that Benchley's vision of heroism is relational, adaptive, and morally grounded rather than rooted in dominance or expertise alone.

Building on Brody's personal and ethical development, *Jaws* situates its competing models of masculinity within broader symbolic environments that shape and intensify identity under pressure. The ocean functions as a central symbol in Benchley's novel, representing both danger and uncertainty, while Amity Island operates as a contained social space where these pressures become visible and immediate. This contrast between open ocean and enclosed town reinforces how masculinity is not only tested in moments of physical danger but also performed under constant social scrutiny, as the town itself becomes a "small place where everybody watched everybody else" (Benchley 61). The vastness of the sea externalizes the psychological strain experienced by Brody, Quint, and Hooper, while also reflecting broader cultural instability surrounding masculinity in the 1970s. Within this environment, the men are forced to negotiate shifting expectations of authority, strength, and vulnerability.

On land, these expectations are reinforced by the town's demand that Brody embody decisive, confident leadership, even as his more cautious and reflective approach resists such performance. This tension between communal expectation and individual judgment underscores Valsecchi et al.'s argument that maritime narratives use natural environments to mirror social and psychological pressures that reshape male identity (161). In this way, Benchley constructs setting as an active force in the novel's critique of rigid masculine norms, suggesting that heroism requires the integration of ethical awareness, intellectual judgment, and emotional responsiveness alongside physical courage.

Taken together, these environmental and interpersonal pressures contribute to the novel's broader critique of masculinity as unstable, constructed, and context-dependent. More specifically, *Jaws* ultimately argues that heroism is not an inherent expression of masculine strength but a relational and adaptive practice that emerges only when individuals are forced to negotiate uncertainty rather than dominate it. Through Brody, Quint, and Hooper, the novel examines three competing modes of manhood: hypermasculine physical dominance, scientific rationality, and ethically grounded civic responsibility. The shark serves as the central catalyst for this examination, functioning as both literal predator and symbolic force that exposes the limits of each model. Likewise, the ocean becomes a space where nature's unpredictability parallels the instability of human authority.

Brody's eventual endurance suggests that effective heroism emerges through synthesis rather than singular strength, while Quint's aggression fails under its own rigidity and Hooper's rationality proves incomplete without ethical engagement. Rather than privileging one form of masculinity, Benchley places these models in tension to show that identity is socially constructed and continually renegotiated in moments of crisis. Returning to the novel's opening image of calm waters concealing hidden danger, *Jaws* ultimately reframes the shark as more than a predator—it becomes a reflection of human insecurity and competing ideals of manhood. While the men believe they are hunting a monster, the narrative reveals that they are equally confronting the instability within themselves. The shark tests not only physical endurance

but also moral clarity and emotional resilience, exposing which forms of masculinity can adapt under pressure. Benchley suggests that heroism is not defined by domination or control but by the ability to confront uncertainty with ethical judgment and self-awareness. The true threat in *Jaws* is therefore not merely the shark in the water but the fragile constructions of masculinity it exposes—revealing that enduring courage lies in navigating, rather than mastering, the instability both within and beyond the self.

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AutismTok: An Experimental Study into TikToks and Self-Diagnosis

Shauna Ayers

Many people have either seen, heard, or made a TikTok. The platform has so many different ideas and opinions from all over the world. One area on TikTok, which some refer to as “AutismTok,” focuses on symptoms and other information about autism. Many people may believe that they have an undiagnosed mental disorder because they saw a TikTok that they felt as if it spoke to their inner mindset. Still, when they talk to their doctor or therapist, they may be told that they do not meet criteria for that disorder. How does viewing TikToks about autism influence whether someone perceives themselves with that disorder?

Researchers have investigated various aspects of autism-related content on TikTok, focusing on how accurate and impactful this content is for viewers. Brown et al. (2024) analyzed 100 TikToks related to autism spectrum disorder (ASD) uploaded between June 19th and 21st, 2023, focusing on content quality. Evaluated by psychiatrists and premedical students, the videos were categorized as either useful, personal experiences, or misleading. The researchers assessed the TikToks’ clarity and actionability using the Patient Education Materials Assessment Tool for Audio-Visual Materials (PEMAT-A/V; Shoemaker et al., 2014). Results showed that 24% of the videos were useful, 36% were personal experiences, and 40% were misleading. The average understandability score was 60.1%, but the median actionability score was 0%, suggesting that the information was easy to read but offered little practical guidance. Videos from healthcare professionals had notably more useful content than those from non-professionals.

Similarly, Aragon-Guevara et al. (2023) examined the reach and accuracy of autism-related content on TikTok, focusing on the hashtag “#Autism.” They addressed significant concerns about the prevalence of misinformation and the unfiltered nature of online content regarding autism. The researchers aimed to quantify the engagement of these videos by documenting views and likes while evaluating the accuracy of the information presented. The analysis targeted the most viewed TikTok videos associated with the hashtag, categorizing the type of content as accurate, inaccurate, or overgeneralized. Findings revealed that the “#Autism” videos collectively garnered a staggering 11.5 billion views. However, the accuracy of the content was alarming, with only 27% of videos classified as accurate, 41% deemed inaccurate, and 32% containing overgeneralizations. While there were no significant differences in engagement metrics between accurate and inaccurate videos, those created by healthcare professionals were more likely to provide accurate information, highlighting a critical area for improving the quality of autism-related content on the platform.

McMahon (2024) investigated how well college students recognize the signs of ASD and how they differentiate these signs from other disorders. The researchers used short stories that showed people with specific autistic traits to test how well students could identify and differentiate these behaviors. The results were troubling, showing that 23% of students confused ASD with other disabilities. They especially had difficulty distinguishing ASD from attention deficit-hyperactivity disorder (ADHD), anxiety, and learning disabilities. Many students who made mistakes felt overly confident about their understanding, which

suggests a gap between what they think they know and what they actually understand. This study highlights the urgent need for better public education on autism to reduce misinformation.

Weigle (2023) studied how social media affects self-diagnosis and views on mental health conditions in adolescents. The study included surveying both adolescents and mental health professionals. Many adolescents said social media influences how they understand and diagnose their mental health conditions, with many self-diagnosing based on what they found online. Mental health practitioners reported that about 80% of their adolescent patients seemed affected by social media regarding their mental health. Based on these reports from both adolescents and mental health practitioners, Weigle encourages clinicians to talk with their adolescent patients about their social media use and highlights the importance of psychoeducation to help teens manage these influences.

While these studies give us valuable insights into the quality, accuracy, and impact of autism-related content on TikTok, they do not specifically address how watching that content affects people's decisions to self-diagnose with autism. Additionally, these previous studies were non-experimental, and thus far, no study has involved an experimental design to observe TikTok's influence on self-diagnosis. Therefore, there is a clear gap in the research about how TikTok videos may affect people's decisions to self-diagnose with autism.

This leads to the current research question: does viewing TikToks about autism influence whether someone self-diagnoses themselves with that disorder? This study focuses specifically on how TikTok content may influence people's tendency to identify themselves with autistic traits. In the current study, I compare participants' identification with autistic traits after viewing either a misinformation TikTok or an accurate TikTok. Based on prior studies (Aragon-Guevara et al., 2023; Brown et al., 2024; McMahon, 2024; Weigle, 2023), I predict that the participants will identify with more autistic traits after being shown misinformation.

Experiment 1

Methods

Participants

I recruited 28 participants through the Department of Psychology and Criminal Justice SONA system. Participants were required to be at least 18 years old to participate. Participants received extra credit in their psychology courses for their participation.

Materials

TikToks. In one TikTok, the speaker talks about the similarities and differences between autistic burnout and panic attacks from her own experiences with both. This TikTok was used as the accurate TikTok about autism and was shown to half of the randomly assigned participants. In the other TikTok, the speaker talks about her autistic traits that are not commonly known. This was used as the misinformation TikTok about autism.

Assessment. The Autism Spectrum Quotient (AQ) is a 50-item self-report measure that assesses autistic traits in people aged 16 and up (Baron-Cohen et al., 2001). The AQ has five different subscales,

each highlighting a specific trait that helps identify people with autism. This study only used the Social Skill and Communication subscale items, resulting in a 20-item revised version of the AQ.

Procedure

Participants scheduled one timeslot to participate in the study through SONA. When they arrived at the lab room at their scheduled time, they first reviewed the informed consent form and agreed to participate in the study. They were then given the modified version of the Autism Spectrum Quotient to take their pre-test assessment. Afterward, they were randomly assigned either the accurate or misinformation TikTok to watch. After watching the randomly assigned TikTok, they were given the Autism Spectrum Quotient for their post-test assessment. If they watched the misinformation TikTok, they were debriefed on the study and provided accurate information by watching the accurate TikTok.

Results

Descriptive Statistics

I calculated the means and standard deviations of pre-test and post-test AQ scores across the TikTok conditions (see Table 1). For the misinformation TikTok condition, the mean AQ scores decreased from 8.143 to 7.5. The means for the misinformation condition were also lower than the accurate condition.

Table 1.

TikTok AQ Scores

	Pre-Test		Post-Test	
	Accurate	Misinformation	Accurate	Misinformation
Mean	9.643	8.143	9.929	7.500
Std. Deviation	5.329	3.759	4.428	3.674
Minimum	1.000	3.000	4.000	1.000
Maximum	19.000	13.000	17.000	12.000

Inferential Statistics

I conducted a Repeated Measures ANOVA with the data to compare pre-test and post-test scores across TikTok conditions. The pre-test and post-test means for the misinformation TikTok were approaching significant difference ($F(1, 28) = 3.264, p = 0.082$).

Table 2.

Repeated Measures ANOVA

Factors	<i>df</i>	<i>F</i>	<i>p</i>
TikToks	1	1.464	0.237
Repeated Measures	1	0.483	0.493
RM * TikToks	1	3.264	0.082

Experiment 2

Methods

Participants

After conducting Experiment 1 during the Spring 2025 semester, I continued recruiting participants in the Fall semester through the Department of Psychology and Criminal Justice SONA system. I recruited a total of 22 participants for this study. Again, participants were required to be at least 18 years old to participate, and they received extra credit for their participation.

Materials

TikToks. The TikToks from Experiment 1 were used as the accurate and misinformation TikToks about autism. I added two distractor TikToks to extend the time between participants seeing the target TikTok and taking the post-test assessment. The distractor TikToks included one of various cat videos and one of various dog videos.

Assessment. The Autism Spectrum Quotient (AQ) from Experiment 1 was used as well as a demographics survey. The demographic survey is a list of questions used to gather information from the participants such as age, gender, religion, etc. The specific use for this survey is to distract the participant from the initial assessment taken and TikToks viewed.

