STUTTERING REACTIONS MINDSET

By

Megan Kaye Arney

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ABSTRACT

Purpose: Mindsets are the thoughts, assumptions, and beliefs that a person has about themselves and their personal experiences. Research has not explored whether there are *stuttering reactions mindsets*, or inherent beliefs specifically about a person's reactions to stuttering. Research has also not yet explored whether a person's mindset, either growth or fixed, is related to the adverse impact of stuttering. This research involved three studies designed to: (a) explore the construct validity of a stuttering reactions mindset, (b) examine potential relationships between stuttering reactions mindsets and the adverse impact of stuttering, and (c) test the efficacy of a single-session mindset intervention aimed to increase growth mindsets of stuttering reactions as it relates to readiness to change.

Method: Participants for all three studies were people who stutter. The first study ($N = 160$) established the construct validity of a stuttering reactions mindset through confirmatory factor analysis using a novel stuttering reactions mindset measure that was based on four previously validated mindsets and corresponding measures (intelligence, emotion, anxiety, personality). The second study ($N = 64$) assessed the predictive nature of a stuttering reactions mindset on the adverse impact of stuttering using linear regression modeling. The third study ($N = 30$) tested group mean differences in a person's readiness to change following a pilot intervention aimed to promote a growth mindset.

Results: Stuttering reactions mindset emerged as a unique construct that is distinguishable from other established mindsets (e.g., anxiety). Relationships were found among all five mindsets measured, indicating that there is still a generalizability among different mindsets; having a growth mindset in one domain is related to having a growth mindset in another. Fixed mindset of stuttering was related to the adverse impact of stuttering in that having a growth mindset

predicted reduced impact of stuttering. No differences were found between groups in their readiness to change following a brief growth mindset intervention.

Conclusion: Understanding a person's stuttering reactions mindset may prove to be a meaningful addition to a comprehensive stuttering intervention, for it can provide clinicians with an easy-to-understand assessment of how a person views the controllability of their reactions to stuttering. Further, understanding a person's mindset, whether growth or fixed, may provide insight into how they approach speaking situation, either with an approach or avoidance response. The relationships found between mindset and the adverse impact of stuttering and qualitative responses from participants in the third study suggest that there may be value in applying mindset interventions that promote a growth mindset in order to reduce the adverse impact of stuttering.

To my dad, who taught me the profound importance of attitudes.
And my grandpa, who asked me my first unanswerable question about stuttering.

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1.0 INTRODUCTION

Mindsets are the thoughts, assumptions, and beliefs that a person has about themselves and their personal experiences (Crum & Langer, 2007; Molden & Dweck, 2006). Mindsets allow a person to simplify and understand otherwise complex events (Zion et al., 2022) by providing an interpretive framework for understanding the world around them (Molden & Dweck, 2006). Mindsets can be thought of as lenses or "frames of mind" (Crum & Zuckerman, 2017, p. 2063) that direct a person toward specific expectations (Crum et al., 2017). Mindsets consist of core assumptions that a person has regarding the malleability or adaptability of their own attributes. Their belief in their capacity to change influences the goals that they create and pursue in life (Dweck, 2006; Molden & Dweck, 2006). These goals drive a person's behavior and ultimately influence their subsequent affective and cognitive reactions in a given situation (Dweck, 1999).

Research into mindsets began as investigations into the relationship between a person's beliefs about human attributes (e.g., intelligence) and corresponding motivational patterns and behavior (Dweck & Yeager, 2019). People have mindsets regarding the malleability or immutability of a specific human attribute; these have been operationalized as either *growth mindsets* or *fixed mindsets*, respectively (Dweck, 2006). People with a growth mindset about a particular attribute believe in their capacity to develop that attribute; they can put in effort that has the potential to result in changes. In contrast, a person with a fixed mindset believes that they cannot change their inherent abilities related to that attribute; they have always and will always perform consistently in that specific domain no matter how much effort they put forth.

