2022 Spring Honors Capstone Projects

Honors College

5-1-2022

THE SCIENCE BEHIND STUTTERING: REDUCING STIGMA AND PUBLIC MISCONCEPTIONS

Christine Hekmat Abasi

Recommended Citation

Abasi, Christine Hekmat, "THE SCIENCE BEHIND STUTTERING: REDUCING STIGMA AND PUBLIC MISCONCEPTIONS" (2022). *2022 Spring Honors Capstone Projects*. 56.
https://mavmatrix.uta.edu/honors_spring2022/56

THE SCIENCE BEHIND STUTTERING: REDUCING STIGMA AND PUBLIC MISCONCEPTIONS

by

CHRISTINE H. ABASI

Presented to the Faculty of the Honors College of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

HONORS BACHELOR OF ARTS IN COMMUNICATION STUDIES

THE UNIVERSITY OF TEXAS AT ARLINGTON
May 2022

ACKNOWLEDGMENTS

This study was achieved with the never-ending support and care of an incredible system of people. I want to express my most profound appreciation to my faculty advisor, Dr. Molly Anne Wiant Cummins, who was instrumental in the growth and development of this study. This study would not exist without Dr. Cummins's support, encouragement, advice, and mentorship. I am grateful to Dr. Grace Brannon for her support and guidance throughout this study, who provided resources and tools to aid the development of this paper. Thank you to Professor Damla Ricks M.A., for introducing me to the field of communication to grow my passion for research in communication. I want to extend my sincere thanks to the Department of Communication faculty, who offered support and feedback in the groundwork for my honors degree: Dr. Molly Cummins, Dr. Grace Brannon, Dr. Brian Horton, Damla Ricks M.A., and Dr. Andrew Clark.

I want to state my deepest and inexpressible appreciation and admiration for my family and friends who supported me in my work and research. Many thanks to my mom, dad, brother, and sister, who have encouraged me mentally, physically, emotionally, and financially throughout my academic career. I would not be where or who I am without your constant faith in me, patience, and love through difficult times and frustrations. Special thanks to my speech therapist, Ashley Montana, who dedicated five years and countless hours of support and learning despite my initial unwillingness. You began my education on stuttering and encouraged me to grow in our sessions every step of the way. I also want to thank my former bosses, current mentors, and UTA family, Latoya Oduniyi and Alexis

Perez, for their continual encouragement and pushing me to grow and expand my comfort zone. Both of you are some of my biggest supporters throughout my time at UTA, and I am forever grateful for your mentorship and friendship. Finally, I would like to thank the UTA Honors College for giving me a platform to share my research with the world and have a chance to change the community. Being a member of Honors College has raised the standards of my work, and I will always look back on it with pride.

April 22, 2022

ABSTRACT

THE SCIENCE BEHIND STUTTERING: REDUCING STIGMA AND PUBLIC MISCONCEPTIONS

Christine H. Abasi, B.A. Interpersonal Communication Studies

The University of Texas at Arlington, 2022

Faculty Mentor: Molly Wiant Cummins

Persistent Developmental Stuttering (PDS) affects about 1% of the world's adult population across all cultures and social classes (Buchel & Sommer, 2004). Stigma, especially around stuttering, can be perpetrated in many ways. There has been and continues to be a strong connection between stuttering in mainstream media and negative characteristics such as lack of intelligence, nervousness, or lack of social skills. This study investigates the source of negative social stigma and possible methods to reduce negative stigma. Participants joined in an empirically-based survey meant to analyze thoughts and beliefs on stuttering and the origin of those beliefs. The results are analyzed using a paired T-test to determine if interpersonal contact and education effectively reduce stigma regarding stuttering. Determining an effective way to reduce the negative stigma around stuttering can be used in other areas of healthcare and increase the quality of life for people who stutter by decreasing adverse effects such as higher anxiety, depression, and lower self-esteem.

TABLE OF CONTENTS

Chapters

Appendix

LIST OF ILLUSTRATIONS

Figure Page

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Definition

Stuttering is a speech disorder characterized by word or syllable repetitions or prolongations and silent interruptions in the flow of speech known as blocks (American Psychiatric Association, 2013). M.E. Wingate coined the earliest found definition in 1964. Persistent Developmental Stuttering (PDS) affects about 1% of the world's adult population across all cultures and social classes, and approximately 80% of those who stutter recover in childhood (Buchel & Sommer, 2004). The recovery rate is much higher in females than in males, resulting in three to four males who stutter to every female (Buchel & Sommer, 2004). Stuttering can impair communication and impact people's socioeconomic status who stutter (Andrews et al., 1983). However, that is not what always happens; there are some strong possibilities despite not knowing a definite cause of stuttering. Genetics, neurology, and lack of motor control support the possible causes of stuttering.

1.2 Possible Causes of Stuttering

1.2.1 Genetic Causes

A hereditary component suggests a correlation between affected family members (Andrews et al., 1982). A study conducted by Andrews and colleagues in 1982 discovered an 18% likelihood of stuttering between same-sex siblings, 30% for dizygotic (fraternal) twins, and 70% for monozygotic (identical) twins. People who do not stutter varied among people who stutter, showing stutterers with lower intelligence scores on verbal and nonverbal tasks on average and delayed speech development (Andrews et al., 1982). However, these results need to be carefully considered since people who stutter have a disadvantage in education systems (e.g., reduced or negative interactions with teachers and/or peers; Andrews et al., 1982).

Stuttering has recently been hypothesized to be affected by a slight genetic mutation. The importance of the following specified genes is yet undiscovered Riaz and colleagues (2005) show a significant correlation between mutations and PDS. The first genetic mutation to play a causal role in stuttering was found on chromosome 12q in a sample of 44 different families containing people who stutter, showing a genetic relationship (Riaz et al., 2005). The same mutation was not found in 96 non-stuttering Pakistani families or the foundation for any other genetic disease at this discovery (Kang et al., 2010); however, it was found only in the members of those 44 Pakistani families with identified PDS. Since then, more gene loci have been identified with highly significant linkages to stuttering, such as 2, 3p, 3q, 10, 14, and 16 (Freigerio-Domingues & Drayna, 2017). The cause of these linkages is yet undiscovered, but previous twin studies have implied that it may not be entirely heredity (Freigerio-Domingues & Drayna, 2017).

Genetic evidence supports the theory that stuttering is not the fault of any child or parent but rather another medical condition. This research shows that stuttering is a legitimate, involuntary issue that requires support and treatment. The discovery of a genetic root can lead to further insights into effective stuttering treatment since it gives a more profound understanding of the cause.

1.2.2 Neurological Causes

Alongside possible genetic causes, past research shows neurological connections to stuttering. Further studies have shown neurological differences between people who stutter and people who do not stutter. In people who do not stutter, the left-brain hemisphere is more active during speech and language tasks; however, EGG studies suggest people who stutter have an abnormal right hemispheric dominance (Moore & Hanes, 1980). This discovery was later reinforced by Braun et al. (1997). Activity in the left hemisphere was more active in stuttered speech, while right hemisphere activation was present in fluent speech. These results suggest that speech disfluency was primarily in the left hemisphere, and the hyperactivity of the right hemisphere was a compensatory response rather than a cause.