Procedures

The procedure was the same as Experiment 1 except, after taking the pre-test assessment, the participants watched one of the distraction TikToks. Afterward, they were randomly assigned one of the TikToks to watch, either accurate or misleading. Then they watched the other distraction TikTok, immediately followed by the demographics survey. Then they were given the Autism Spectrum Quotient for their post-test assessment. If they watched the misleading TikTok, they were debriefed on the study and provided accurate information by watching the accurate TikTok.

Results

Descriptive Statistics

Again, I calculated the means and standard deviations of pre-test and post-test across the TikTok conditions. This time, for the accurate TikTok, the mean AQ scores decreased from 8.333 to 7.583.

Table 3.

TikTok AQ Scores

	Pre-Test		Post-Test	
	Accurate	Misinformation	Accurate	Misinformation
Mean	8.333	10.100	7.583	10.200
Std. Deviation	4.735	3.665	4.461	3.765
Minimum	2.000	3.000	2.000	4.000
Maximum	20.000	16.000	18.000	16.000

Inferential Statistics

I conducted a Repeated Measures ANOVA with the data. There was no difference across pre-test and post-test scores across TikTok conditions ($F(1, 22) = 1.210, p = 0.284$).

Table 4.

Repeated Measures ANOVA

Factors	<i>df</i>	<i>F</i>	<i>p</i>
TikToks	1	1.538	0.229
Repeated Measures	1	0.707	0.410
RM * TikToks	1	1.210	0.284

General Discussion

The goal of this study was to determine if watching TikToks about autism could influence someone to identify themselves as having traits of the disorder. While Brown et al. (2024) and Aragon-Guevara et al. (2023) analyzed the quality of TikTok content related to autism, this study builds on their findings by examining TikTok's impact on self-diagnosis. The results of the current study showed that viewing these TikToks did not significantly change participants' self-assessment scores on the AQ assessment. In Experiment 1, participants who watched the TikTok with misinformation showed a slight decrease in AQ scores from the pre-test to the post-test. However, participants who watched the accurate TikTok had a slight increase in AQ scores from the pre-test to the post-test. In Experiment 2, I did not find a significant difference across conditions, although participants in the accurate condition did have lower scores than in the misinformation condition. Overall, this study did not confirm the hypothesis that the misinformation in the TikToks would cause participants to rate themselves with autistic traits.

While this study did not find a significant effect of misinformation on AQ scores, in light of the research on misinformation in TikToks and social media's impact on mental health (Aragon-Guevara et al., 2023; Brown et al., 2024; McMahon, 2024; Weigle, 2023), social media users should rely on trustworthy sources and healthcare professionals for accurate information. Content creators could share information grounded in research about autism and health conditions. They could also collaborate with healthcare experts to make sure their information is reliable. Healthcare professionals should talk to patients about their use of social media and help them distinguish between trustworthy information and misleading content. Talking about social media's impact can improve patient education. Public health campaigns should highlight the dangers of self-diagnosis from social media and stress the need to get professional medical advice. By following these steps, we can reduce misinformation, improve understanding of autism, and support informed health choices.

Limitations

There are a few potential issues with this study. The sample size was significantly smaller than necessary for the statistical analyses used. Using G*power, an a priori power analysis for a between-subjects repeated measures ANOVA with two groups, with a medium effect size, it was suggested that I should have recruited at least 98 participants. Unfortunately, I only managed to recruit 28 participants for Experiment 1

and then 22 participants for Experiment 2. Since the statistical test was approaching significance, it is likely that a significant relationship exists, but this study was underpowered to detect such a relationship.

The AQ items used in this study focused on social and communication traits associated with autism. Expanding the questions to cover other areas might have helped as well. It is possible that the TikTok videos discussed symptoms or experiences outside of that scale, and incorporating a broader range of questions could capture a more comprehensive view of the content's impact.

Future Research

Future research could look at how different social media platforms affect self-diagnosis decisions. Comparing TikTok with sites like Instagram and YouTube could give a better understanding of how social media shapes a person's perspective on their mental health. A larger and more diverse sample would make the findings more applicable to a wider audience, including people from various age groups, education levels, and cultures. Additionally, it might be useful to ask participants whether they are actually autistic or have an official diagnosis. This could provide more accurate insights into how TikToks influence self-diagnosis among individuals with and without a formal diagnosis. Researchers could also track how exposure to autism-related content on TikTok influences individuals' views and self-assessment of autistic traits over time. Using the full Autism Spectrum Quotient (AQ) measure would give a more complete picture of these traits.

Conclusion

This study explored whether watching TikToks about autism influences people to self-diagnose with autism. The results showed that whether the TikTok content was accurate or misleading, it did not significantly affect the participants' self-assessment scores. This suggests that while TikTok can influence someone's opinions, it may not have a strong effect on self-diagnosis behaviors. The findings highlight the need for accurate information on social media to prevent misinformation and its potential impact on mental health. By addressing this gap in current research, this study offers insights that can help improve public health strategies and social media policies. These improvements can help provide a better quality of health information online and support informed health decisions.

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The AI Rosetta Stone: How Artificial Intelligence and Machine Learning Are Translating the Unknown, from Animal Languages to Ancient Texts and Hidden Cures

Reema Bhaskar

Abstract

Artificial intelligence is rapidly evolving from a tool for data analysis into an active agent of scientific discovery, one capable of identifying patterns and generating insights that exceed human perceptual and cognitive limitations. This paper surveys three case studies spanning fundamentally different scientific domains to illustrate the breadth and transformative potential of AI-driven research. First, it examines the Earth Species Project's use of AI and bioacoustic analysis to decode non-human animal communication, including new audio models and synthetic vocalizations designed for interspecies research. Second, it explores how machine learning has enabled researchers to read ancient Roman scrolls that were carbonized by the eruption of Mount Vesuvius nearly 2,000 years ago. Third, it analyzes the discovery of halicin, a novel antibiotic identified by a deep neural network after screening over 100 million chemical compounds, which demonstrated remarkable effectiveness against drug-resistant bacteria. Across these case studies, a unifying theme emerges: AI functions as a translator of the previously inaccessible, decoding signals, texts, and molecular relationships that lie beyond the reach of unaided human inquiry. The paper discusses common methodological patterns, ethical considerations, and the implications of these advances for the future of interdisciplinary scientific research.

Keywords: artificial intelligence, scientific discovery, machine learning, bioacoustics, digital humanities, drug discovery, foundation models

Introduction

In 2024, the Nobel Prize in Chemistry was awarded to researchers behind AlphaFold, an artificial intelligence system that solved the fifty-year-old protein folding problem (Jumper et al., 2021). That same year, AI systems discovered new antibiotics, decoded ancient manuscripts, and began translating the vocalizations of whales and crows. These achievements span biology, medicine, archaeology, and ecology, yet they share a common thread: in each case, AI served not merely as an analytical instrument but as a translator, making accessible what was previously beyond the reach of human perception or computational capacity.

The role of AI in scientific research has evolved considerably over the past decade. Early applications focused on classification, prediction, and pattern recognition within well-defined datasets. More recently, however, AI systems have demonstrated the capacity to generate novel hypotheses, identify overlooked candidates in vast chemical libraries, and extract meaningful information from data that humans cannot directly perceive (Merchant et al., 2023). This shift, from AI as a passive tool to AI as an active participant in discovery, represents a significant transformation in the scientific process.

This paper surveys three case studies that illustrate the breadth and transformative potential of AI-driven scientific discovery. The cases were selected to maximize diversity of domain: the Earth Species Project's efforts to decode non-human animal communication (ecology and bioacoustics), the use of machine learning to read the carbonized Herculaneum scrolls (archaeology and the humanities), and the discovery of halicin as a novel antibiotic compound (medicine and chemistry). Despite their differences,

these cases converge on a shared insight: AI is most transformative when it functions as a translator of the previously inaccessible, decoding information that exists in the world but lies beyond the boundaries of unaided human inquiry.

Background

Understanding the case studies presented in this paper requires a brief overview of several key concepts. Deep learning is a branch of machine learning that uses artificial neural networks, computational systems loosely inspired by the structure of the brain, to learn from large amounts of data. These networks are composed of multiple layers, each of which extracts increasingly abstract features from the input. For example, the first layer of a network trained on images might detect edges, while deeper layers might recognize shapes or objects. Through exposure to large datasets, these models adjust their internal settings to minimize errors, gradually learning to identify subtle patterns in complex, high-dimensional data (LeCun et al., 2015). This ability to detect patterns invisible to human analysis is central to each of the discoveries discussed below.

A foundation model is a large-scale AI system trained on broad, diverse data that can then be adapted to many different tasks, much like a person with a strong general education can specialize in new fields more quickly than someone trained only in one narrow area (Bommasani et al., 2021). These models have proven effective in language processing, image recognition, and, more recently, scientific applications such as animal sound analysis and molecular prediction. The development of domain-specific foundation models, trained on specialized scientific data rather than general text, has been a key enabler of the breakthroughs surveyed in this paper.

The transition from AI as an analytical tool to AI as a discovery agent has been accelerated by several converging factors: the exponential growth of available scientific data, improvements in computing power, and advances in model design that allow AI systems to work across different types of input, processing audio, imagery, molecular structures, and text within unified systems (Nature, 2025). Across the three case studies that follow, AI does not merely automate existing workflows; it expands the space of what is knowable.

Decoding Animal Communication: The Earth Species Project

Human understanding of animal communication has historically been limited by the constraints of human perception and the labor-intensive nature of behavioral observation. Traditional bioacoustic research (the study of biological sounds) depends on researchers manually cataloging animal calls, inferring meaning from context, and attempting to isolate individual signals from noisy environments. These methods, while valuable, are constrained by cognitive biases, sensory limitations, and the sheer volume of sound data generated by social species (Zacarian, as cited in World Economic Forum, 2023). The Earth Species Project (ESP), a nonprofit founded in 2017 by Britt Selvitelle and Aza Raskin, seeks to overcome these limitations by applying AI to the challenge of decoding animal communication at scale.

ESP's approach centers on several interconnected innovations. The organization developed NatureLM-audio, the first large-scale audio foundation model designed specifically for animal sounds.

Unlike general-purpose audio models trained primarily on human speech and music, NatureLM-audio was trained on a wide range of animal vocalizations and can identify species, distinguish traits such as sex and age, and classify call types from raw audio input (Earth Species Project, 2024). This model represents a significant advance over previous tools, which typically required species-specific training and could not generalize across different types of animals.