Positive relationships have been found between possessing growth mindsets and having adaptive behavioral responses across multiple domains. For example, a person who has a *growth mindset of personality* believes that personality, either their own or another person's, can develop

and shift. Personality is not a static trait but can change for the better (Chiu et al., 1997). A consequence of this belief is more adaptive and potentially helpful responses to negative social exchanges. In this example, a person with a growth mindset of personality is less likely to make self-blaming statements or even retaliate in response to peer exclusion or victimization (Yeager et al., 2014). Similarly, a person who has a *growth mindset of emotion* believes that they can control and adjust their emotional response during times of distress. Such beliefs are related to more adaptive and potentially helpful emotional regulation responses when a person is faced with aversive stimuli (Kappes & Schikowski, 2013). In this example, a person may be more likely to approach difficult or even feared experiences due to their belief that they have control over their own emotions. A person who has a *growth mindset of anxiety* believes in the malleable nature of anxiety symptoms, so they would be more likely to engage in cognitive reappraisal to recognize and change negative thought patterns when faced with anxiety-provoking situations. Due to this belief, these individuals are less likely to experience symptoms of anxiety, depression, and interpersonal distress (Schroder et al., 2015). Together, these and other findings from the psychology literature highlight the overall beneficial nature of having growth mindsets across a range of domains.

These demonstrated relationships between a person's mindset, either growth or fixed, and their well-being have led to the development of interventions that aim to develop growth mindsets for improved psychosocial functioning (Burnette et al., 2022, 2023). Mindset interventions are programs that teach the message that people can cultivate their abilities and develop their attributes. These interventions are designed to change how people think about themselves and their personal experiences, with the goal of helping people use more adaptive responses to setbacks or adverse events (Burnette et al., 2023). Mindset interventions—or even

verbal statements promoting the idea that mindsets *can* be changed—may be simple; still, they have proven to be effective at enhancing treatment outcomes (Crum & Zuckerman, 2017). Mindset interventions have been shown to result in positive changes at the affective, behavior, and cognitive levels for many populations (Burnette et al., 2013, 2020, 2023). Research has shown that these interventions are most effective for disadvantaged populations that frequently face setbacks, such as people with lower socio-economic status or racial minority status (Burnette et al., 2023). Such findings are relevant to the present inquiry because people who stutter frequently encounter setbacks in many areas of their lives, including employment (Klein & Hood, 2004; Gerlach et al., 2018), education (Ellis & Hartlep, 2017), and social relationships (Beilby et al., 2013), to name only a few. To date, mindsets in people who stutter, and the potential effects of growth mindset interventions aimed to improve affective, behavior, and cognitive reactions to stuttering have not been explored.

Stuttering is a neurodevelopmental condition that, on the surface, involves disruptions in the forward flow of speech (Smith & Weber, 2017). As experienced by people who stutter, the condition involves much more than disruptions in the flow of speech (Tichenor & Yaruss, 2019b). Specifically, stuttering includes the behavioral reactions to stuttering, such as physical tension or avoidance of speaking situation, as well as affective and cognitive reactions, such as the thoughts and feelings about stuttering that can negatively impact a person's self-esteem and overall sense of self. These negative reactions, combined with the reactions of those in the speaker's environment, can lead to notable adverse impact on a person's life. Previous research with adults who stutter has shown that higher levels of unhelpful thoughts about speaking situations are associated with negative psychosocial impacts (Iverach et al., 2011; St. Clare et al., 2009). A person who stutters may internalize negative societal attitudes due to recurrent negative

experiences in speaking situations. This can lead to repetitive negative thinking (RNT) specific to stuttering (Tichenor et al., 2023; Tichenor & Yaruss, 2020) and a greater adverse impact of stuttering (Gerlach et al., 2021). A closer examination of mindsets about stuttering in people who stutter can lead to a greater understanding of the overall experience of stuttering. This exploration may point toward interventions that might help people learn that they can make positive changes in how they react to the challenges that stuttering presents.