These studies indicate that a problem of timing in speech production exists between the left frontal cortex and the left central cortex. The study was conducted under the assumption that hyperactivity was the cause of stuttering. A newfound compensation effect opens the door for future research to evaluate what causes this compensatory response and why these changes occur in the brain. In 2008, Watkins et al. discovered an overactivity in the midbrain, abnormal function in the basal ganglia, and excessive amounts of dopamine in people who stutter. These brain structures and neurotransmitters are responsible for muscle and motor control, implying that stuttering is partly caused by excessive muscle contractions (Delong & Wichmann, 2009; Lindvall et al., 1990). There was also underactivity in motor areas of the brain associated with articulation and speech production (Watkins et al., 2008).

Further investigation showed reduced integrity of white brain matter in the underactive motor cortex of people who stutter (Watkins et al., 2008). White matter is responsible for communication between different brain structures, implying that the brains of people who stutter have a more challenging time processing and articulating speech (Cees De Groot et al., 2000). Watkins and colleagues (2008) support the conclusion that stuttering is related to the disruption and underactivity of motor activity needed for fluent speech production.

More recent studies conducted using fMRI have shown decreased blood flow to the brain during stuttering (Desi et al., 2017). Regional cerebral blood flow (rCBF) was measured in Broca's area and inversely related to stuttering severity (Desi et al., 2017). The reduced rCBF in people who stutter shows an inverse correlation and suggests that the stuttering severity is partly dependent on rCBF levels in Broca's region (Desi et al., 2017). However, there are some limitations to task-based fMRI studies. Primarily, participants may differ in response to each task and may use different strategies to perform the task. The differences in response may lead to regional activation with little or no relevance to the task or study itself (Desi et al., 2017).

The neurological causes of stuttering are not limited to one particular area and cannot fully explain the cause of stuttering. It combines activity levels and communication between various brain structures, the production level of neurotransmitters, and blood flow throughout the brain. Even though the research states many different causes, it does not invalidate previously found research but can instead support it.

1.2.3 Motor Control Causes

Speech comprises motor control and various movements coinciding to get the desired sound (The physiological, n.d.). The vocal tract consists of the trachea (windpipe) to the mouth and nose, while lips, tongue, and teeth are all individual organs used in speech production (The physiological, n.d.). The vocal cords are tense as air passes through, which causes vibrations, also known as the voice; the vibrations will be more or less frequent based on the vocal cords' tightness (The physiological, n.d.). Frequent places of articulation are between the back of the tongue to the soft palate and the tip of the tongue to the back of the teeth (The physiological, n.d.).

In 2007, Visscher et al. conducted a study with 125 children with speech and language disorders to test their motor development for differences. On the Movement Assessment Battery for Children, those with speech and language disorders performed worse than those without; about 51% of children with a speech or language disorder displayed motor problems (Visscher et al., 2007). Results of this study show when speech production is affected, motor control problems are more evident in the client. This supports the need to give early support to help children who show signs of speech disorders, such as stuttering, and educate children and families on proper techniques to best handle stuttering. Having a speech disorder affects more than just the ability to communicate and muscle and motor control.

A later study showed that children with a language impairment showed decreased gross and fine motor skills and increased articulatory variability to monitor speech production errors (DiDonato et al., 2014). The study showed that children with a language impairment had significantly lower motor scores than their peers and demonstrated language and motor discrepancies (DiDonato et al., 2014).

Stuttering is more than needing to breathe and talk slowly but is partly due to involuntary muscle contractions. As seen with neurological causes, stuttering is more than taking time to speak; it can also be a mechanical issue of having difficulty controlling muscle movements. Motor control, combined with neurological and genetic causes, explains the possible reasons why people stutter. One cause alone is not enough to justify the source of stuttering, but each area offers insight into a fuller understanding of the causes of stuttering.

Despite not knowing the cause of stuttering, treatment and therapy can still be helpful to those who stutter. Stuttering therapy means changing behaviors and attitudes primarily for the people who stutter and, hopefully, those in their lives. Therapies can assist in many ways, such as reducing disfluency, increasing knowledge about stuttering, learning more effective communication skills, and decreasing stress and anxiety alongside stuttering.

CHAPTER 2

STUTTERING STIGMA IN MEDIA

2.1 Defining Stigma

Stigma is a broad topic that can often be difficult to define. However, the American Psychological Association (2021) defines stigma as “the negative social attitude attached to a characteristic of an individual that may be regarded as a mental, physical, or social deficiency. A stigma implies social disapproval and can lead unfairly to discrimination against and exclusion of the individual.” Hatzenbuehler, Phelen, & Link (2013) describe stigma as "the co-occurrence of labeling, stereotyping, separation, status loss, and discrimination in a context in which power is exercised."

2.2 Differences of Stigma Across Cultures

People who stutter face stigma worldwide. Reducing stigma can be challenging when its root cause can vary between countries, cultures, and people groups. Ustun-Yavuz, Warmington, Gerlach, and St. Louis (2021) conducted a study to test attitudes between different cultures, primarily Arab, British, and Chinese. The four primary differences were the cause of stuttering, how to help people, sympathy towards those who stutter, and the stereotype that those who stutter are nervous and excitable (Ustun-Yavuz, 2021).

Regarding the cause of stuttering, all three cultures attribute it to genetics. However, Chinese participants tend to attribute stuttering to emotional trauma and a virus or disease more than other cultures. British participants tend to reject emotional trauma as the cause of stuttering more than the different cultures observed. Arab participants tend to attribute stuttering as an Act of God and part of a larger plan set in place by God (Ustun-Yavuz, 2021).

The way to help people who stutter was also seen differently among cultures. Chinese participants are the most likely to think they should help by filling in words and telling people who stutter to slow down or relax. Even though the reason for the response is unknown, Chinese participants may be pulling from past experiences of their disfluency where they felt nervous or uncomfortable. Arab and British participants did not differ significantly from each other and did not believe they should help people who stutter by filling in words or telling them to slow down. (Ustun-Yavuz, 2021).

Chinese participants were most likely to report stereotypical beliefs concerning sympathy and concern towards people who stutter. All three groups would be concerned if they stuttered; however, Chinese participants reported they would be concerned significantly more than the British participants. On the other hand, all three groups reported little to no concern if their doctors, neighbors, or siblings stuttered. However, Chinese and Arab participants were most likely to feel concerned if one of the members above stuttered, and British participants were the least likely to feel concerned (Ustun-Yavuz, 2021).

Finally, Arab participants were most likely to agree that people who stutter were nervous and easily excitable, while British participants were least likely to believe in the stereotype. The belief was present in the British participants but significantly less so in Arab and Chinese participants (Ustun-Yavuz, 2021).

Despite their differences, there are some similarities. All three cultures tend to believe: people who stutter are shy and fearful; they would not want to stutter themselves;

they did not know anyone who stuttered; and most of their knowledge came from television, radio, or the internet, where unreliable sources can be easily accessed (Ustun-Yavuz, 2021). Noting these similarities is essential because it shows that some beliefs reach across all cultures and need to be addressed first and foremost.

Ustun-Yavuz et al. (2021) does help shape the way we can reduce the stigma regarding stuttering. The study limitations should be taken into consideration. The study noted that the current geographical location did not significantly impact attitudes about stuttering. Anti-stigma campaigns need to consider the people's culture instead of only the host culture (geographical location) (Ustun-Yavuz, 2021). Stigma is not localized to one area but can be seen worldwide.

2.3 Effects of Negative Stigma Around People Who Stutter

2.3.1 Social Effects

People who stutter are often met with adverse reactions and feelings from the public (St. Louis, 2012). They are stereotyped as having negative personality traits (St. Louis, 2012) and turned away from jobs that require speaking or customer interaction (Gabel et al., 2004; Boyle, 2017). Living in these environments can cause adverse effects on their mental and emotional well-being since they tend to become highly aware of these attitudes. (Boyle, 2013). Internalization of negative attitudes and beliefs about people who stutter has been shown to cause higher anxiety, depression, lower self-esteem, and lower quality of life (Boyle, 2015).