One of ESP's most notable achievements addresses what researchers call the "cocktail party problem" in animal communication: the challenge of following a single voice in a crowd. In social species, multiple individuals often vocalize simultaneously, producing overlapping signals that are difficult to separate. ESP developed neural network models capable of isolating individual voices from group recordings, successfully separating individual sperm whale clicks and zebra finch songs from complex acoustic environments (Earth Species Project, 2024). This capability has dramatically increased the volume of usable data available to researchers.

Beyond analyzing recordings, ESP is pioneering the use of AI-generated synthetic animal calls as an experimental tool. Researchers have begun creating artificial vocalizations using generative models and playing them back to animal populations to test hypotheses about what specific calls mean. This approach, conducted under strict ethical protocols and initially limited to captive populations, allows scientists to manipulate specific sound features and observe behavioral responses with a precision that traditional playback experiments could not achieve (Earth Species Project, 2025). ESP is also developing the Inter-Species Phonetic Alphabet (ISPA), a standardized system for representing animal sounds that could enable the application of human language AI models to non-human communication systems.

Early results have shown that techniques originally developed for human speech can transfer effectively to animal communication, reinforcing the hypothesis that AI can identify shared structural features of communication across species (Earth Species Project, 2025). The practical implications of this work extend to conservation: understanding the vocal repertoires of endangered species such as the Hawaiian crow and the St. Lawrence beluga whale can inform breeding programs, habitat management, and the design of marine protection zones (Zacarian, as cited in World Economic Forum, 2023).

Reading the Herculaneum Scrolls: AI and the Recovery of Lost Texts

In 79 AD, the eruption of Mount Vesuvius buried the Roman city of Herculaneum under volcanic material, carbonizing hundreds of papyrus scrolls housed in a private library believed to have belonged to Julius Caesar's father-in-law, Lucius Calpurnius Piso Caesoninus. These scrolls, discovered in the eighteenth century, represent the only intact library to survive from classical antiquity. However, the extreme heat of the eruption transformed them into fragile, blackened cylinders of compressed carbon, and early attempts to unroll and read them destroyed many. For over two centuries, the remaining scrolls were considered permanently illegible (Seales et al., 2023).

The challenge of reading the Herculaneum scrolls is fundamentally a problem of perception. The carbon-based ink used by ancient scribes is nearly indistinguishable from the carbonized papyrus on which it was applied, both to the naked eye and under standard imaging. Beginning in the early 2000s, researchers led by Brent Seales at the University of Kentucky pioneered the use of X-ray computed tomography (CT

scanning) to create three-dimensional images of the intact scrolls, capturing their internal structure without physical contact. However, the resulting scans contained thousands of tightly compressed layers of papyrus, and identifying ink within this data proved extraordinarily difficult using conventional image processing (Seales et al., 2023).

The breakthrough came through machine learning. In 2023, Seales and collaborators launched the Vesuvius Challenge, a global competition offering prizes for the first successful detection and reading of text within the CT scans. Participants developed deep learning models trained to detect subtle differences in surface texture at the microscopic level, where ink had been applied to papyrus nearly two millennia ago. The winning approaches used convolutional neural networks, a type of deep learning model designed to analyze visual patterns, to identify ink traces invisible to the human eye, first recovering individual letters, then words, and ultimately entire passages of Greek text (Vesuvius Challenge, 2024).

The recovered text has been identified as a previously unknown philosophical work, likely authored by or associated with the Epicurean philosopher Philodemus of Gadara, who was active in the first century BC. The content discusses pleasure, perception, and the senses, themes consistent with Epicurean philosophy but not found in any previously known manuscript. Scholars have compared the significance of this discovery to that of the Dead Sea Scrolls (Vesuvius Challenge, 2024).

The implications extend well beyond a single set of scrolls. Hundreds of Herculaneum papyri remain unread, and the machine learning techniques developed through the Vesuvius Challenge are being refined to accelerate the reading of additional texts. These methods may also be applicable to other damaged or deteriorated manuscripts, potentially opening new avenues for the recovery of lost texts across cultures and historical periods. The Herculaneum project demonstrates that AI-driven discovery is not confined to the natural sciences; it is equally capable of transforming research in the humanities.

Discovering Halicin: AI-Driven Antibiotic Discovery

Antimicrobial resistance (AMR), the ability of bacteria to survive drugs designed to kill them, represents one of the most pressing global health challenges of the twenty-first century. According to the World Health Organization, bacterial AMR was directly responsible for an estimated 1.27 million deaths worldwide in 2019 and contributed to approximately 4.95 million additional deaths (Murray et al., 2022). Despite the severity of this crisis, the antibiotic development pipeline has slowed dramatically. The high cost and low profitability of antibiotic research, combined with the rapid emergence of resistance to new compounds, has led many pharmaceutical companies to reduce or abandon their antibiotic programs (Stokes et al., 2020). In this context, AI has emerged as a potential means of revitalizing the discovery process.

In 2020, researchers at the Massachusetts Institute of Technology, led by James Collins and Regina Barzilay, published a landmark study demonstrating the use of deep learning to identify a novel antibiotic. The team trained a deep neural network on a dataset of approximately 2,500 molecules with known antibacterial activity against *Escherichia coli*. The model learned to associate molecular structural features with antibacterial effectiveness, without relying on predefined chemical rules or human assumptions about what an effective antibiotic should look like (Stokes et al., 2020). In other words, the AI was free to evaluate

each molecule on its own terms rather than filtering candidates through the lens of existing drug design conventions.

When applied to the Drug Repurposing Hub, a library of compounds previously investigated for other medical purposes, the model flagged a molecule called SU-3327 as having strong predicted antibacterial activity. This molecule had originally been developed as a treatment for diabetes but had been abandoned due to poor results. The researchers renamed it halicin, a reference to the fictional artificial intelligence HAL 9000 from Stanley Kubrick's *2001: A Space Odyssey* (Stokes et al., 2020).

Laboratory testing confirmed that halicin exhibited broad-spectrum antibacterial activity against a wide range of disease-causing bacteria, including several drug-resistant strains. It was effective against *Clostridium difficile*, *Acinetobacter baumannii*, and *Mycobacterium tuberculosis*. In a particularly striking result, halicin cleared infections caused by a strain of *A. baumannii* resistant to all known antibiotics in a mouse model within 24 hours of treatment (Stokes et al., 2020). This species is listed by the World Health Organization as a critical-priority pathogen.

Studies of halicin's mechanism revealed that it kills bacteria by disrupting the electrochemical gradient across bacterial cell membranes, a voltage-like charge difference that bacteria need to produce energy. Because halicin targets the membrane broadly rather than a single protein, bacteria find it exceptionally difficult to develop resistance through simple genetic mutations. In a 30-day experiment designed to encourage resistance development, *E. coli* developed no measurable resistance to halicin, whereas resistance to the conventional antibiotic ciprofloxacin emerged within one to three days (Stokes et al., 2020).

Following the initial discovery, the researchers expanded their search, applying the model to ZINC15, an online collection of over 1.5 billion commercially available chemical compounds. In just three days, the model screened over 100 million molecules and identified 23 additional candidates with predicted antibacterial activity that were structurally different from existing antibiotics (Stokes et al., 2020). This work has since been extended through the MIT Antibiotics-AI Project, which in 2023 reported a new class of compounds effective against methicillin-resistant *Staphylococcus aureus* (MRSA), a pathogen responsible for more than 10,000 deaths annually in the United States (Wong et al., 2024). The halicin discovery illustrates AI's capacity to identify therapeutic potential in molecules that human researchers, constrained by familiarity with existing drug designs, had overlooked.

Discussion

Despite the diversity of the domains surveyed in this paper, several common patterns emerge. In each case, AI functioned as a translator, making accessible information that was present in the world but imperceptible to unaided human inquiry. The Earth Species Project translates acoustic signals structured with meaning but produced at frequencies, volumes, and complexities that exceed human analytical capacity. The Herculaneum scrolls contain text that is physically present within CT scan data but invisible to human eyes because the ink and the carbonized papyrus are nearly identical in density. Halicin's antibacterial potential was encoded in its molecular structure but overlooked by human chemists whose

intuitions were shaped by familiarity with existing drug designs. In all three cases, AI did not create new information; it decoded information that already existed but was previously inaccessible.

A second shared pattern is the role of scale. Each case study involved datasets far too large for manual analysis: thousands of hours of animal vocalizations across dozens of species, billions of data points in high-resolution CT scans, and libraries of over 100 million chemical compounds. Deep learning's capacity to process and identify patterns within such vast datasets is not merely a speed improvement over human cognition; it represents a qualitative expansion of the boundaries of scientific inquiry. Problems that were previously impossible to tackle due to their sheer size have become solvable through AI.

Third, all three case studies demonstrate the importance of human-AI collaboration. In none of these examples did AI operate autonomously. ESP's synthetic vocalizations require expertise in animal behavior to design experiments and interpret responses. The Vesuvius Challenge relied on classicists and papyrologists to identify and contextualize the recovered Greek text. The halicin discovery required microbiologists to validate the model's predictions through laboratory experiments and mechanistic studies. AI expands the space of what is discoverable, but human expertise remains essential for validation, interpretation, and responsible application.

Limitations and Ethical Considerations

These case studies also highlight important limitations and ethical concerns that deserve careful attention as AI's role in science continues to grow.

In the domain of animal communication, the Earth Species Project has acknowledged the ethical complexity of generating synthetic animal calls. Playing artificial vocalizations to wild populations could disrupt natural behavior, alter social dynamics, or interfere with cultural transmission within species, potentially causing harm in ways that are difficult to predict or reverse (Earth Species Project, 2025). More broadly, interpreting animal sounds through AI models trained on human language carries the risk of anthropomorphism: projecting human communicative structures onto systems that may operate according to fundamentally different principles. Researchers must remain cautious about claiming that animal vocalizations constitute "language" in the human sense without sufficient behavioral evidence.

The Herculaneum project raises questions of cultural ownership, scholarly access, and interpretive caution. When AI recovers fragmentary text, scholars must resist the temptation to treat machine-generated readings as definitive. The models that identify ink traces operate probabilistically; they estimate where ink is likely present, and their outputs require careful expert review. There is also the question of who controls access to these newly recovered texts and how they are made available to the broader scholarly community.

The halicin discovery, while promising, has encountered significant practical challenges. Pharmacokinetic studies have revealed that halicin suffers from poor absorption and rapid elimination from the body, complicating its path from laboratory success to clinical use as an actual drug that patients can take (El Belghiti et al., 2025). This gap between computational prediction and clinical viability is a recurring theme in AI-driven drug discovery: a model can identify a molecule with antibacterial properties, but transforming that molecule into a safe and effective treatment involves extensive testing that AI cannot yet perform or replace.