To date, research has not explored whether there are *stuttering reactions mindsets*, or inherent beliefs about a person's reactions to stuttering either, and if there are, whether they might influence a person's experience of stuttering. An initial step for understanding how stuttering reactions mindsets might influence the broader experience of stuttering is to examine whether stuttering-specific mindsets exist. This inquiry can be framed as the question: *Do people who stutter hold mindsets related to stuttering?* The question can be specified further: *Do people who stutter hold mindsets about their affective, behavioral, and cognitive reactions to the experience of stuttering?* If they do hold mindsets regarding these personal reactions to stuttering, a further question becomes relevant: *Can their mindsets be described in terms of growth or fixed as has been seen in other areas of literature?* Gaining such information will allow for a greater understanding of the underlying features related to the individual experience of stuttering and potentially lead to mindset interventions that may support the development of more adaptive reactions to the experience of stuttering.

As research among numerous clinical populations has demonstrated, interventions that focus on developing growth mindsets can result in positive changes at the affective, behavioral, and cognitive levels (Burnette et al., 2013, 2020, 2023). The present study explored the concept of a *stuttering reactions mindset* to determine if this is a valid construct, as has been found in

other domains including intelligence, personality, emotion, and anxiety (Schroder et al., 2016). After demonstrating the validity of the construct of stuttering reactions mindset, the study examined the relationships between stuttering reactions mindsets and the adverse impact of stuttering. A pilot exploration of the effects of changing mindsets in people who stutter was also conducted, as the benefits of changing fixed mindsets towards growth mindsets are well-documented for many conditions in the fields of psychology and physiology (Crum et al., 2011, 2013). This was accomplished using an exploratory design in which participants engaged in a single-session mindset intervention aimed at developing their belief in the changeability of their reactions to stuttering. A better understanding of the factors that may lead to more growth mindset will lead to improved psychosocial benefits for people who stutter, including reducing the adverse impact of stuttering.

2.0 LITERATURE REVIEW

Mindsets are the thoughts and beliefs a person has about themselves and their experiences (Crum & Langer, 2007; Molden & Dweck, 2006). Mindsets consist of the core assumptions that a person has about a particular category that allow them to simplify and understand otherwise complex events (Zion et al., 2022). Mindsets direct a person toward specific expectations (Crum et al., 2017), shape their perception (Crum et al., 2013), and provide an interpretive framework to help them understand the world around them (Molden & Dweck, 2006). What is known today as mindsets originated from investigations into implicit theories (Dweck & Yeager, 2019).

2.1 MINDSET THEORY

Implicit theories are "intuitive beliefs" (Plaks, 2017, p. 262) that a person has about human attributes. These inherent assumptions provide a person with a mental framework to help them understand and explain their social environment (Plaks, 2017). A person can have an implicit theory regarding the stability or malleability of a human attribute. The implicit theory associated with believing in the malleability of a specific attribute is called *incremental theory,* whereas believing in the stability of specific attribute is called *entity theory*. These two examples of implicit theories (incremental theory and entity theory) have more recently been operationalized as *growth mindset* and *fixed mindsets,* respectively (Dweck, 2006).

A person with a growth mindset of intelligence believes in the malleability or adaptability of their intellectual ability. They can change their intelligence through hard work and effort. For example, they may view mathematics as a challenging subject that requires hard work, but they believe that mathematical skills *can* be developed with effort. A person with a fixed mindset of intelligence believes in the stability of their intelligence; no amount of effort can change how

intelligent they are in a given subject. A person with a fixed mindset regarding their mathematical ability would not believe that they can improve this skill; instead, they believe that their competency in mathematics is fixed and that no amount of effort can change this ability.

2.1.1 HISTORY OF MINDSET THEORY

Research on implicit theories or mindsets[1] has greatly enhanced our understanding of behavioral patterns and response to adverse events (Dweck & Yeager, 2019). But it began as a simple inquiry into why people respond differently when faced with the same challenge. More specifically, research examined children's motivational and behavioral patterns in response to failure and sought to explain why some children give up while others persevere. This work was primarily initiated by psychologist Carol Dweck; it stemmed from earlier work on learned helplessness, or the perceived separation of behavior and aversive events, in dogs (Seligman & Maier, 1967, Dweck, 1975). In their seminal investigation into learned helplessness, Seligman & Maier found that in a group of dogs that initially learned an electric shock was inescapable, these dogs no longer attempted to escape in subsequent trials even when they were able to escape the electric shock. The work was more humanely adapted to humans beginning with an investigation into the cognitive-motivational differences following failure feedback in children (Diener & Dweck, 1978). Seventy fifth grade students were labeled as either *master-oriented* or *helpless.* The students were classified into each group based on scores from the Intellectual Achievement Responsibility (IAR) Scale (Crandall et al., 1965*)*. In the first part of the study, both groups of children engaged in a discrimination task in which they were given a set of cards containing two figures that varied on three dimensions. The three dimensions were color (e.g., red), form (e.g.,