A study conducted by Boyle in 2017 described some of the most common attitudes towards people who stutter and how they are primarily negative. Some participants believed that people who stutter are treated differently because they are different from others (Boyle, 2017). People who stutter are often thought of negatively regarding capabilities (e.g., unintelligent), often face adverse emotional reactions when speaking (e.g., impatience, irritation, discomfort), and have negative behaviors displayed towards them (e.g., mocked, ignored, avoided, treated disrespectfully) (Boyle, 2017).

2.3.2 Health Effects

Alongside adverse social effects, health issues arise with negative stigma towards people who stutter. The research above shows how people who stutter are aware of the stigma and internalize those negative feelings. Boyle and Fearon (2018) showed that stigma is positively related to stress and negatively related to physical health and health care satisfaction. The more internalization occurred, the more the risk of anxiety increased. Physical health declined to cause headaches, difficulty sleeping, and gastrointestinal problems (Boyle & Fearon, 2018). As awareness of stuttering and stigma increased, people who stutter were less likely to seek out healthcare and support when these issues occurred, causing a further decline in health (Boyle & Fearon, 2018).

However, this study did not consider digital communication between health providers and patients, such as email or virtual patient portals (Boyle & Fearon, 2018). Having another outlet of communication besides verbal communication could increase patient comfortability and satisfaction when seeking healthcare. There are minimal accommodations around stuttering. It recently became a partially protected disability under the Americans with Disabilities Act in 2009 on a case-by-case basis (Weiner & Tetnowski, 2016)

CHAPTER 3

BACKGROUND LITERATURE

3.1 Reducing Stigma Around Stuttering

Corrigan and Kosyluk (2013) listed three primary stigma-reduction approaches for those with a mental illness. While a speech disorder, like stuttering, varies from a mental illness, both face stigmatization and disadvantages. The first method is interpersonal contact with the individual who stutters or has any stigmatized disorder (Corrigan et al., 2013). The individual(s) share their own stories and experiences living with this condition. This strategy is an exceedingly popular and primary effort to reduce stigma and begin a change in society (Corrigan et al., 2013). It relies heavily on sharing personal information by the individual, a willingness to listen, and an eventual change by the audience.

A second strategy is an educational approach. Education separates myths from facts to present research on a particular condition (Corrigan & Kosyluk, 2013). Like The Stuttering Foundation, some groups are a great example of this by distributing materials to educate friends and family and those who stutter. The Stuttering Foundation has a page of myths versus facts about stuttering that cover intelligence, causes behind stuttering, and stuttering treatments (The Stuttering Foundation: Five Myths About Stuttering, 2020).

The final approach listed is the protest method (Corrigan & Kosyluk, 2013). The protest method offers a chance to speak out about the unfair treatment of individuals with the condition and give a voice to the people who may otherwise be overlooked (Corrigan & Kosyluk, 2013). The Stuttering Foundation (SNL Skit, 2012) issued a press release against the show *Saturday Night Live* after they released a sketch making a joke of stuttering, claiming, "…[T]hey chose to overlook the pain felt by many who stutter and their families for just a cheap laugh... Not funny SNL. Not funny at all."

Corrigan et al. (2012) analyzed 72 articles focusing on the protest method. They categorized the areas of study in attitudes (stereotypes), affects (emotional responses), and behavioral intentions (avoidance). They gathered results from over 38,000 participants across 14 countries. They showed education and contact combined improved attitudes, affects, and behavioral intentions toward individuals with a stigmatized condition (Corrigan et al., 2012). Education showed a more significant effect on adolescents, whereas contact was more effective on adults (Corrigan et al., 2012). Interpersonal contact led to a more substantial change in attitudes where education was more impactful for effect and behavioral intentions (Corrigan et al., 2012). The average response for protests was not significant enough from zero and had less support for this strategy's effectiveness (Corrigan et al., 2012). This study was later supported by Boyle, Dioguardi, and Pate (2016). There is minimal research regarding stuttering and stigma. As of 2016, there have only been six peer-reviewed journal articles focusing solely on changing negative attitudes and misconceptions around stuttering (Boyle, Dioguardi, and Pate, 2016).

Flynn and St. Louis (2011) evaluated high-school students' opinions toward people who stutter before and after watching a presentation by a person who stutters. The study implies that interpersonal contact with a person who stutters telling their story can be a potentially successful way to reduce the stigma associated with stuttering.

Abdalla and St. Louis (2014) also saw positive attitude changes after showing pre-service trainees an educational video discussing educational and emotional aspects of stuttering. Langevin and Prasad (2012) applied a pretest-posttest to study changes in school-age children's attitudes about stuttering after using an educational curriculum and bullying prevention program. The program caused significantly better attitudes towards people who stutter and decreased bullying.

CHAPTER 4

METHODOLOGY

Participants were recruited across multiple university departments. Each participant received the same treatment by engaging with a 34-question pre-test survey to analyze their initial thoughts regarding the cause, treatment, and reactions to a person who stutters. Participants then watched a 10-minute video produced by CBS in 2011 titled *Finding their voices – Understanding Stuttering,* which explains what stuttering is and acknowledges some of the most common stuttering misconceptions. Participants finished the project by completing a post-test, 12-question survey to analyze how education and interpersonal stories changed their views on stuttering and people who stutter.

4.1 Participant Demographics

Participants were recruited from the University of Texas at Arlington. Thirty-five participants completed the POSHA-S pre-test survey, and twenty-five completed the POSHA-S post-test survey. The final analysis and results are dependent on the twenty-five participants who completed the survey thoroughly. Participants were recruited through various professors to distribute among university courses across the university. Some students were offered an extra-credit incentive upon the completion of the survey. The gender balance of participants was highly skewed and not fully representative of the university average (N: 25; Male: 6; Female: 18; Non-listed gender: 1). The participants ranged from ages 19-to 60 years old; most participants were between 19-and 22 years. See Table 4.1 for further demographic information.

Table 4.1: Demographics of participants who completed POSHA-S pre-test and post-test survey

		Total 25
Gender		
	Male	24%
	Female	72%
	Non-listed gender	4%
Age		
	19-22	56%
	23-38	28%
	39+	16%
Nationality		
	United States	88%
	Turkey	4%
	China	4%
	Mexico	4%
Academic Status		
	Freshman (0-30 credits)	31%
	Sophomore (31-60 credits)	17%
	Junior (61-90 credits)	4%
	Senior (91+ credits)	24%
	Faculty or Staff	24%

4.2 Materials

4.2.1 CBS – Finding their voices: Understanding stuttering

In 2011, CBS News broadcasted a report to discuss the truth about stuttering.

> In this report originally broadcast on "Sunday Morning" on January 30, 2011, correspondent Mo Rocca talks to young stutterers, a speech therapist, and researchers at Purdue University's Stuttering Project and visits a

> workshop run by the organization Stuttering Association for the Young (formerly known as Our Time), to demystify a condition that's been around since man has been speaking.

4.2.2 Public Opinion Survey of Human Attributes- Stuttering (POSHA – S)

The POSHA-S is a pre-and post-test assessment of participant attitudes towards people who stutter and persistent developmental stuttering (St Louis, 2015). The POSHA-S is a 32-standardized question questionnaire designed to measure public attitudes toward stuttering (St Louis, 2015). A radial graph visually displays each group's mean scores of each subscore, representing their attitudes towards individuals who stutter. The graphs represent positive attitudes towards the outside of the graph, while negative attitudes are closer to the center. An Overall Stuttering Score (OSS) ranges from 0 to 100 to determine the frequency of a presented feeling or behavior; 0 represents no behavior and feeling present, and 100 denotes a frequent behavior or a strong feeling.