More broadly, the accelerating pace of AI-driven discovery creates what might be called a validation bottleneck. AI systems can generate hypotheses and identify candidates far faster than human researchers can experimentally verify them. This imbalance raises concerns about the reliability and reproducibility of AI-assisted findings, particularly if the pressure to publish novel results outpaces the capacity for rigorous experimental follow-up. As AI takes on a larger role in the scientific process, the research community will need robust frameworks for evaluating, benchmarking, and responsibly deploying these systems.

Future Directions

Looking forward, the trajectory of AI in science points toward increasingly capable systems that can manage larger portions of the research pipeline. Recent developments, such as Duke University's framework for extracting simple mathematical rules from complex nonlinear systems (Moore et al., 2025) and Google DeepMind's AlphaEvolve agent, which discovered novel mathematical algorithms by autonomously proposing and testing hypotheses (Novikov et al., 2025), suggest that AI's role in science will continue to deepen. These advances make the need for evaluation frameworks and ethical guidelines all the more urgent.

Conclusion

The three case studies surveyed in this paper, spanning animal communication, ancient textual recovery, and antibiotic discovery, demonstrate that AI-driven scientific discovery is not confined to a single domain or methodology. Across ecology, the humanities, and medicine, AI has functioned as a translator of the previously inaccessible, decoding acoustic signals, recovering lost texts, and identifying therapeutic molecules that lay beyond the boundaries of unaided human perception and cognition.

At the same time, these cases underscore that AI is most effective not as an autonomous agent but as a collaborative partner, expanding the reach of human inquiry while depending on human expertise for validation, interpretation, and ethical oversight. The limitations encountered in each domain, from the risks of synthetic animal calls to the pharmacokinetic hurdles facing halicin, serve as reminders that AI-generated insights are starting points, not finished answers. As AI continues to assume a larger role in the scientific process, the research community must invest in evaluation frameworks, ethical guidelines, and interdisciplinary training to ensure these powerful tools are deployed responsibly. The unknown is vast, but AI is proving to be one of our most capable translators.

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The Effects of Imagery on Three-Point Shooting Accuracy, Shooting Under Pressure, and Shooting Confidence: A Case Study of a Former Collegiate Basketball Player

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Abstract

This case study assessed the effects of imagery on three-point shooting accuracy, three-point shooting performance under pressure, and shooting confidence in a former collegiate basketball player. The participant met weekly with the researcher to complete a confidence measure and a series of shooting tests designed to assess shooting accuracy and shooting performance under pressure. After the initial baseline shooting tests, the participant practiced a guided imagery script for approximately 5 min a day, 5 days a week before meeting for the next week's shooting session. Observable improvements in shooting and confidence began as soon as session 2. The field of sport psychology may benefit from this case study's findings that imagery may improve sport performance, specifically shooting accuracy, shooting under pressure, and confidence from the three-point line. *Keywords:* Imagery, Visualization, Basketball, Three-point shooting, Mental Training, sport psychology

The three-point shot has become an important aspect of basketball, and for basketball players, the ability to shoot three-pointers is a crucial skill needed to play, especially at higher levels of basketball (Lu et al., 2020). Due to this, coaches and trainers frequently try new techniques to improve players' shooting ability. One effective technique used by most sports psychologists is imagery, which is the process of using multiple senses to create specific experiences to simulate in the mind (Vishwanth et al., 2019). The mental aspect of basketball is often overlooked due to a focus on physical training, and many coaches and players do not emphasize the importance of mental training. Textbook and applied sport psychology literature suggest that mental factors play a prominent role in sport performance success, and players who have good mental training are more skilled at overcoming emotional and mental problems externally and internally while competing (Ramadhan et al., 2023; Weinberg & Gould, 2023). Additionally, research suggests that imagery is the most powerful mental training technique (Ramadhan et al., 2023; Weinberg & Gould, 2023).

Imagery is a mental skill that involves the use of multiple senses to create or recreate experiences in the absence of physical movement (Vishwanth et al., 2019). Imagery improves performance in sports because it activates similar brain regions that physical activity activates. That is, the brain interprets imagery as actually performing physical activity. Imagery activates the motor cortex, cerebellum, and basal ganglia, which are also activated during physical activity (Simonsmeier et al., 2021). The motor cortex plans and starts voluntary movements which allows imagery to strengthen motor pathways by activating brain patterns like actual motor movements (Guillot & Collet, 2008). The cerebellum handles smooth and precise motor movements and activates during imagery, which in turn improves the accuracy and coordination when the movement is actually performed (Guillot & Collet, 2008). The basal ganglia handle movement selection and habit formation; therefore, imagery improves initiation and sequencing of motor movements, which reinforces procedural memory and automaticity in physical movements (Cumming & Williams, 2012). All these parts combine to make up the motor simulation system which is the brain's ability to

simulate motor tasks without actually performing them (Simonsmeier et al., 2021). Imagery activates the motor simulation system the same way as physical exertion but at a lower activation rate (Guillot & Collet, 2008).

Both Zureigat et al. (2023) and Mousavi et al. (2023) found that over six weeks, imagery increased shooting accuracy significantly more than physical practice. Mazumdar and Agarwal (2014) found a significant improvement in pre-test to post-test shooting accuracy and speed after examining the effects of imagery and goal setting with 15 female college basketball players over 4 weeks. Zureigat et al. (2023) conducted their study using 15- and 16-year-old high school basketball players while Mazumdar and Agarwal (2014) conducted their study using 15 female college basketball players. In both studies, they found imagery to increase shooting accuracy. These studies show that this effect is found across different levels of basketball (i.e., high school and college). Vishwanth et al. (2019) found that imagery not only increased free throw accuracy but also increased confidence and reduced anxiety showing technical and psychological improvements from imagery in four weeks. This research shows the power of imagery on shooting in basketball and supports that athletes benefit physically and mentally from imagery practice.

Research suggests that imagery increases shot performance and confidence, but there is a lack of research on the effects on shooting under pressure. In this case study, I will examine whether over time guided imagery is associated with improvements in shot performance, shooting confidence, and shooting under pressure from the three-point line.

Methods

Participants

This is a single-participant case study design. The participant was over the age of 18 and provided informed consent to take part in this study. The participant was selected using convenience sampling based on prior experience playing basketball. No compensation was provided upon completion.

Materials

The materials used in this study included a men's basketball, an indoor basketball court with a basketball goal, a confidence measure, and a guided imagery script. Shooting performance was recorded using voice memos on a smartphone and AirPods to record real-time shooting scores.

Guided Imagery Script

A 5 min guided imagery video was created for the participant to complete independently. The participant was instructed to practice the guided imagery 5 days per week for approximately 5 min. Additionally, the participant was instructed to record the imagery sessions on another device to submit to the researcher. A picture of the shooting spot was shown in the guided imagery, and the participant was instructed to imagine the scene. Next, the participant imagined shooting 10 three-point shots from one spot. The first day the participant imagined shooting from the corner, then the second day they imagined from the wing, third day from the top, fourth day from the other wing, and fifth day from the other corner.

Interview

At the beginning of the study, the participant was interviewed about their previous experience playing basketball and their experience with imagery. Questions for the interview included asking about

the participant's age, their major and profession, experience playing basketball and other sports, the meaning of sports and basketball in their life, and experiences using imagery or other mental training.

Confidence Measure

In this case study, the participant's shooting confidence was assessed. The participant completed the measure before engaging in the shooting test and at the beginning of every session with the researcher. The confidence measure asked the participant to rate his current confidence shooting a basketball, his perceived shooting ability, and confidence and shooting ability in a game scenario to make the winning shot. See Appendix A for confidence measure.

Shooting Tests

For the "spot shooting test", the participant shot 50 three-point shots, with 10 shots taken from each of the two corners, two wings, and the top of the key.

The participant then completed the "timed three-point test", which added a time component for pressure. The participant was given 1 min 15 sec to shoot five three-point shots per spot from the two corners, two wings, and the top of the key.

In the next test, time and consistency were combined, and the participant was scored for consistency. In the "consistency under pressure test", the participant shot six shots from each spot and was required to make two consecutive shots to earn one point. The participant was given 1 min 30 sec to complete this test.

In the next test, the participant faced increased pressure by adding consequences. In the "penalty-based pressure test," a made shot earned +1 point, while a missed shot incurred -1 point. A score resulting in -10 points automatically resulted in the cancellation of the test. The participant was required to run the number of laps baseline-to-baseline corresponding to their negative score.

Lastly, in the "defensive pressure test," the participant shot while the researcher simulated a defensive closeout (i.e., sprinting from the painted area toward the shooter and jumping with an outstretched arm to contest the shot). The researcher ran from the painted area to the defender at the three-point line and contested each shot by jumping to simulate defense in actual gameplay.

In all shooting tests, the participant shot from the same five spots and the researcher caught the rebound and passed the ball back to the participant after each shot.

Procedure

The participant was selected using convenience sampling. In the first meeting of the study, the participant completed the interview. Afterward, the participant completed the baseline confidence measure and the baseline shooting test. After the first meeting the participant was sent the guided imagery and instructed to complete it independently 5 days a week. The participant recorded each guided imagery session and sent it to the researcher after completion. Once the participant completed the guided imagery for the week, they met with the researcher and completed the confidence measure and shooting test.

Results and Discussion

The purpose of this case study was to document the potential effects of imagery practice on shooting accuracy and confidence. This case study examined whether practicing imagery for 5 min, 5 days a week

was associated with improvements in shooting accuracy, shooting under pressure, and confidence.

Case Study: “John”

John is a 33-year-old health and wellness coach and a former collegiate basketball player who competed at the junior college level and won a national championship. John reported previous experience with imagery and mental training to improve performance. At one point, basketball was John’s entire life. John stated that sports have taught him that sometimes the most talented player is not the one who will always win; the most prepared is. John stated, “You can have talent all day but if someone is more prepared than you, they can outsmart you at every angle of the situation.”

Table 1.

Shooting Test

	Session 1	Session 2	Session 3
Spot Shooting	15/50	27/50	23/50
Timed 3pt Test	6/13	9/18	7/16
Consistency under pressure test	2 total points	3 total points	3 total points
Penalty-based Pressure Test	+7	+4	+4
Defensive Pressure Test	7/25	13/25	11/25

Shot Performance

From session one to session two, John made notable improvements in shooting accuracy and performance under pressure. John made 12 more three-point shots in the “spot shooting test,” three more three-point shots in the “timed three-point test”, increased by one point in the “consistency under pressure test”, and nearly doubled the amount of made shots in the “defensive pressure test.”