[1] This literature review includes research that originally used the terminology of implicit theories (incremental vs entity) but has replaced these terms with mindsets (growth vs fixed) for consistency and simplicity.

square), and symbol (e.g., star). The students were tasked with finding the one correct pattern of dimensions for each deck of cards. Regardless of the solution they provided in each trial, the deck was arranged such that the children could only select an answer that was incorrect. After the experimental trial, children were asked, "Why do you think you had trouble with these patterns?" This was done to explore their perceived relationship between their behavior and the feedback they received during the task in which their answers were consistently incorrect. The same procedures were conducted for the second part of the study, with the exception that the children were encouraged to verbalize their performance attribution aloud throughout the task, as opposed to at the conclusion of the trial. Although the same negative feedback was still given to both groups, the attribution of failure reported by the children differed depending on their group status. The children in the *mastery-oriented* group attributed their errors to their lack of effort. They demonstrated improvement in their problem-solving behavior and used strategies to improve their performance; they apparently believed that their behavior could affect the outcome of the task. Children in the *helpless* group tended to attribute their errors to their being "not smart enough" (p. 456). These children ruminated on their failures, suggesting a maladaptive coping response to this setback. It appeared that the children who demonstrated learned helplessness patterns believed that their errors were outside of their control, and so they tended to give up more easily. These conclusions and subsequent findings on goal-directed behavior (Diener & Dweck, 1980; Dweck, 1986) eventually led Dweck and her colleagues to develop the *social-cognitive model* of motivation (Dweck & Leggett, 1988) to explain why behavioral reactions to the same stimuli can vary among people and to explore the implications for psychological functioning.

2.1.2 SOCIAL-COGNITIVE MODEL

The social-cognitive model for understanding motivation and personality (Dweck & Leggett, 1988) is a framework that describes how a person's beliefs and values contribute to their unique behavioral patterns. According to the model, the goals that a person pursues underlie their motivation and consequent reactions. Within this framework, people who focus on personal strategy and effort are classified as *master-oriented* and strive towards *learning goals*. These goals involve personal growth or increasing competence in a specific skill, even if that person appears inadequate in front of others. Learning goals are considered adaptive because people who seek these goals are able to adjust their behavior when they encounter challenges. In contrast, people who focus on their ability and adequacy are classified as *helpless* and strive towards *performance goals*, such as gaining favorable judgment from others or obtaining a good grade. People who pursue performance goals are not as concerned with the process of learning as much as demonstrating their ability and adequacy in front of others. According to Dweck and Leggett (1988) this goal pattern is considered maladaptive, as individuals may avoid challenges in an attempt to reduce the likelihood that they will appear inadequate in front of others.

The social-cognitive model further contends that goal orientation, which can focus on learning goals or performance, stems from a person's *implicit theory*, or inherent beliefs about human attributes, such as ability. Implicit theories, henceforth referred to as *mindsets*, are predictive of the goals a person pursues and their subsequent behavioral and affective patterns following a given situation. A person's mindset is presumed to emerge based on past experiences and personal beliefs. People who have a growth mindset tend to seek learning goals that maintain their self-efficacy. They believe in the controllability of situations; further, they believe that the outcome is related to their own effort. People whose mindsets lead them to seek performance

goals (i.e., they harbor a fixed mindset[2]) may have reduced self-efficacy of effort, as they do not attribute outcomes to their personal behavior; instead, they view outcomes as being outside of their control.