The instrument assesses participants' attitudes internationally, representing various ages, socioeconomic statuses, and cultures. The POSHA-S was chosen for this current study due to the technical and structural integrity of the tool itself and its general use with diverse populations (St Louis, 2015).

4.3 Procedure

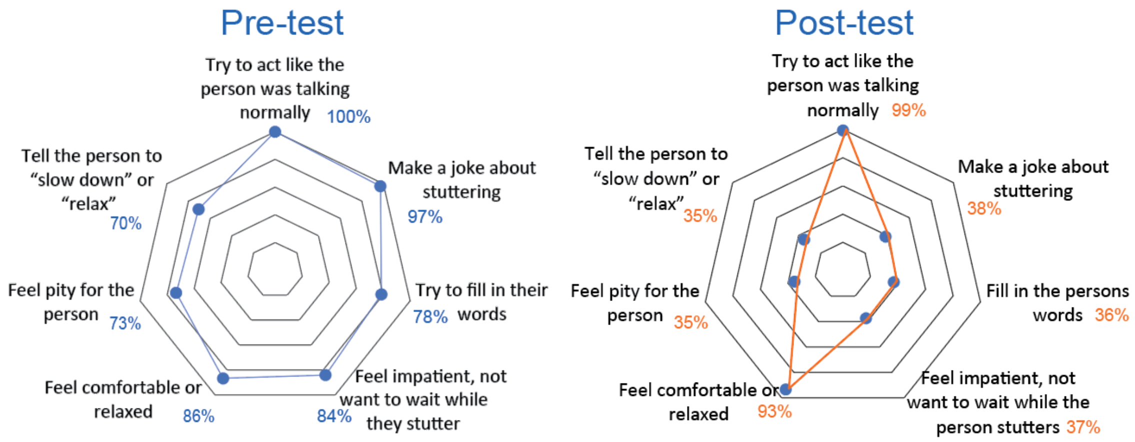
Participants completed a 34-question pre-test survey to analyze current behaviors and beliefs toward people who stutter and determine where those beliefs could have originated. After completing the pre-test survey, participants immediately watched a 10-minute video produced by CBS News in 2011 titled "Finding their voices: Understanding stuttering" to combine an interpersonal and education intervention. The footage included people who stutter, explaining personal experiences with stuttering, and speech pathologists meant to identify and correct common stereotypes and myths. Following the video, participants immediately completed a 12-question post-test survey to determine if attitudes and beliefs changed due to the intervention. This study was a quasi-experimental group design with a pre-test and immediate post-test measures of attitudes towards people who stutter.

CHAPTER 5

RESULTS

Raw data was converted to a 0 – 100-point scale to analyze the frequency of behavior or strength of a belief. A score of 0 represents no belief present or no instances of behavior; a score of 100 represents a strong belief or consistent behavior present. Some negative behaviors or attitudes, such as filling in words or telling someone who stutters to "relax" or "slow down," have been reverse coded for testing. A mean Overall Stuttering Score is reported before and after the intervention to determine participants' average attitudes towards stuttering. OSS is scored between 0 – 100-point scale, where a score of 0 shows the most negative attitudes toward people who stutter and 100 shows the most positive attitudes toward people who stutter.

Figure 5.1: Radial graphs represent the frequency of behavior or strength of belief. The left represents the frequency of behavior or power of attitude when interacting with a person who stutters before intervention. The right represents the frequency of behavior or strength of attitude when interacting with a person who stutters after the intervention.



A paired-samples t-test was conducted to compare the attitudes towards people who stutter before and after education and interpersonal contact intervention. There was a significant difference in the scores before intervention (M= 54.35, SD= 8.35) and after intervention (M= 65.53, SD= 8.35); t(24)= – 6.69, $p < 0.01$. Participants reported having a significant change in attitudes and beliefs after the intervention. There was a 73% self-reported increase in understanding the life experience of a person who stutters. 87% of participants reported they agree or strongly agree they should be aware of listening behaviors when talking with a person who stutters.

Table 5.1: POSHA-S means (percentage out of 100) for individual items, sub-scores, and mean Overall Stuttering Score (OSS)

Overall Stuttering Score		Before intervention	After intervention
		54.35%	65.53%
Traits/Personality		Before intervention	After intervention
	Have their selves to blame*	92%	-----
	Nervous*	54%	26%
	Shy*	57%	-----
	Should hide their stuttering*	89%	-----
Potential			
	Can do any job	71%	86%
	Can make friends or have a meaningful relationship	73%	90%
	Have jobs that decide important things	92%	-----
Accommodating/helping		Before intervention	After intervention
	Act normally	100%	99%
	Fill in words*	78%	37%
	“Slow down” or “relax” *	70%	35%
	Make jokes*	97%	38%
Self-reactions to stuttering			
	Feel comfortable	86%	93%
	Feel pity*	73%	35%
	Feel impatient*	84%	37%

Note. Items that have been marked by * have been reverse coded.

CHAPTER 6

CONCLUSION

6.1 Discussion

Negative behaviors and attitudes such as making jokes or filling in words for people who stuttered were reduced by 41%. These results supported the hypothesis that education and interpersonal contact are successful intervention strategies to reduce the stigma around stuttering. There was an increase in positive behaviors and attitudes towards people who stutter, such as feeling comfortable with people who stutter. Participants' mean OSS increased after viewing a short educational and interpersonal contact intervention that effectively reduced negative stigma. Education about stuttering and interpersonal contact, or "putting a face to the issue," significantly impacted participants and indicated more positive interactions with a person who stutters.

6.2 Limitations

While research shows an increase in positive attitudes, there are some limitations to the significant findings. Due to the scope of the study, there was a small sample size of participants who participated virtually to analyze immediate behavior and attitude change.

A small sample size of 25 participants responded that it was not representative of the diverse university community. Participants were primarily American females between the ages of 19-and 22. Having a limited sample size with limited data can increase the chance of producing a type 1 error by incorrectly rejecting the null hypothesis. There was not enough diversity in the participant demographics to test for differences across gender and cultural communities. A second limitation of research involves intervention occurring virtually. Even though the video intervention was relatively short, at 10 minutes to watch, participants may have lost interest during the task. Loss of interest could result in participants not retaining or understanding information that could have impacted their responses.

Finally, follow-up on behavior change in the future was not possible, and long-term change could not be evaluated. This study supported a change in behavior and attitude immediately after the intervention that may not continue. Testing could not be done to analyze if education and interpersonal contact were effective for long-term change. Carefully considering the limitations, the current study results still offer significant support for the ability to change attitudes and behaviors towards people who stutter through education and interpersonal contact intervention.

6.3 Future Directions

Future research can analyze long-term behavior and attitude change toward people who stutter with a more diverse participant pool. A prospective study may be completed to analyze if culture or gender differences impact the effectiveness of education and interpersonal contact interventions. Alongside correcting negative stigma and stereotypes, research can examine preemptive steps to stop stigma from forming toward people who stutter. Data can be collected to determine the most influential sources of information about stuttering and minimize misinformation from being spread.

These findings can be applied to educate individuals who frequent contact with a large population of people, especially people who stutter. Using education and interpersonal contact can train frontline workers who interact with the public often to increase listening behavior and reduce negative reactions towards people who stutter or those with any communication disorder.