From session two to session three, performance decreased slightly but remained improved compared to the baseline. Only two performance decreases were observed. John scored three fewer points in the “penalty-based pressure test” from baseline and required more shot attempts to achieve a score of 7 out of 16 during session three compared to baseline, despite higher performance in session two.

Due to gym closure, session two took place in a different gym than the imagery scene. The results from session two suggest that performance gains may reflect across different environments. Also, reduced improvement from session two to three may have been influenced by the participant completing the guided imagery more consistently for session two than session three. This suggests that consistency in imagery may be an important factor for improving performance, regardless of where the physical action is taking place.

Table 2.*Shooting Confidence Over Time*

	Session 1	Session 2	Session 3
Confidence Shooting	1 - Unconfident	3- Confident	4 – Very Confident
Perceived Ability Shooting	2 - Okay	4 -Automatic	3- Good
Game Winning Shot (Confidence)	2 – Don’t pass to me	3- Shoot if needed	4- I’ll shoot
Game Winning Shot (Ability)	4 – I’ll shoot	3- Shoot if needed	5- Pass me the ball

Confidence

From session one to session two, there was an immediate increase in confidence that John reported on the measure and discussed during the second session. Not only did John go from “unconfident” to “confident” in his shooting confidence, during session two, John described the imagery as the formula for shooting. By session three, John increased to “very confident” in his shooting ability.

Additionally, John’s perceived shooting ability went from “okay” in session one to “automatic” in session two, but lowered to “good” in session three.

In the game-winning shot scenarios for confidence, John moved from “don’t pass to me” to “I’ll shoot if I have to” in session one to session two. In Session 3, his response increased to “I’ll take the shot.”

In John’s game-winning shot scenarios using perceived shooting ability, his score decreased from “I’ll shoot” in session one to “I’ll shoot if I have to” in session two. However, in session three he increased to the highest level: “pass me the ball.”

Limitations

Time was a limiting factor in this study. The original plan was at least 4 sessions and projected for eight sessions, but setbacks occurred, and I was only able to get three sessions completed. Even though performance improved, the new environment introduced a potential confounding variable. Additionally, the consistency of imagery practice was a limiting factor. The participant was supposed to do the imagery five days a week, but there were days missed which may have influenced the shooting trend from session two to session three.

Although the participant was instructed to send a video of the guided imagery completion, the participant suggested scheduled video-chat meetings to improve accountability, which future studies should include. Future research should replicate this study over a longer duration using a larger sample size. Future studies should also add scheduled video-chat meetings to improve accountability and consistent imagery practice. An experimental study focusing strictly on the effects of imagery and shooting under pressure should be investigated based on the results of this study.

Finally, as this was a case study design, this study can only be used as applied use and not causal evidence. The single participant case study design gives the findings low generalizability. Also, due to lack

of a control group, the participant could have become better from practice. This is unlikely, however, because overall shooting improvement typically requires more than shooting once a week to become better from practice. While case studies have these limitations, the benefit of a case study is that it provides an in-depth examination and qualitative context.

Summary

This case study examined the effects of guided imagery practice on three-point shooting performance, shooting under pressure, and confidence in a former collegiate basketball player across three sessions. Following the baseline assessment, the participant engaged in a guided imagery intervention independently for approximately 5 min, 5 days per week, followed by weekly shooting and confidence tests. Improvements were observed in shooting accuracy, performance under pressure, and shooting confidence, with performance gains most notable between the first and second sessions. These findings are consistent with existing research supporting the role of imagery in improving shooting accuracy and confidence (Mazumdar & Agarwal, 2014; Vishwanth et al., 2019). The observed effects support prior research that imagery may improve performance by engaging similar brain regions involved in physical activity (Guillot & Collet, 2008; Cumming & Williams, 2012; Simonsmeier et al., 2021). Improvements in shooting confidence, perceived ability, and game-winning shot scenarios are consistent with Vishwanth et al. (2019), who identified imagery as a confidence-enhancing technique. While research supports imagery increasing shooting accuracy, research on the effects of imagery on shooting under pressure is underexplored.

This case study adds to existing research by suggesting that imagery may be beneficial for increasing accuracy under pressure. The field of sport psychology may benefit from this case study's findings that imagery may improve sport performance, specifically shooting accuracy, shooting under pressure, and confidence from the three-point line.

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Appendix A

1. Current Shooting Confidence

Rate your current confidence in accurately shooting a basketball.

- 1 = Unconfident
- 2 = Slightly confident
- 3 = Confident
- 4 = Very confident

2. Perceived Shooting Ability

Rate your perceived ability to shoot a basketball.

- 1 = Bad
- 2 = Okay
- 3 = Good
- 4 = Excellent / Automatic

3. Game-Winning Shot Confidence

With the game on the line, think of the best four basketball shooters you know. Rate your confidence in taking the game-winning shot.

- 1 = Take me out of the game
- 2 = I don't want the ball
- 3 = I'll shoot if I have to, but my teammates have a better chance
- 4 = I'm shooting — pass me the ball
- 5 = Pass me the ball

4. Game-Winning Shot Ability

Now rate this question using your perceived ability to accurately shoot the basketball.

- 1 = Take me out of the game
- 2 = I don't want the ball
- 3 = I'll shoot if I have to, but my teammates have a better chance
- 4 = I'm shooting
- 5 = Pass me the ball

Dismantling Apartheid from Below: The Evolution of Women’s Resistance and Leadership in the SACP and ANC in South Africa, 1950-1965

Tara Mann

In 1950, the National Party government of South Africa enacted the Suppression of Communism Act, targeting organizations such as the South African Communist Party (SACP) and the African National Congress (ANC). The act broadly defined communism, giving the apartheid government powers to ban and dismantle any organization that opposed apartheid. The intensifying repression caused anti-apartheid organizations, particularly the SACP and ANC, to transition to underground operations. Restrictive apartheid legislation, such as the Suppression of Communism Act (1950), had unintended consequences that ultimately strengthened women’s role in anti-apartheid movements. As the SACP and ANC shifted their resistance underground, women expanded their involvement, took on more leadership roles, and made significant contributions to anti-apartheid movements.

In the years leading to the 1948 elections, the National Party asserted its intent to protect a pure white race and reject equality. South Africa was already racially segregated; the National Party election win in 1948 moved to institutionalize apartheid, an official policy of racial separation cemented through legislation.¹ Party leaders enacted laws to solidify segregation, distinguishing between so-called “white” and “non-white” populations. The government under apartheid tried to limit or deny people it considered “non-white” access to voting, jobs, education, labor unions, housing, public facilities, meeting spaces, places of worship, and more.

In the Cold War era, the National Party capitalized on anti-communist sentiment as one strategy to target resistance leaders. The government passed the Suppression of Communism Act (1950), declaring the Communist Party of South Africa an unlawful organization. The act prohibited organizations associated with communism and certain publications.² The apartheid government intentionally put forth a broad definition of communism to blur the lines between communism, socialism, and liberalism as it targeted opposition. Opposition leaders faced an array of punishments, from banning orders to the seizure of property, detention without trial, torture, and imprisonment. Through this act, the apartheid government hoped to silence opposition and deter resistance. While the act initially accomplished its goal of spreading fear, it also inadvertently contributed to stronger resistance underground.

Though the Suppression of Communism Act applied to resisters of various political leanings, the main target was the Communist Party of South Africa (CPSA). With this act, the CPSA moved its resistance underground and adopted a new name, the South African Communist Party (SACP). As the SACP transitioned to an underground network, it developed new and innovative strategies to continue the

¹ Jens Meierhenrich, *The Legacies of Law: Long-Run Consequences of Legal Development in South Africa, 1652–2000* (Cambridge: Cambridge University Press, 2008), 101–103.

² Suppression of Communism Act, No. 44 of 1950, https://disa.ukzn.ac.za/sites/default/files/pdf_files/leg19500717.028.020.044.pdf.

movement. Some of these strategies included underground press releases, safe houses for meetings, and using the voices of women to spread their ideology. The ANC allied with the SACP, and the two organizations began a joint resistance.

Histories of the SACP and ANC often highlight the role of key male figures, including Moses Kotane, Joe Slovo, Yusuf Dadoo, and Oliver Tambo. While some studies credit women's contributions, these accounts usually emphasize women's supportive roles to men within the resistance. For example, a popular account of the SACP and its resistance to apartheid, *Ruth First and Joe Slovo in the War Against Apartheid*, details the history of the husband-and-wife pair Ruth First and Joe Slovo, who were key figures in the SACP's underground network. The account acknowledges First's significance to the anti-apartheid movement; however, it suggests she played a supportive role to her husband, Slovo.³ Such histories call for a deeper examination of the roles of South African women in apartheid resistance.

This project challenges dominant narratives of male-centric resistance in history. While the restrictive apartheid legislation aimed to dismantle anti-apartheid movements, this paper argues that the Suppression of Communism Act (1950) had unintended consequences in strengthening resistance movements and contributing to the rise of women's leadership in the SACP and ANC. Examining the underground movement and women's participation gives a view of resistance from below, amplifying the often untold and downplayed stories of women's involvement in resistance.

With the Suppression of Communism Act, women moved to the foreground of resistance. Before apartheid, male-dominated resistance organizations, such as the ANC and SACP, had played a central role in protesting inequalities. It was not until 1943 that women were allowed to join these organizations. Even then, their involvement was limited by their exclusion from leadership roles. In response to the banning of the SACP under the Suppression of Communism Act, anti-apartheid organizations partnered in resistance. In her memoir *My Spirit Is Not Banned*, Frances Baard discussed how women's roles evolved within the ANC and SACP coalition.⁴ As apartheid laws put more pressure on anti-apartheid movements, resistance organizations brought all hands on deck. Through the 1950s, women joined men. Baard stated, "During that time the husband would come to the house and tell his wife, 'I am going to jail now'. And then the wife says, 'well, I am going to jail too.'"⁵ The power and determination behind these actions showed how, due to broadly restrictive apartheid legislation, the fight against apartheid had to grow broadly as well. The growth of women's involvement also shifted women from a primarily domestic role to leading roles in anti-apartheid movements.

The rise of women's roles within resistance organizations also appeared through their continued distribution of banned publications. Women played significant roles in the production and distribution of underground publications, such as *Fighting Talk*, in defiance of the Suppression of Communism Act. *Fighting Talk* was in publication from 1950 to 1963 and focused on the suppressive legislation of the

³ Alan Wieder and Nadine Gordimer, *Ruth First and Joe Slovo in the War Against Apartheid* (New York: Monthly Review Press, 2013).