2.1.3 DOMAIN-SPECIFIC MINDSETS

Although empirical work on mindsets has primarily focused on academic achievement and associations with a person's intelligence mindset (Macnamara & Burgoyne, 2023), mindsets are domain specific and can address attributes other than a person's intelligence. Dweck & Leggett (1988) argued that a person can have mindsets regarding different self-attributes, such as talent (Dweck, 2006), social functioning, and morality (1988). The fact that a person can have domain-specific mindsets is notable, as their behavior and subsequent reactions depend on the specific situation; a mindset is not an inherent trait itself. To illustrate, a person may have more of a growth mindset regarding their intelligence compared to their talent in a given area (e.g., golf), in which they may have a fixed mindset. Mindset theory has been applied to a growing number of human attributes outside of intelligence, such as personality, emotion, and anxiety, to better understand a person's motivation and behavioral responses in various situations. These are often referred to as *domain-specific* mindsets.

2.1.3.1 PERSONALITY MINDSETS

The beliefs that a person has regarding the malleability of personal dispositions or *personality* affects how they perceive a social exchange. Chiu et al. (1997) explored the relationship between a person's personality mindset and their perception of social situations through five separate studies that examined relationships between how a person perceives social

[2] Although referred to as having either a fixed or growth mindsets, mindsets operate on a continuum and are not dichotomous.

situations and how they predict future social behaviors based on those perceptions. It was hypothesized that believing in the malleability of personality traits, referred to as *growth mindset of personality*, would be associated with less negative judgment of others. A person with a growth mindset of personality would be less likely to make predictions regarding a person's character based on a single observation of their behavior in a social scenario. Believing in the fixedness of personality traits, referred to as a *fixed mindset of personality*, would be associated with greater negative judgement of others and higher likelihood of making predictions regarding a person's character from a single observation.

In the first study, participants completed an implicit theory (i.e., mindset) scale on personality, a measure designed to examine the inherent beliefs a person has about personality. The participants also completed a behavioral prediction measure that consisted of four questions in which they were asked to predict the likelihood of a person's lasting behavior based on a single scenario. The researchers sought to determine if participants judged that a person's behavior in one scenario would be reflective of their lasting personality. For instance, one question asked, "Suppose you observed Jack and Joe in one particular situation and found that Jack was more friendly than Joe. What do you suppose is the probability that in a completely different situation, you would also find Jack to be more friendly than Joe?" (p. 23). The authors found that the people with a growth mindset of personality were less likely to believe that a person's behavior in a social situation was predictive of their lasting personality. Holding a fixed mindset of personality was associated with making stronger predictions in traits across social situations; people with fixed mindsets of personality were more likely to predict that a person who was unfriendly in one scenario would also be unfriendly in subsequent scenarios. In the second study, participants completed the same implicit theory scale to measure their mindsets of

personality as the first study. However, they answered questions about ten different social scenarios that assessed whether knowledge about a person's trait would be predictive of that person's lasting behavior. One question posed, "Henry is more aggressive than Edward on average. What do you suppose the probability that Henry would act more aggressively than Edward in a given situation?" (p. 23).

Results from these two studies suggested that a person's personality mindset shapes how they perceive and predict social interactions. The results of the second study confirmed that those who had a growth mindset of personality believed in the dynamic nature of personal traits. They were less likely to place as much value on the observed traits and did not subscribe to the belief that a single scenario is predictive of future social interactions. A person may have thought, "Joe was probably just having a bad day and that is why Jack seemed friendlier." For someone with a growth mindset of personality, behaviors are not indicative of moral character; such people place less judgment on others and even themselves. On the contrary, relative to people with growth mindsets of personality, people with fixed mindsets of personality make stronger predictions based on a single scenario. They consistently view a person's behavior as a function of their dispositional traits as opposed to other situational factors. Subsequent investigations (Yeager et al., 2014) confirmed the relationship between personality mindsets and self-perceptions and extended these findings to how mindsets of personality relate to coping responses in adverse social events.