APPENDIX A

RECRUITMENT AND IRB DOCUMENTATION

Hi all!

My name is Christine Abasi, and I am asking you to participate in my undergraduate research survey.

This research study is going to ask your **honest** opinion about 5 different topics. Participating in this study will help me complete my senior research project and is greatly appreciated!

Some professors may accept participation in this as extra credit!

You can choose to participate in this anonymous and confidential research study if you are at least 18 years old and you must be a student or faculty/staff member actively enrolled at UTA. It won't take longer than 30 minutes but MUST be completed within one sitting.

Please complete this survey by **March 31, 2021**!
If you have any questions, please contact me at: christine.abasi@mavs.uta.edu
If you choose to participate, please continue to the survey!

Thank you for your participation.

UNIVERSITY OF TEXAS ARLINGTON
OFFICE OF RESEARCH ADMINISTRATION
REGULATORY SERVICES

12/13/2021

IRB Approval of Minimal Risk (MR) Protocol

PI: Christine Abasi
Faculty Advisor: Molly Cummins
Department: Health Services
IRB Protocol #: 2022-0118
Study Title: *Public Opinion Survey of Human Attributes - Stuttering (POSHA-S)*

Effective Approval: 12/12/2021

The IRB has approved the above referenced submission in accordance with applicable regulations and/or UTA's IRB Standard Operating Procedures.

Principal Investigator and Faculty Advisor Responsibilities

All personnel conducting human subject research must comply with UTA's IRB Standard Operating Procedures and RA-PO4, Statement of Principles and Policies Regarding Human Subjects in Research. Important items for PIs and Faculty Advisors are as follows:

- **Notify Regulatory Services of proposed, new, or changing funding source**
- Fulfill research oversight responsibilities, IV.F and IV.G.
- Obtain approval prior to initiating changes in research or personnel, IX.B.
- Report Serious Adverse Events (SAEs) and Unanticipated Problems (UPs), IX.C.
- Fulfill Continuing Review requirements, if applicable, IX.A.
- Protect human subject data (XV.) and maintain records (XXI.C.).
- Maintain HSP (3 years), GCP (3 years), and RCR (4 years) training as applicable.
-

APPENDIX B

SURVEY AND ASSOCIATED MATERIALS

My name is Christine Abasi, and I am asking you to participate in a UT Arlington research survey titled, "*Public Opinion Survey of Human Attributes – S Form*". This research study is going to ask your honest opinion about 5 different human attributes and some information about yourself to help identify you from other participants. *Please do not include your name, address, telephone number, student ID, or any other identifying information besides what is directly asked on the form.*

You can choose to participate in this research study if you are at least 18 years old and you must be a student, faculty, or staff currently enrolled at UTA.

This study is intended to explore public opinion about human attributes that are shown across the country. Your decision about whether to participate is entirely up to you. If you decide not to be in the study, there won't be any punishment or penalty; there will be no impact on any benefits or services that you would normally receive. Even if you choose to begin the study, you can also change your mind and quit at any time without any consequences. However, you must complete the entire study for your results to be used in the final publication.

The survey asks for a few short answers and for clicking boxes [☐] that apply to you. But mostly it involves making judgments by clicking your answer. Some of these judgments are numbers on number scales, while others are "Yes," "No," choices. There are no right or wrong answers! Please work quickly and mark your first impression. Please select the option choice that best represents your opinion.
It should take about 15 minutes. Although you probably won't experience any personal benefits from participating, the study activities are not expected to pose any additional risks beyond those that you would normally experience in your regular everyday life or during routine medical/psychological visits.

You will not be paid for completing this study. However, some professors may accept the completion of this survey as extra credit. This is available on an individual class basis.

The research team is committed to protecting your rights and privacy as a research subject. We may publish or present the results, but your name will NOT be used. While absolute confidentiality cannot be guaranteed, the research team will make every effort to protect the confidentiality of your records as described here and to the extent permitted by law. If you have questions about the study, you can contact me at christine.abasi@mavs.uta.edu.

For questions about your rights or to report complaints, contact the UTA Research Office at 817-272-3723 or regulatoryservices@uta.edu.

You are indicating your voluntary agreement to participate by completing and returning the survey.
Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

Public Opinion Survey of Human Attributes – S (POSHA-S)
Please tell about yourself in this section

Dates	**Month**	**Day**	**Year**
Today's Date	e.g., January _____________	e.g., 1 _____________	e.g., 2021 _____________
Date of Birth	_____________	_____________	_____________

Residence and Citizenship	**Country**	**State (or Province)**	**City (or town, village, or region)**
I live in	_____________	_____________	_____________
I was born in	_____________	_____________	_____________

My native language is: _______________________

I can also <u>easily speak and understand</u> the following languages: (leave blank if not applicable)

1. ________________________

2. ________________________

Mark [✓] all that apply

I am: ☐ Male ☐ Female ☐ Other	**I am a:** ☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior	**I am/have been married:** ☐ Yes ☐ No

I would rate the <u>following aspects of my life now</u> as…	**Very Poor (1)**	**Poor (2)**	**Average (3)**	**Good (4)**	**Excellent (5)**
My physical health	☐	☐	☐	☐	☐
My mental health	☐	☐	☐	☐	☐
My ability to learn new things	☐	☐	☐	☐	☐
My speaking ability	☐	☐	☐	☐	☐

For me, the <u>importance</u> of each aspect of my life is….	**Not Important (1)**	**Usually Not Important (2)**	**Equally Important Or not Important (3)**	**Usually Important (4)**	**Always Important (5)**
Being safe and secure	☐	☐	☐	☐	☐
Being free to do what I want	☐	☐	☐	☐	☐
Spending quiet time alone	☐	☐	☐	☐	☐
Attending parties or social events	☐	☐	☐	☐	☐
Imagining new things	☐	☐	☐	☐	☐
Helping the less fortunate	☐	☐	☐	☐	☐
Having exciting but potentially *dangerous* experiences	☐	☐	☐	☐	☐
Practicing my religion	☐	☐	☐	☐	☐
Earning money	☐	☐	☐	☐	☐
Doing my jobs or my duty	☐	☐	☐	☐	☐
Getting things finished	☐	☐	☐	☐	☐
Figuring out how to solve important problems	☐	☐	☐	☐	☐

Now please give your opinion about people who have the following characteristics

My *overall impression* of a person who is…	**Very Negative (-2)**	**Somewhat Negative (-1)**	**Neutral (0)**	**Somewhat positive (1)**	**Very positive (2)**
Obese (overweight)	☐	☐	☐	☐	☐
Left-handed	☐	☐	☐	☐	☐
Has a stuttering (speech) disorder	☐	☐	☐	☐	☐
mentally ill	☐	☐	☐	☐	☐
intelligent	☐	☐	☐	☐	☐
I would want to be a person who is…	**Very Negative (-2)**	**Somewhat Negative (-1)**	**Neutral (0)**	**Somewhat positive (1)**	**Very positive (2)**
Obese (overweight)	☐	☐	☐	☐	☐
Left-handed	☐	☐	☐	☐	☐
Has a stuttering (speech) disorder	☐	☐	☐	☐	☐
mentally ill	☐	☐	☐	☐	☐
intelligent	☐	☐	☐	☐	☐
The amount I know about the people who are…	**Very Negative (-2)**	**Somewhat Negative (-1)**	**Neutral (0)**	**Somewhat positive (1)**	**Very positive (2)**
Obese (overweight)	☐	☐	☐	☐	☐
Left-handed	☐	☐	☐	☐	☐
Has a stuttering (speech) disorder	☐	☐	☐	☐	☐
mentally ill	☐	☐	☐	☐	☐
intelligent	☐	☐	☐	☐	☐