⁴ Frances Baard and Barbie Schreiner, *My Spirit Is Not Banned* (Harare: Zimbabwe Publishing House, 1986), 33–37.

⁵ Baard and Schreiner, *My Spirit Is Not Banned*, 41.

apartheid.⁶ Ruth First was a journalist and editor of *Fighting Talk* for nine years, and despite the risk, continued distributing it.⁷ The publication continued for thirteen years after the Suppression of Communism Act made the production and possession of it illegal.⁸ Women like First and other activists risked their lives to write, edit, and distribute this banned material. Though illegal, the publication continued through underground networks and served as a platform to circulate information and support across anti-apartheid organizations.

As women's role within resistance organizations continued to grow, women became more empowered to fight not only alongside men but to build their own movements. Women founded the Federation of South African Women (FEDSAW) in 1954 to bring more women into apartheid resistance and amplify women's voices.⁹ Frances Baard recalls how women were targets of both apartheid and gender inequality, and expressed that their resistance against apartheid would be stronger if all women worked together.¹⁰ Baard recounts how the inaugural FEDSAW conference highlighted gender inequality and oppression, recalling Lilian Ngoyi's observation that many more women wanted to join but their husbands would not allow them to attend.¹¹ The emergence of women's organizations was crucial, as women fighting alongside men against apartheid simultaneously faced gender-based oppression.

A Women's Charter was drafted by Hilda Watts-Bernstein to promote unity during the inaugural FEDSAW conference. FEDSAW adopted the Women's Charter and used it as an outline for the organization's aims and demands for equality in South Africa. The preamble of the charter begins with, "We, the women of South Africa, wives and mothers, working women and housewives, Africans, Indians, Europeans and Coloured, hereby declare."¹² Baard explained how the women at the conference agreed on the importance of an organized women's movement to further impact the fight against apartheid laws.¹³ In her memoir, Baard quoted from the actual conference invitation: "The battle for democracy and liberation can only be won when women, mothers of the nation—a half of the whole population—can take their rightful place as free and equal partners with men."¹⁴ This quote is further evidence of how restrictive apartheid laws had the unintended consequence of empowering and unifying women.

Women's activism continued to evolve, as seen with the Women's March of 1956. The march protested the newly passed pass laws that had been extended to women, bringing resistance from the underground to the forefront. Approximately 20,000 women marched to the Union Buildings in Pretoria. For the next half hour, the women stood outside in silence, with hands raised. Lilian Ngoyi then broke the silence by singing a song written specifically for the march, and the other women joined her.¹⁵ The song

⁶ Fighting Talk Committee, "Fighting Talk," 1950, <https://disa.ukzn.ac.za/fi>.

⁷ Ruth First, *117 Days* (London: Bloomsbury Publishing, 1965), 12.

⁸ Suppression of Communism Act, No. 44 of 1950, 2.

⁹ Sheila Meintjes, ed., "Federation of South African Women, Women's Charter," in *Women Writing Africa: The Southern Region*, vol. 1 (New York: Feminist Press at CUNY, 2003), 236.

¹⁰ Baard and Schreiner, *My Spirit Is Not Banned*, 44.

¹¹ Baard and Schreiner, *My Spirit Is Not Banned*, 45.

¹² Meintjes, "Federation of South African Women, Women's Charter," 236.

¹³ Baard and Schreiner, *My Spirit Is Not Banned*, 45–46.

¹⁴ Baard and Schreiner, *My Spirit Is Not Banned*, 43.

¹⁵ Baard and Schreiner, *My Spirit Is Not Banned*, 58–60.

Ngoyi began singing, ‘Wathint’ Abafazi, Wathint’ Imbokodo,’ translates to “you strike the women, you strike the rock.” Female musician Nothembi Mkhwebane wrote the song for the march to symbolize the courage and strength of women.¹⁶ The power behind these words, along with the image of thousands of silent women, embodies the spirit of women’s activism for freedom and equality.

As women’s involvement in resistance continued to grow, the apartheid government made more aggressive moves to dismantle anti-apartheid organizations. One significant move came in December 1956 with the arrest of 156 anti-apartheid leaders. The overuse and abuse of apartheid laws enabled arrests on charges of treason for allegedly planning to overthrow the government. Frances Baard was among the women arrested and described her experience: she and others were arrested at two in the morning, flown to Johannesburg, and held for a time without being informed of the charges against them.¹⁷ The initial arrests were in 1956, but trials did not begin until 1958, and defendants remained in detention throughout. By the end of the trial in 1961, charges against the majority of defendants had been withdrawn, and ultimately all defendants were found not guilty. While the trial demonstrated the abuse of apartheid legislation, it further strengthened the anti-apartheid movement. The aftermath of the Treason Trials brought about a new generation of activists against apartheid.

The 1960s demonstrated a significant shift in women’s involvement within armed resistance. Hilda Watts-Bernstein described in her memoir how resistance in the 1950s was nonviolent, but that the 1960s marked a turning point toward armed resistance.¹⁸ Armed resistance began when the apartheid government declared a state of emergency, banning the ANC and granting the government the power to arrest anyone.¹⁹ The continued use of legislation as a weapon against anti-apartheid organizations only deepened the resolve of those within them. The ANC and SACP formed an armed wing, Umkhonto we Sizwe, in 1961. Its manifesto calls people to action, declaring that Umkhonto we Sizwe “will be the striking force of the people for liberty, for rights and for their FINAL liberation!”²⁰ The manifesto captures the vision of a more powerful movement rising against oppression.

As women had gained significant empowerment over the preceding decade, they carried that empowerment into the armed wing, with many notable women—such as Winnie Mandela—taking on leadership roles. Throughout her involvement in the ANC’s armed wing as an outspoken revolutionary activist, Winnie Mandela was regularly under surveillance and imprisoned.²¹ Her own words speak to the strength and resilience of the often-underestimated role of women in resistance: “They honestly believed

¹⁶ South African History Archive, *You Have Touched the Women, You Have Struck a Rock!: National Women’s Day, August 9th, 1984*, https://www.saha.org.za/women/you_have_touched_the_women_you_have_struck_against_a_rock_national_womens_day_august_9th.htm.

¹⁷ Baard and Schreiner, *My Spirit Is Not Banned*, 63–64.

¹⁸ Hilda Bernstein, *For Their Triumphs and for Their Tears* (London: International Defence and Aid Fund, 1975), 84–85.

¹⁹ Bernstein, *For Their Triumphs and for Their Tears*, 70.

²⁰ Umkhonto we Sizwe, “Manifesto of Umkhonto we Sizwe,” ANC, December 16, 1961, <https://www.anc1912.org.za/manifesto-1961-manifesto-of-umkhonto-we-sizwe/>.

²¹ “She Who Struggles: Winnie Mandela – Breaking the Chains,” *Breaking the Chains Magazine*, n.d., <https://www.breakingthechainsmag.org/she-who-struggles-winnie-mandela/>.

that it was impossible for a Black woman to have this kind of stamina, to be this stubborn. Because they were meant to break us and they could not believe that anyone would resist them like that.”²² She and other women exemplified persistence and resilience through decades of peaceful and armed opposition. The shift from nonviolent to armed resistance was a significant turning point in the fight against apartheid.

The 1950s and 1960s were pivotal for women’s resistance. Women remained resilient and ready to continue the fight against apartheid regardless of the challenges they faced. Through unity and collective action, women amplified their voices in resistance. No longer confined to domestic or supportive roles, women evolved as powerful activists in the fight against apartheid. While their influence grew significantly during this period, these steps were just the beginning. This era marked the rise of women as central figures in resistance organizations, and the legacy of women’s resistance during this time demonstrates how resilience and determination strengthened the fight for equality.

The evidence presented in this research reveals the complex dynamics of apartheid South Africa, showing how restrictive legislation—particularly the Suppression of Communism Act of 1950—led to strengthened resistance movements and gave women space to step into leadership roles and become central figures in the fight against apartheid. With restrictions and punishments, organizations shifted their resistance underground, and women rose to participate and helped shape new strategies. Overall, this research offers a critical reexamination of traditional and dominant narratives of apartheid resistance in South Africa. By focusing on the Suppression of Communism Act (1950), it argues that women not only redefined their roles in resistance but also made significant contributions to the overall anti-apartheid movement.

²² “She Who Struggles: Winnie Mandela – Breaking the Chains.”

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Education, Race, and Partisanship in the Fair Counting of Votes

Sarah Ruuth

Abstract

The 2020 election was historic because of the political elite’s narrative of a stolen election. It is well known that Republicans’ trust in the fairness of the vote count was lower amid this new top-down narrative. Using survey data from the 2020 ANES, this study seeks to understand whether and how this new demographic of distrust influenced historic levels of trust across other demographics, specifically education and race. Controlling for partisanship, cross-tabulations were computed to examine the relationships between education and belief in vote-count fairness, and between race and belief in vote-count fairness. Both showed expected patterns, with higher levels of education associated with greater trust and White respondents showing less trust than racial minorities. An aggregation of all variables, including partisanship, showed that partisanship overwhelms expected trends, with highly educated Republicans exhibiting higher levels of distrust. Although White Republicans showed a high level of distrust, Hispanic Republicans surprisingly showed the highest level of distrust, surpassing the most trusting group, White Democrats, by a 44-percentage-point difference.

Introduction

Wednesday, January 6, 2021, was a day meant to represent the strength of democracy in the United States. With the elections over, votes counted, and a victory declared, it was time for the traditional joint session of Congress to certify the win for Joe Biden for the presidency of the United States. This succession of power is vital for the stability and legitimacy of democratic institutions. Unlike other elections, the 2020 results were challenged not by a grassroots movement but by the top of the political elite—President Donald Trump. The president’s rhetoric not only encouraged the mob that attacked the Capitol but also fostered the distrust that led to their actions. Instead of condemning the mob, Trump tweeted that these events occur when “a sacred election landslide victory is so unceremoniously & viciously stripped away from great patriots who have been badly & unfairly treated for so long” (Bennie G. Thompson et al., 2022). It is likely that, especially for those who stormed the Capitol on January 6, partisanship was the key factor in distrusting the 2020 vote count.

While partisan gaps in electoral confidence have generally been modest, 2020 marked a dramatic divergence, raising questions about other factors contributing to distrust. The next step is to determine what else influenced the belief that votes were not counted fairly. Although demographics like race and ethnicity have historically affected trust in government and education has played an ongoing role, it remains to be seen whether race and education shape beliefs about vote counting directly or primarily through partisanship. To explore this, a review of research on institutional trust, partisan messaging, and the roles of race and education provides the framework for this study.