2.1.3.2 PERSONALITY MINDSETS AND RESPONSES

Yeager et al. (2014) explored the relationship between personality mindsets and coping responses to social adversity in adolescents. In the first of two studies, 158 ninth-grade students were surveyed about their personality mindset, global psychological stress, and physical health

during the first week of school. Personality mindsets were measured using a four-item Likert scale utilized in previous studies (e.g., Yeager et al., 2011); global psychological stress was measured using a 10-item Perceived Stress Scale (Cohen et al., 1983); and physical health was measured using an adapted physical health symptoms survey from a previous study on adult health symptoms (Hays et al., 1993). One week following these measures, participants engaged in an experimental condition to measure their negative reactions to social exclusion. The experimental condition involved the "Cyberball" paradigm (Williams & Jarvis, 2006), which is an online game of catch between the participant and who they believed to be two other "students" (but were in actuality controlled by a computer program). In the first part of the paradigm, the two students threw the ball to the participant twice before only throwing the ball to each other for the remainder of the time. An "error" box appeared, and the participant was told that there was a computer malfunction so that the other "students" did not know there was a third player online. In the next part of the paradigm, the participant was fully included in the online game of catch. The participant was then asked a series of questions regarding their experience playing the game. For example, "Is there anything you'd like to share with the research team?" Academic achievement was measured with end-of-semester grades for English, math, and science for both the fall and spring semester.

Results of this first study indicated that believing in the malleability of traits, or having a growth mindset of personality, is related to more optimal responses to social challenges. Those who were rated to have more of a growth mindset of personality reported less stress, anxiety, and negative self-feelings than those who were rated to have a fixed mindset of personality. The adolescents who had a fixed mindset of personality had more negative reactions to being socially excluded in the Cyberball paradigm. They also reported more stress, anxiety, and negative self-

feelings following this experience. The adolescents who reported having a fixed mindset of personality at the beginning of the year also reported more stress at the end of the year, suggesting that their personality mindset had a stable effect across time. The results confirmed that the mindset a person has about another person's character has both short-term and long-term effects on their perception of adverse events. This mindset then influences their coping responses when faced with negative events such as social exclusion. The relationship found between mindsets and coping responses points to the influence that a person's mindset has on the way they react to challenges.

2.1.3.3 EMOTION MINDSETS

Extending the findings that mindsets of personal attributes can shape behavioral reactions and coping responses, Tamir et al. (2007) explored the associations between emotion mindsets and self-efficacy of emotional regulation strategies in students entering college. Similar to personality mindsets, people who have a *growth mindset of emotion* believe in the malleability of emotions; they are more likely to regulate their emotional response, as they believe that they can control their emotional reaction. On the other hand, people who have a *fixed mindset of emotion* believe in the fixedness of emotions; they do not readily regulate their emotional response, as they do not believe that they can control their emotional response to the situation. Participants were 437 students entering their first year of college who were measured on their implicit theory (i.e., mindset) of intelligence using The Implicit Theories of Intelligence Scale (Dweck, 1999) and their implicit theory (i.e., mindset) of emotion using a modified version of The Implicit Theories of Intelligence Scale, now referred to as the Implicit Theories of Emotion Scale (TOE; Tamir et al., 2007). Participants' emotional regulation self-efficacy was measured using the Emotion Regulation Questionnaire (ERQ; Gross & John, 2007). The participants also kept a

weekly diary of social outcomes, which was a rating of their emotional experiences with friends and family during the prior week. They were asked to rate how often they felt positive emotions (e.g., happy/pleased/contented) and negative emotions (e.g., anxious/nervous) within the prior week using a four-point rating scale (0 = *not at all*, 4 = *extremely*). In addition, they were asked to rate the degree of social support they received from friends and family using a seven-point rating scale (1 = *no support*, 7 = *great support*). Their peers were asked to provide self-reports of the participants' emotions using the same rating scale provided to the participants. These measures were repeatedly given throughout the participants' first year of college to capture social and emotional changes longitudinally during this time of transition.