Following are people I know who are….	**Nobody**	**Acquaintance**	**Close friend**	**Relative**	**me**
Obese (overweight)	☐	☐	☐	☐	☐
Left-handed	☐	☐	☐	☐	☐
Has a stuttering (speech) disorder	☐	☐	☐	☐	☐
mentally ill	☐	☐	☐	☐	☐
intelligent	☐	☐	☐	☐	☐

Now, please give a more detailed opinion about the speech disorder of stuttering

People who stutter (PWS)	**Yes**	**No**
Should try to hide their stuttering	☐	☐
Should have jobs where they try to correctly understand and decide important things	☐	☐
Are nervous or excitable	☐	☐
Are shy or fearful	☐	☐
have themselves to blame for their stuttering	☐	☐
Can make friends	☐	☐
Can do any job they want	☐	☐

I'd be concerned if the following people stuttered…	**Yes**	**No**
My doctor	☐	☐
My neighbor	☐	☐
My brother or sister	☐	☐
Me	☐	☐

If I were talking with a PWS, I would (or have)…	**Yes**	**No**
Try to act like the person was talking normally	☐	☐
Make a joke about stuttering	☐	☐
Try to fill in their words	☐	☐
Feel impatient, not want to wait while they stutter	☐	☐
Feel comfortable or relaxed	☐	☐
Feel pity for the person	☐	☐
Tell the person to "slow down" or "relax"	☐	☐

I believe stuttering is caused by…	**Yes**	**No**
Genetic inheritance	☐	☐
Ghosts, demons, or spirits	☐	☐
A very frightening event	☐	☐
An act of God	☐	☐
Learning or habits	☐	☐
A virus or disease	☐	☐
I believe stuttering should be helped by…	**Yes**	**No**
Other people who stutter	☐	☐
A speech and language therapist	☐	☐
People like me	☐	☐
A medical doctor	☐	☐
My knowledge of stuttering comes from…	**Yes**	**No**
My personal experience (me, family, or friends)	☐	☐
Television, radio, or films	☐	☐
Magazine, newspapers, or books	☐	☐
The internet	☐	☐
School	☐	☐
Doctors, nurses, or other specialists	☐	☐

You have finished! Thank you for completing the pre-test survey! Please continue to the following video:

https://www.youtube.com/watch?v=juMxqemIlpU&ab_channel=PeekabooKidz

Thank you for watching the short informational video. Please respond to the following questions:

Question List 1:

	Strongly Agree (1)	Somewhat Agree (2)	Neither Agree nor Disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
My understanding of the life experience of a person who stutters was changed by this presentation	☐	☐	☐	☐	☐
A person who stutters could hold any job that matches their interest and skills	☐	☐	☐	☐	☐
A person who stutters is likely as a person who does not stutter to have a meaningful romantic life	☐	☐	☐	☐	☐
All people who stutter are nervous or anxious	☐	☐	☐	☐	☐
I should be aware of my listening behaviors when talking with a person who stutters	☐	☐	☐	☐	☐

Question List 2:

If I were talking to a person who stutters, I would	No (1)	Unsure (2)	Yes (3)
Try to act like the person was talking normally	☐	☐	☐
Make a joke about stuttering	☐	☐	☐
Fill in the persons words	☐	☐	☐
Feel impatient, not want to wait while the person stutters	☐	☐	☐
Feel comfortable or relaxed	☐	☐	☐
Feel pity for the person	☐	☐	☐
Tell the person to "slow down" or "relax"	☐	☐	☐

CBS Finding Their Voices - Understanding Stuttering Transcript

Beginning of Transcript

Opening scene to Our Time Workshop session

Tero Alexander: So you have about t-t-ten minutes to complete these character profiles, okay?

Narrator voice-over: At the Our Time workshop in New York City, young people who stutter come together in a patient and understanding environment

Interview session with group of kids from Our Time Worshop

Danielle: Hi, I'm D-D-Danielle, and I a-a-m n-ninet-t-een years old.

Claire: My name is C-C-Claire and I am, um, eight years old.

Julianna: I-i-i'm Julianna a-a-and I-i-i'm th-th-thirteen years old

Philip: My name is P-p-p-philip and I'm f-f-f-fteen years old

Tyler: I'm Tyler and I'm 10 years old.

Mo Rocca (Interviewer): What does it feel like physically when you're stuttering?

Danielle: It k-kind of, um, feels like at t-t-times, like, theres like, no like air like like p-p-passing like through y-y-you and your y-y-you know like like like like locked in like your throat

Video of King George VI speaking

King George: When, when when

Interview with David Seidler

David Seidler: People who stuttered were considered feeble minded. Word went around that King George VI was feeble minded because he stuttered.

Video of King George VI speaking

King George VI: My first w-w-word

Narrator voice-over: Screen writer David Seidler understand the humiliation Britain's King George VI felt. As a child, Seidler suffered from a severe stutter

Cut back to interview with David Seidler

David Seidler: He was my childhood hero. That's why I grew up always thinking one day I want to write something about King George VI.

video of "The King's speech" adaption of King George VI

King George VI Actor: I have received t-t-he

Narrator voice-over: And so, the British born Seidler scripted the Oscar nominated "The King's Speech"

Cut back to interview with David Seidler

Seidler: He was the man who was the king. He was speaking to the world. Everyone, friend or foe, was listening to every syllable he uttered waiting for him to stutter and if he could do that, there was hope for me.

Narrator voice-over: Though Seidler seems to have overcome his impediment, he still counts himself among the 3 million Americans and 65 million worldwide who stutter.

Our Time Workshop session

Narrator voice-over: Experts define stuttering, also called stammering, as an involuntary disruption of the rhythm and flow of speech. The person knows what he or she wants to say but just cant produce the words fluently. Boys are 3 to 4 times more likely to stutter than girls. And just as no two people have the same voice, no two people stutter in the same way.

Interview Scene with Christine Webber Fox and Ann Smith

Christine Webber Fox: You may not know a child is stuttering when they are just producing one word.

Narrator voice-over: Christine Webber Fox and Ann Smith are the lead researchers at Purdue University's "Stuttering Project"

Christine Webber Fox: When they start putting words together is usually when you see it so "mommy up" or "daddy eat" or something like that so you typically see it maybe at around age 3.

Narrator voice-over: Speaking, they point out, is complex for anyone

Mo Rocca: What is going on physiologically when we speak?

Ann smith: First of all, you have so many muscles you have to control, you have to think of what you want to say, you have to generate the grammar. So there's just many, many levels of activity in the brain, very widespread activity when you're speaking

Chris Christine Webber Fox tine: And it turns out the emotional system, the whole brain everything in your brain, is interacting so that impacts how we control our muscles

Narrator voice-over: Over the course of 5 years, Smith and Webber Fox are following 72 children who stutter, monitoring their brain waves and testing their motor skills. Some will stop stuttering, others will not

Christine Webber Fox: We don't have any good predictor of who are these children who are really high risk for chronic stuttering and so by the end of our project, we are really hoping that we will be able to, um, key in on what are those key that might differentiate.

Interview scene with Kid 1 in therapy session with Lee Cajiano

Kid 1: I think that just coming to therapy has, like, built my self confidence

Narrator voice-over: Lee Cajiano became a speech therapist 20 years ago after her own son began stuttering. She used to meet parents who were certain they knew what caused their kids stuttering.