Literature Review and Theoretical Framework

Trust in elections is at the core of democracy; without it, there is no trust in government institutions. In his article “Trust in Elections,” Stewart (2022) notes that trust can be broken down into trust in the election administration, the electoral process, and the government. When Americans are asked about their trust in elections, they mainly focus on the performance or technical processes involved in election

administration. This focus on the vote-counting process was evident in the January 6, 2021, storming of the Capitol. It was not distrust of the system's fairness but rather distrust of election officials' ability to count the votes correctly.

It was evident that Trump's rhetoric, both before and on January 6, played a significant role in this distrust. Still, Stewart (2022) also shows that partisanship on both sides accounted for the large gap in trust between Republicans and Democrats. A 44-percentage-point difference between Democratic and Republican trust in the 2020 election occurred not only because of the extremely low percentage of Republican trust (8%) but also because of the major increase in Democratic trust (52%, up from 29% in 2016). This gap is greater than in any other modern election.

This decline in trust among Republicans is shown to be triggered by party cues, regardless of personal traits, policy views, or voting experiences, as highlighted by Fitz and Saunders (2024) in their article "Distrusting the Process: Electoral Trust, Operational Ideology, and Nonvoting Political Participation in the 2020 American Electorate." Trust perceptions in the 2020 election were more influenced by partisan narratives, with Republicans showing lower trust and Democrats showing higher trust. For this reason, it is imperative to control for partisanship when seeking other contributing factors to voting distrust.

The findings in Fitz and Saunders' (2024) study simply confirm this necessity. Using the American National Election Study (ANES) data from the 2020 election, they demonstrated that lower levels of trust were associated with nonvoting political participation (NVP), such as protesting, boycotts, or campaign work. The influence of party identity was strong, especially with the top-down narrative that helped motivate the NVP on January 6. Levendusky et al. (2024) argued that those who believe the election was unfairly and inaccurately counted expect future elections to face similar issues, especially if their preferred candidate loses again. If Republicans were more likely than Democrats to distrust the 2020 vote count, this would naturally confound any effects of variables such as education and race. For example, any finding that "White voters distrust the election" or that "voters with only a high school education distrust the election" could be an artifact of those groups containing a high proportion of Republicans who distrust the election. Therefore, separating partisan loyalty from other variables will help identify which demographics might be more susceptible to the potent partisan narrative.

It is essential, then, to understand the demographics beyond party that contribute to this significant increase in distrust. Many demographic factors have been shown to influence distrust prior to the 2020 election, particularly education and race/ethnicity. Uribe et al. (2025) describe the historic trend of race in election trust in their article "The Racial Gap in Trust in Elections (and How to Close It)." They find a "significant and enduring gap over trust in elections along racial and ethnic lines" in a study spanning from 2012 to 2022. This gap is attributed to systemic discrimination, disenfranchisement, and structural barriers such as restrictive state voting laws. Uribe et al. argue that these barriers are real, rooted in years of unequal treatment, and do not stem from elite narratives and cues. Racial gaps in trust are entrenched in impediments to democratic access and are not driven by the win-or-lose outcomes of elections. This trend has remained stable over decades and does not suggest a quick or easy fix. That is why the shift in trust in elections during the 2020 election is of particular interest. Especially when viewing accounts of the January 6 event, it appears that White distrust spiked relative to that of racial minorities. If unusually strong distrust in the

2020 election were driven by partisan factors, as Stewart (2022), Fitz and Saunders (2024) claim, it would need to be tested to see whether race and ethnicity remain significant factors in distrust of elections. Truly, not all White Americans are Republican, and not all minority groups are Democrat, but the anomaly in this specific election raises the question of whether partisanship affected racial patterns or whether the historical trend of race and trust shifted independently of partisanship.

Beyond racial and ethnic trust, education is another powerful variable that shapes trust in institutions and in elections. Many studies have shown that education and politics are tightly intertwined, especially since education is a strong predictor of trust. Hakhverdian and Mayne (2012) examine this relationship, building on the foundational theory that education increases trust in government institutions. They theorize that trust is increased not only as education levels rise but also because education enhances a person's ability to evaluate governments. Although a consistent pattern exists whereby greater education leads to greater institutional trust, they emphasize that this pattern applies only in certain contexts. Because education improves evaluative skills, highly educated citizens are more likely to trust governments when they perceive them as worthy of trust. They argue that trust is formed through "a performance-based evaluation of political institutions" (Hakhverdian & Mayne, 2012, p. 743). It is therefore reasoned that corruption in government can be more accurately identified with higher levels of education. Trust is thus contingent on a government's level of corruption, with greater trust in less corrupt governments and less in more corrupt ones. Hakhverdian and Mayne conclude that the interaction between the level of education (the micro variable) and perceived corruption (the macro variable) determines the level of trust in government institutions.

How, then, does the variable of education influence trust in the 2020 election according to the findings of Hakhverdian and Mayne (2012)? Their study measured institutional trust broadly, but the theoretical framework could also be applied to institutions that directly oversee voting and vote counting. Given the elite narrative of a corrupt electoral institution, would highly educated citizens respond to partisan narratives more than at pre-2020 levels? The normal trends were disrupted by a new context in which highly educated political elites claimed corruption in vote counting, potentially affecting the trust levels of highly educated citizens who believed the rhetoric. It is therefore necessary to examine whether partisanship overrides the historical trend of higher education being associated with higher trust, by controlling for partisanship when testing the relationship between education and the belief that votes were counted fairly in the 2020 election.

This literature review advocates for a three-dimensional analysis of race, education, and the belief that votes are counted fairly. Examining these variables without the potent partisanship variable that so heavily impacted the 2020 election can help determine whether normative trends are shifting or if the political elite's rhetoric and accusations have temporarily distorted them. Exploring these dimensions sets the stage for the hypotheses evaluated in the subsequent section.

Hypothesis Explanation

Levendusky et al. (2024), Fitz and Saunders (2024) argue that the 2020 election centered around the "Big Lie" narrative, which appears to have overridden typical demographic patterns in trust in the vote

count. Consequently, partisanship becomes the primary factor to control for in the first two hypotheses of this study. Because partisan cues about election fraud influence perceptions, variables like education and race are likely to be affected, potentially reversing normative trends. Therefore, controlling for partisanship is essential to accurately assess the true effects of education and race.

H1: *Individuals with higher levels of education will be more likely to believe that votes are counted fairly.*

H2: *The level of non-belief in fair elections will be stronger in White Americans compared to minority racial groups in the 2020 election.*

H1 aims to establish a baseline expectation that aligns with widely accepted findings in political science: higher education leads to greater civic capacity. It is predicted that education will hold through the partisan narrative, maintaining directionally consistent effects on trust across educational levels. Despite the unusual partisan circumstances, the effect of higher education should remain, given its historically robust nature.

H2 anticipates the opposite of the usual trend, in which racial minorities tend to have lower institutional trust, including lower belief that votes are counted fairly. It is predicted that the partisan narrative, which White Republicans mainly embraced, overshadowed this trend, leading to higher distrust among White Americans and temporarily surpassing the typical trust gap seen with minority racial and ethnic groups.

The final hypothesis examines whether partisanship explains the effects found in H1 and H2 by removing it as a control from the model.

H3: *The effects observed in H1 and H2 will shift when partisanship is not controlled, with Republicans displaying less trust despite higher education and compared to racial minorities.*

Partisanship played such a dominant role in the 2020 election that its influence on racial and educational factors must also be recognized. It is predicted that White voters, who predominantly voted Republican in 2020, will be less likely to believe that votes were fairly counted compared to the historical trend among suppressed minority groups, because of the Republican political elite's narrative. H3 also considers higher education alongside the narrative of corruption in vote counting, leading to the prediction that highly educated Republican voters will trust the process less than Democratic and Independent voters.

Methodology

Data for this study were sourced from the 2020 American National Election Studies (ANES), which provides extensive survey data on American political attitudes (ANES, 2020). This survey is nationally representative, using a stratified probability sample. Interviews were conducted pre- and post-election via phone and the internet. This study focuses on post-election data to examine attitudes after vote counting was complete. Survey weights were used to ensure that findings were generalizable to the national adult population.

The question and responses used for the dependent variable were "How often are votes counted fairly," with response options of (1) All of the time, (2) Most of the time, (3) About half of the time, (4) Some of the time, and (5) Never. Independent variables include "R self-identified race/ethnicity," with

responses of (1) White, non-Hispanic, (2) Black, non-Hispanic, (3) Hispanic, (4) Asian or Native Hawaiian/other Pacific Islander, non-Hispanic alone, (5) Native American/Alaska Native or other race, non-Hispanic alone, and (6) Multiple races, non-Hispanic; and “Respondent 5 Category level of education,” with responses of (1) Less than high school credential, (2) High school credential, (3) Some post-high school, no bachelor’s degree, (4) Bachelor’s degree, and (5) Graduate degree. The control variable question is “Does R think of self as Democrat, Republican, or Independent,” with the same response options (ANES, 2020).

Using these variables, cross-tabulations were employed to examine the relationships between education and beliefs about how often votes are counted fairly, as well as between race/ethnicity and these beliefs. After listwise deletion for missing data, the education \times vote-count-fairness analysis included $N = 7,221.1$ (weighted) respondents, and the race/ethnicity \times vote-count-fairness analysis included $N = 7,281.1$ (weighted) respondents (ANES, 2020). The weight adjusts the sample size to represent the population, which is why it is presented as a fractional value.

H1 was tested through a cross-tabulation of education and vote-count fairness. H2 was tested similarly, using the race/ethnicity variable. The cross-tabulation tables helped analyze the percentage differences between variables. A chi-square test was then conducted to determine whether these differences were due to chance and to evaluate whether the results in the cross-tabulations were statistically significant. H3 used conditional tables that filtered data by partisanship to compare with the H1 and H2 results.

Key weaknesses in this study’s design include the inability of cross-sectional survey data to establish causality. Because cross-tabulation is used, endogeneity can also unknowingly skew results. Lastly, self-reported data through the ANES will naturally be subject to social desirability bias; that is, responses may be biased as respondents aim to answer in the most socially acceptable manner.

Results

Prior to testing the hypotheses, the dependent variable was assessed across all respondents, showing that 71.4% reported feeling votes were counted fairly most or all of the time, while 19.1% felt votes were counted fairly some of the time or never. Additionally, 9.4% believed votes were counted fairly about half the time (ANES, 2020).