The results indicated that having a growth mindset of emotion was related to greater emotional regulation, as these participants were more likely to use cognitive reappraisal during challenging situations. Additionally, these participants reported higher self-efficacy or greater confidence in their ability regulate their emotions. These participants also gained more social support as the academic year progressed, according to the peer reports. In contrast, those with fixed mindsets of emotion reported more negative and intense emotions throughout their first academic year. They were also less likely to gain social support from peers and reported increased feelings of loneliness. These findings demonstrated that mindsets related to emotion have both personal *and* interpersonal effects. The pre-existing knowledge that a person has during a challenging time, such as transitioning to college, influences how they perceive their social environment and their response to challenges. Holding a growth mindset of emotion allows a person to believe that they *can* control their emotions with their actions, and this can result in the use of more adaptive strategies, such as cognitive reappraisal. This, in turn, can lead to better emotional and social outcomes. These results provided the foundation for understanding

the influence that emotion mindsets can have on a person's interpretation of social experiences and the propensity that that person may have to use adaptive responses in difficult situations.

2.1.3.4 EMOTION MINDSETS AND RESPONSES

Kappes & Schikowski (2013) explored the association between a person's mindset of emotion and the strategies they used within a distressing situation. Participants were 84 female students whose feelings of discomfort and emotional regulation strategies were measured while they watched a portion of the first "Russian roulette" scene from *The Deer Hunter*. Emotion mindsets were measured using the TOE (Tamir et al., 2007). Participants were also measured on their baseline negative affect using the Negative Affect Scale of the Positive and Negative Affect Schedule (PANAS-N; Watson et al., 1988). Emotional regulation, operationalized as experiential avoidance, was measured through a nine-point rating scale (0 = *not at all*, 8 = *all the time*) on how often they felt bothered by their discomfort while they viewed the movie clip. The findings indicated that the inherent beliefs that the participants held regarding their ability to regulate their emotions, whether either growth or fixed, influenced their response to the distressing situation. Those who had a growth mindset of emotion reported being less bothered by the movie clip, and some even chose to watch it a second time to be able to fully view the outcome of the Russian roulette game. Their belief in the controllability of their emotions allowed them to more adaptively manage negative feelings that were evoked from the film scene. In contrast, individuals with a fixed mindset of emotion demonstrated greater negative affect, experiential avoidance, and feelings of discomfort. They were also more likely to employ avoidance strategies, such as closing their eyes, while they watched the video, and reported stronger negative emotions after the video.

These findings confirmed previous research on the influence that emotion mindsets have on personal experiences (e.g., Tamir et al., 2007) and added further evidence to the association between a person's emotion mindset and their coping responses. Those who hold a growth mindset of emotion are more likely to face challenges head-on and use adaptive emotional regulation strategies, such as cognitive reappraisal or changing how they view a situation (Schroder et al., 2015). On the other hand, those with fixed mindsets of emotion are more likely to engage in experiential avoidance to reduce feelings of discomfort. Examining emotion mindsets can provide a greater understanding of people's tendencies to use utilize adaptive coping strategies when they are distressed.

2.1.3.5 ANXIETY MINDSETS

Relatedly, the mindsets that people have about anxiety can also be predictive of their emotional regulation and coping response, and this relationship has implications for their overall mental health. To understand the degree to which people believe that anxiety is malleable, Schroder et al. (2015) explored the associations between different mindsets and several common psychological symptoms, specifically anxiety, depression, and perfectionism. The authors examined mindsets that have been previously established through research, such as intelligence and emotion, as well as a novel measure of a *mindset of anxiety* (i.e., Implicit Theories of Anxiety; TOA). They contended that people who have a *growth mindset of anxiety* believe in the malleability of their anxiety through actions and that genetics only partially contributed to their anxiety. On the other hand, people who have a *fixed mindset of anxiety* believed they are genetically predisposed to their symptoms of anxiety and that they are unable to control these symptoms through their actions. The authors also examined whether a person's mindset of other

self-attributes, including intelligence, emotion, and anxiety, influenced their treatment preferences and, potentially, therapeutic outcomes.