Interview scene with Lee Cajiano

Mo Rocca: What would a parent say typically back then?

Lee Cajiano: That they did something wrong, that they disciplined their kid wrong, they toilet trained their child wrong, they talk too fast, they talk too slow, they talk too much, they didn't talk enough. Something they did that must have caused the stuttering.

Narrator voice-over: Researchers don't know exactly what causes stuttering. The roots are neurological, its not caused by anxiety. Studies show there is a genetic component, it runs in some families. But for Cajiano, what causes the stuttering isn't as important as the emotional impact.

Mo Rocca: Is it fair to say its more about making you comfortable with yourself than actually eliminating the stutter?

Lee Cajiano: Yeah, especially since eliminating the stuttering, for many people, the only way to do that is to stop speaking.

Photo of Tero Alexander

Narrator voice-over: Someone who is not not speaking, the founder of Our Time, Tero Alexander. He was 11 when he realized he was a stutterer.

Interview scene with Tero Alexander

Tero Alexander: I-I-I became obsess-s-ssed with not st-t-t-tuttering, I mean really, from age 11 to about 26 years old that was my number 1 goal in life was to not let anyone know that I st-t-t-tutter

Narrator voice-over: And there he developed an elaborate toolbox of tricks to mask his stuttering

Mo Rocca: Give me an example of some of the tricks you deploy

Tero Alexander: *fake yawn* excuse me

Mo Rocca: Oh I'm sorry I thought maybe that was one of them

Tero alexander: It is

Mo Rocca: Really?

Tero Alexander: *fake yawn* Oh yea, im so sorry im just really tired. I would just yawn through the entire conversation because I would never stutter when I yawn. *whispering* I would whisper a lot. I don't know what happened but I lost my voice last night

Mo Rocca: And you don't stutter when you whisper?

Tero alexander: *whispering* I would never stutter. For me, its not like a rule about stuttering but this is effective for me

Narrator voice-over: But 12 years ago, alexander slipped. Preforming on stage, he stuttered. That's when he decided to stop hiding.

Tero alexander: And now when I st-t-t-tutter, because the emotional baggage is no longer there, it's not a big thing to me anymore, you know

Philip: Since ive got s-s-s-ome ex-x-x-t-t-tensive s-s-survi-i-ival….

Narrator voice-over: 15 year old Philip from Our Time sees an upside to the challenge he faces in speaking

Philip: One thing I think is pretty u-u-u-niversal for st-t-tutters i-i-i-is that since we need to deal with this e-e-e-every single day of our lives I think that e-e-e-everyone will will agree that it really teaches c-c-c-compassion.

Narrator voice-over: Still, the most ordinary interactions can be fraught for stuttering kids and grown-ups alike

Tero alexander: And there are a lot of experiences as a new dad meeting other parents and having to say your kids names and, um, you know that can be, um, that can be really hard.

Mo Rocca: Do you sometimes having trouble saying your kids names?

Tero alexander: Yea, I do. For a long time I thought, you know, I don't know that I want to have kids because I don't know, um, what I would name them because I don't want to stutter on their name for their whole life, you know. I don't want to be that guy. I don't want to be that parent when everyone is introducing their kids names, um, and not even for me, but for my kid. You know, what will my kid think of me when I can't say their name?

Mo Rocca: You and your kids ending up giving you kids names you wanted to give them?

Tero Alexander: That's a great question, you know, uh, we did. We did.

Mo Rocca: I don't want to put you on the spot and ask your boys names, but what are your boys names?

Tero Alexander: Uh yea, so m-m-my o-o-oldest son's name is J-j-jackson and my y-y-youngest son's name is w-w-w-walker.

Mo Rocca: Those are great names

Tero Alexander: Thank you.

Scene of Our Time Workshop Sessions

Narrator voice-over: Stuttering might alter a life, but Alexander believes it should never compromise it

Tero alexander: When I say our time, you say my time. Our time

Our Time kids: My time

Tero Alexander: Our time

Our Time kids: My time

Interview session with group of kids from Our Time Workshop

Julianna: I-i-I'm i-i-interested i-i-in the medical f-f-field

Philip: I am going to go to c-c-college to become a, to become a p-p-p-photojournalist

back to our time session

Tero Alexander: Our time

Groups of kids: My time

Tero Alexander: Our time

Groups of kids: My time

Terro Alexander: Great job everyone, have a great weekend.

End of Transcript

REFERENCES

Abdalla, F., & St. Louis, K. O. (2014). Modifying Attitudes of Arab School Teachers Toward Stuttering. *Language, Speech, and Hearing Services in Schools*, *45*(1), 14–25. https://doi.org/10.1044/2013_LSHSS-13-0012

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Andrews, G., Craig, A., Fayer, A. M., Hoddinott, S., Howie, P., & Neilson, M. (1983). Stuttering: A review of research findings and theories. *The Journal of Speech and Hearing Disorders*, *48*(3).

Boyle, M. P. (2013). Assessment of Stigma Associated with Stuttering: Development and Evaluation of the Self-Stigma of Stuttering Scale (4S). *Journal of Speech, Language, and Hearing Research*, *56*(5), 1517–1529. https://doi.org/10.1044/1092-4388(2013/12-0280)

Boyle, M. P. (2015). Identifying correlates of self-stigma in adults who stutter: Further establishing the construct validity of the Self-Stigma of Stuttering Scale (4S). *Journal of Fluency Disorders*, *43*, 17–27. https://doi.org/10.1016/j.jfludis.2014.12.002

Boyle, M. P. (2017). Personal Perceptions and Perceived Public Opinion About Stuttering in the United States: Implications for Anti-Stigma Campaigns. *American Journal of Speech-Language Pathology*, *26*(3), 921–938. https://doi.org/10.1044/2017_AJSLP-16-0191

Boyle, M. P., Dioguardi, L., & Pate, J. E. (2016). A comparison of three strategies for reducing the public stigma associated with stuttering. *Journal of Fluency Disorders*, *50*, 44–58. https://doi.org/10.1016/j.jfludis.2016.09.004

Boyle, M. P., & Fearon, A. N. (2018). Self-stigma and its associations with stress, physical health, and health care satisfaction in adults who stutter. *Journal of Fluency Disorders*, *56*, 112–121. https://doi.org/10.1016/j.jfludis.2017.10.002

Braun, A. (1997). Altered patterns of cerebral activity during speech and language production in developmental stuttering. An H2(15)O positron emission tomography study. *Brain*, *120*(5), 761–784. https://doi.org/10.1093/brain/120.5.761

Physiological and physical basis of speech (n.d.). *Britannica - Language*. Retrieved April 20, 2022, from https://www.britannica.com/topic/language/Physiological-and-physical-basis-of-speech

Büchel, C., & Sommer, M. (2004). What Causes Stuttering? *PLoS Biology*, *2*(2), e46. https://doi.org/10.1371/journal.pbio.0020046

Cees De Groot, J., De Leeuw, F.-E., Oudkerk, M., Van Gijn, J., Hofman, A., Jolles, J., & Breteler, M. M. B. (2000). Cerebral white matter lesions and cognitive function: The Rotterdam scan study. *Annals of Neurology*, *47*(2), 145–151. https://doi.org/10.1002/1531-8249(200002)47:2<145::AID-ANA3>3.0.CO;2-P

Corrigan, P. W., & Kosyluk, K. A. (2013). Erasing the Stigma: Where Science Meets Advocacy. *Basic and Applied Social Psychology*, *35*(1), 131–140. https://doi.org/10.1080/01973533.2012.746598