A bivariate analysis was conducted to test H1. Table 1 presents the relationship between education and belief in vote-count fairness (ANES, 2020).

Table 1
Education Level and Trust in Vote Counting

		Statistics for all valid cases					
		V202219					
Cells contain: -Row percent -Z-statistic -Weighted N		1	2	3	4	5	ROW TOTAL
		1. All of the time	2. Most of the time	3. About half of the time	4. Some of the time	5. Never	
V201549x	1: 1. White, non-Hispanic	25.1 -4.52 1,203.8	42.2 2.52 2,021.8	10.5 -.82 505.4	15.1 2.43 724.9	7.1 .64 339.9	100.0 --- 4,795.8
	2: 2. Black, non-Hispanic	32.1 3.62 259.7	42.2 .67 341.4	9.3 -1.45 74.9	10.1 -3.68 81.8	6.3 -.76 51.0	100.0 --- 808.8
	3: 3. Hispanic	30.8 3.02 295.8	34.9 -4.21 335.0	13.3 2.78 128.1	13.3 -1.02 127.9	7.6 .90 73.3	100.0 --- 960.2
	4: 4. Asian or Native Hawaiian/other Pacific Islander, non-Hispanic alone	29.3 1.00 84.7	46.8 2.01 135.1	6.7 -2.24 19.5	13.9 -.22 40.2	3.2 -2.59 9.1	100.0 --- 288.5
	5: 5. Native American/Alaska Native or other race, non-Hispanic alone	20.6 -1.71 30.0	44.1 .74 64.3	14.4 1.45 21.1	13.1 -.43 19.2	7.7 .37 11.3	100.0 --- 145.8
	6: 6. Multiple races, non-Hispanic	27.2 .14 76.6	34.0 -2.48 95.9	12.1 .73 34.0	19.2 2.35 54.2	7.6 .42 21.4	100.0 --- 282.0
	COL TOTAL	26.8 --- 1,950.5	41.1 --- 2,993.4	10.8 --- 783.0	14.4 --- 1,048.1	7.0 --- 506.0	100.0 --- 7,281.1
Means		1.82	1.72	1.82	1.77	1.74	1.77
Std Devs		1.30	1.26	1.35	1.38	1.30	1.30
Unweighted N		2,101	3,111	686	962	431	7,291

Color coding:	<-2.0	<-1.0	<0.0	>0.0	>1.0	>2.0	Z
N in each cell:	Smaller than expected			Larger than expected			

Note. Table reproduced from the ANES 2020 SDA online analysis tool (ANES, 2020)

Those with less than a high school credential believed the votes were counted fairly only some of the time or never, at 31.6%; those with a high school degree but no college degree, at 23.7%; and those with a graduate degree, at 10.4%. The relationship between the two variables was highly statistically significant ($\chi^2 = 376.93, p < 0.001$).

A bivariate analysis was also conducted to test H2. Table 2 (ANES, 2020) presents the relationship between race and belief in the fairness of vote counts.

Table 2

Race/Ethnicity and Trust in Vote Counting

Statistics for all valid cases							
Cells contain: -Row percent -Z-statistic -Weighted N		V202219					ROW TOTAL
		1 1. All of the time	2 2. Most of the time	3 3. About half of the time	4 4. Some of the time	5 5. Never	
V201549x	1: 1. White, non-Hispanic	25.1 -4.52 1,203.8	42.2 2.52 2,021.8	10.5 -.82 505.4	15.1 2.43 724.9	7.1 .64 339.9	100.0 --- 4,795.8
	2: 2. Black, non-Hispanic	32.1 3.62 259.7	42.2 .67 341.4	9.3 -1.45 74.9	10.1 -3.68 81.8	6.3 -.76 51.0	100.0 --- 808.8
	3: 3. Hispanic	30.8 3.02 295.8	34.9 -4.21 335.0	13.3 2.78 128.1	13.3 -1.02 127.9	7.6 .90 73.3	100.0 --- 960.2
	4: 4. Asian or Native Hawaiian/other Pacific Islander, non-Hispanic alone	29.3 1.00 84.7	46.8 2.01 135.1	6.7 -2.24 19.5	13.9 -.22 40.2	3.2 -2.59 9.1	100.0 --- 288.5
	5: 5. Native American/Alaska Native or other race, non-Hispanic alone	20.6 -1.71 30.0	44.1 .74 64.3	14.4 1.45 21.1	13.1 -.43 19.2	7.7 .37 11.3	100.0 --- 145.8
	6: 6. Multiple races, non-Hispanic	27.2 .14 76.6	34.0 -2.48 95.9	12.1 .73 34.0	19.2 2.35 54.2	7.6 .42 21.4	100.0 --- 282.0
	COL TOTAL	26.8 --- 1,950.5	41.1 --- 2,993.4	10.8 --- 783.0	14.4 --- 1,048.1	7.0 --- 506.0	100.0 --- 7,281.1
Means		1.82	1.72	1.82	1.77	1.74	1.77
Std Devs		1.30	1.26	1.35	1.38	1.30	1.30
Unweighted N		2,101	3,111	686	962	431	7,291

Color coding:	<-2.0	<-1.0	<0.0	>0.0	>1.0	>2.0	Z
N in each cell:	Smaller than expected			Larger than expected			

Note. Table reproduced from the ANES 2020 SDA online analysis tool (ANES, 2020)

White, non-Hispanic respondents believed votes were counted fairly only some of the time or never at 22.2%; Black, non-Hispanic respondents, at 16.4%; and Hispanic respondents, at 20.9%. The analysis of these results focuses on these three main racial/ethnic groups. The relationship between the two variables was statistically significant ($\chi^2 = 78.47, p = .03$).

H3 was analyzed by aggregating distrust percentages across education and race/ethnicity by partisanship. Table 3 presents the relationships among the independent variables, partisanship, and the belief that votes were counted fairly.

Table 3

Aggregated Distrust Rate (Categories 4 & 5) by Partisan-Demographic Subgroup

Subgroup	Republican Distrust Rate	Democrat Distrust Rate	Independent Distrust Rate
Race/Ethnicity			
White, non-Hispanic	34.7%	5.7%	18.7%
Black, non-Hispanic	30.7%	12.3%	21.6%
Hispanic	49.7%	9.6%	15.4%
Education Level			
Less than high school	43.3%	23.9%	24.5%
Some post-high school	36.8%	9.3%	21.2%
Graduate degree	24.7%	1.8%	11.4%

Note. Distrust Rate is the aggregation of responses "Some of the time" and "Never" for V202219 (Trust in Vote Counting).

The conditional analysis shows that when partisanship is taken into account, the relationship between the dependent variable and the two independent variables changes significantly. The findings in Table 1 indicated that respondents with a graduate degree believed that votes were counted fairly some of the time or never at 10.4%, but Republicans with graduate degrees believed this at 24.7%. Simultaneously, Democrats with graduate degrees believed this at only 1.8%. The findings for race and ethnicity were substantially higher for Republican respondents, with Hispanic Republicans distrusting at 49.7%. There is a 44-percentage-point difference between the most distrustful group, Hispanic Republicans, and the most trusting group, White Democrats. These disparities highlight the importance of understanding the underlying factors influencing trust, which will be explored in the discussion below.

Discussion of Results

This study aimed to determine whether race/ethnicity and education could influence beliefs about the fairness of vote counting after the 2020 election and to explore how partisanship affects these factors. Partisan rhetoric appeared to have greater explanatory power than education and race for public trust in the 2020 election. The cross-tabulations and combined analysis show interesting correlations between these variables and partisanship.

H1, which predicted that individuals with higher levels of education will be more likely to believe that votes are counted fairly, was strongly supported by the bivariate analysis. H2 was also confirmed: the level of non-belief in fair elections was stronger in White Americans compared to minority racial groups in

the 2020 election. H3 was partially confirmed, with Republican graduate-degree respondents showing higher levels of distrust than when partisanship was controlled for. Partisanship overwhelmed both subgroups, showing that Republicans, regardless of demographic, were the most distrustful. However, the specific expectation that White Republicans would show higher distrust than racial minorities was partially contradicted by the data. White Republicans were found to be highly distrustful, but their rates fell short in comparison to Hispanic Republicans at 49.7% (Table 3). This revealed that the top-down partisan narrative may have gained substantial traction among a key minority group.

When comparing trust levels within a demographic group—such as trust in the fair counting of votes between White and Black individuals, or between those with less than a high school credential and those with a graduate degree—the differences are modest. For example, in Table 1, the aggregated results for “Some of the time” and “Never” remained within approximately a 20-percentage-point range across all five levels of education. When partisanship is introduced into both of these demographics, the gaps between partisan groups are significantly larger than the level differences alone. This is especially evident between Republican and Democratic respondents at the same level of education, such as the “Some post-high school” level, at 36.8% for Republicans and 9.3% for Democrats. This significant difference was driven by the overriding influence of partisanship relative to the differences observed across demographic categories. Partisanship restructures the relationship between these demographics and trust by introducing greater within-group variation than between-group variation.

Hakhverdian and Mayne’s (2012) theory that perceived corruption could reverse traditional patterns of trust in governmental institutions among the highly educated may well apply here. Republicans with higher education may have internalized the narrative of a corrupt vote-counting system, resulting in stronger distrust. Not only did partisanship eclipse traditional racial trends, but the data revealed a notable discrepancy: the highest aggregate distrust rate was found among Hispanic Republicans, reaching nearly 50%, suggesting a potential unique vulnerability to elite messaging within this subgroup.

Conclusions

The 2020 election proved to be historic, with widespread belief that votes were being miscounted. The top-down narrative from the President of the United States may have laid the foundation for the temporary reversal of established demographic trends. This study shows that individuals’ levels of trust can be strongly associated with partisan ideologies and the political environment. Partisanship in the 2020 election is the predominant predictor of distrust, while education and race were secondary explanatory variables. The study also found that higher education can work against a group when partisanship is introduced.

Democracy is vulnerable when a single partisan group can shape public trust in democratic institutions. The narrative that the election was “stolen” shook the foundations of democracy, as seen in the January 6 event. Future studies can further explore this vulnerability by using methods that establish causality rather than mere correlation. Did the top-down narrative cause distrust, or did preexisting distrust make citizens more susceptible to the rhetoric? Future studies could also explore the role of media use in determining whether partisan media override normative education and racial patterns.

The legitimacy of government institutions in the United States is validated only if political elites continue to have confidence in them. Elite narratives have proven more potent than initially thought, and it is the responsibility of American politicians to deploy them ethically. The consequence of one party holding the power to declare when and where to trust is the fracturing of the very foundation of democracy.

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