Corrigan, P. W., Morris, S. B., Michaels, P. J., Rafacz, J. D., & Rüsch, N. (2012). Challenging the Public Stigma of Mental Illness: A Meta-Analysis of Outcome Studies. *Psychiatric Services*, *63*(10), 963–973. https://doi.org/10.1176/appi.ps.201100529

Corrigan, P. W., Morris, S. B., Michaels, P. J., Rafacz, J. D., & Rüsch, N. (2012b). Challenging the Public Stigma of Mental Illness: A Meta-Analysis of Outcome Studies. *Psychiatric Services*, *63*(10), 963–973. https://doi.org/10.1176/appi.ps.201100529

Corrigan, P. W., Vega, E., Larson, J., Michaels, P. J., McClintock, G., Krzyzanowski, R., Gause, M., & Buchholz, B. (2013a). The California schedule of key ingredients for contact-based antistigma programs. *Psychiatric Rehabilitation Journal*, *36*(3), 173–179. https://doi.org/10.1037/prj0000006

Corrigan, P. W., Vega, E., Larson, J., Michaels, P. J., McClintock, G., Krzyzanowski, R., Gause, M., & Buchholz, B. (2013b). The California schedule of key ingredients for contact-based antistigma programs. *Psychiatric Rehabilitation Journal*, *36*(3), 173–179. https://doi.org/10.1037/prj0000006

DeLong, M., & Wichmann, T. (2009). Update on models of basal ganglia function and dysfunction. *Parkinsonism & Related Disorders*, *15*, S237–S240. https://doi.org/10.1016/S1353-8020(09)70822-3

Desai, J., Huo, Y., Wang, Z., Bansal, R., Williams, S. C. R., Lythgoe, D., Zelaya, F. O., & Peterson, B. S. (2017). Reduced perfusion in Broca's area in developmental stuttering: Perfusion in Developmental Stuttering. *Human Brain Mapping*, *38*(4), 1865–1874. https://doi.org/10.1002/hbm.23487

DiDonato Brumbach, A. C., & Goffman, L. (2014). Interaction of Language Processing and Motor Skill in Children With Specific Language Impairment. *Journal of Speech, Language, and Hearing Research*, *57*(1), 158–171. https://doi.org/10.1044/1092-4388(2013/12-0215)

Five Myths About Stuttering. (n.d.). *The Stuttering Foundation*. Retrieved April 20, 2022, from https://www.stutteringhelp.org/five-myths-about-stuttering

Florance, C. L., & Shames, G. H. (1980). Stutter-free speech: A goal for therapy. *Columbus: C. E. Merrill Publishing.*

Flynn, T. W., & St. Louis, K. O. (2011). Changing adolescent attitudes toward stuttering. *Journal of Fluency Disorders*, *36*(2), 110–121. https://doi.org/10.1016/j.jfludis.2011.04.002

Frigerio-Domingues, C., & Drayna, D. (2017). Genetic contributions to stuttering: The current evidence. *Molecular Genetics & Genomic Medicine*, *5*(2), 95–102. https://doi.org/10.1002/mgg3.276

Gabel, R. M., Blood, G. W., Tellis, G. M., & Althouse, M. T. (2004). Measuring role entrapment of people who stutter. *Journal of Fluency Disorders*, *29*(1), 27–49. https://doi.org/10.1016/j.jfludis.2003.09.002

Hatzenbuehler, M. L., Phelan, J. C., & Link, B. G. (2013). Stigma as a Fundamental Cause of Population Health Inequalities. *American Journal of Public Health*, *103*(5), 813–821. https://doi.org/10.2105/AJPH.2012.301069

Kang, C., Riazuddin, S., Mundorff, J., Krasnewich, D., Friedman, P., Mullikin, J. C., & Drayna, D. (2010). Mutations in the Lysosomal Enzyme–Targeting Pathway and Persistent Stuttering. *The New England Journal of Medicine*, *362*(8).

Langevin, M., & Prasad, N. G. N. (2012). A Stuttering Education and Bullying Awareness and Prevention Resource: A Feasibility Study. *Language, Speech, and Hearing Services in Schools*, *43*(3), 344–358. https://doi.org/10.1044/0161-1461(2012/11-0031)

Lindvall, O., Brundin, P., Widner, H., Rehncrona, S., Gustavii, B., Frackowiak, R., Leenders, K. L., Sawle, G., Rothwell, J. C., Marsden, C. D., & Björklund, M. (1990). Grafts of Fetal Dopamine Neurons Survive and Improve Motor Function in Parkinson's Disease. *Science*, *247*(4942), 574–577. https://doi.org/10.1126/science.2105529

Moore, J., W. H., & Haynes, W. O. (1980). Alpha hemispheric asymmetry and stuttering: Some support for a segmentation dysfunction hypothesis. *Journal of Speech and Hearing Research*, *23*(2).

Riaz, N., Steinberg, S., Ahmad, J., Pluzhnikov, A., Riazuddin, S., Cox, N. J., & Drayna, D. (2005). Genomewide Significant Linkage to Stuttering on Chromosome 12. *The American Journal of Human Genetics*, *76*(4), 647–651. https://doi.org/10.1086/429226

St. Louis, K. O. (2012). Research and development on a public attitude instrument for stuttering. *Journal of Communication Disorders*, *45*(2), 129–146. https://doi.org/10.1016/j.jcomdis.2011.12.001

The Stuttering Foundation: Five Myths About Stuttering (2022). *The Stuttering Foundation.* Retrieved April 20, 2022, form https://www.stutteringhelp.org/five-myths-about-stuttering

The Stuttering Foundation: SNL Skit a 'Huge Step Backwards' for Stuttering Community (2012). *The Stuttering Foundation*. Retrieved April 20, 2022, from https://www.stutteringhelp.org/content/stuttering-foundation-snl

Üstün-Yavuz, M. S., Warmington, M., Gerlach, H., & St. Louis, K. O. (2021). Cultural difference in attitudes towards stuttering among British, Arab and Chinese students: Considering home and host cultures. *International Journal of Language & Communication Disorders*, *56*(3), 609–619. https://doi.org/10.1111/1460-6984.12617

Van Riper, C. (1973). The treatment of stuttering. *Prentice-Hall*.

Visscher, C., Houwen, S., Scherder, E. J. A., Moolenaar, B., & Hartman, E. (2007). Motor Profile of Children With Developmental Speech and Language Disorders. *Pediatrics*, *120*(1), e158–e163. https://doi.org/10.1542/peds.2006-2462

Watkins, K. E., Smith, S. M., Davis, S., & Howell, P. (2007). Structural and functional abnormalities of the motor system in developmental stuttering. *Brain*, *131*(1), 50–59. https://doi.org/10.1093/brain/awm241

Weiner, C., & Tetnowski, J. A. (2016). Stuttering Discrimination Under the Law. . . *Journal of American Speech and Hearing Association*. https://leader.pubs.asha.org/doi/10.1044/leader.FTR2.21072016.52

Wingate, M. E. (1964). A standard definition of stuttering. *The Journal of Speech and Hearing Disorders*, *29*.

BIOGRAPHICAL INFORMATION

Christine Hekmat Abasi is a graduating senior completing an Honors Bachelor of Arts in Interpersonal Communication Studies and a Bachelor of Science of Psychology, minor in Neuroscience, from the University of Texas at Arlington. Her future academic plans include attending the Master and Doctoral Speech and Language Pathology Program at the University of Texas at Dallas. She is interested in researching the neurological and physiological activity around speech fluency disorders, specifically stuttering.