In the first of two studies, 388 participants were given scales to test their implicit theories of intelligence using the Implicit Theories of Intelligence scale (TOI; Hong et al. 1999), emotion (TOE; Tamir et al. 2007), and anxiety (TOA; Schroder et al., 2015). Participants were then given a battery of measures to assess mental health symptoms of anxiety, depression, perfectionism, and emotion regulation. Participants were asked to provide their hypothetical psychological treatment preferences (*Individual Treatment*, *Medication*, or *No Treatment*). Although a wide range of mental health symptoms was reported, the authors found an association between having a growth mindset of anxiety operationalized as higher scores on the TOA and fewer reported mental health symptoms. Notably, participants' anxiety mindsets were the most predictive of their mental health symptoms. Having a growth mindset of anxiety was associated with fewer mental health symptoms, whereas having a fixed mindset of anxiety was associated with more mental health symptoms. Holding a growth mindset was also related to more beneficial emotional regulation strategies during stressful events. These strategies included cognitive reappraisal and less emotional suppression, possibly accounting for the reduced report of mental health symptoms. Mindsets were also related to hypothetical treatment preference, as participants with a fixed mindset of anxiety chose Medication over the No Treatment or Individual Treatment options. Those who held a fixed mindset of anxiety subscribed to the idea that their mental health symptoms were due to biological factors outside of their control, such as their genetic makeup. Behavioral options, such as intervention, were perceived by this group to be ineffective, as respondents believed that intervention and their personal actions would not address the underlying cause of anxiety.

The second study was similar to the first, but it also included measures of social phobia, as measured by the Social Phobia Inventory (SPIN; Connor et al. 2000), and interpersonal distress, as measured by the Inventory of Interpersonal Problems-Short Circumplex (IIP-SC; Soldz et al., 1995). The results of the second study mirrored and extended the results of the first. Having a growth mindset of anxiety was associated with less mental health impact, including reduced symptoms of anxiety, depression, and interpersonal problems. Additionally, greater emotional regulation was associated with a growth mindset of anxiety, further indicating the benefits of having a growth mindset of anxiety and the associated tendency to engage in more adaptive coping responses.

2.1.3.6 ANXIETY MINDSETS AND RESPONSES

Numerous studies (e.g., Kappes & Schikowski, 2013; Schroder et al., 2015; Tamir et al., 2007; Yeager et al., 2014) have confirmed a positive relationship between growth mindsets across domains and adaptive coping responses to adverse life events, yet the magnitude of this effect is less well understood. Schroder et al. (2017) investigated the moderating effect that mindsets have on the association between adverse life events and coping responses in 1,682 undergraduate students. Participants completed a self-report anxiety mindset measure (TOA; Schroder et al., 2015) and a series of outcome measures, specifically: the occurrence of stressful life events, as measured by the Life Events Checklist-5 (LEC-5; Gray et al., 2004); psychological distress, as measured by the posttraumatic Checklist for DSM-5; symptoms of depression, as measured by the Patient Health Questionnaire-9 (PHQ; Kroenke et al., 2001); and maladaptive coping, operationalized as alcohol abuse, as measured by the Patient Reported Outcome Measurement System Alcohol Use Short Form (PROMIS-Alc; Pilkonis et al., 2013); drug abuse problems, as measured by the Drug Abuse Screening Test-10 (DAST-T; Skinner, 1982); and

non-suicidal self-injury, as measured by the Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009). Results indicated that stressful life events were positively associated with psychological distress, but different mindsets were more predictive of the outcomes than the number of stressful life events a person had experienced. In particular, growth mindsets of anxiety were found to moderate the degree to which stressful life events effected the outcomes that were measured, suggesting that growth mindsets of anxiety may be a protective mechanism or buffer against adverse events. Conversely, fixed mindsets of anxiety were more strongly related to psychological distress, symptoms of depression, and maladaptive coping strategies, supporting the notion that mindset interventions that aim to promote growth mindsets of anxiety may mitigate and protect against the negative effects of adverse events.

2.1.4 SUMMARY OF MINDSET THEORY

Although research on mindsets is still considered to be in its infancy (Dweck & Yeager, 2019), findings across the domains of personality, emotion, and anxiety highlight the importance of understanding different mindsets and how they shape a person's behavioral, affective, and cognitive reactions to adverse life events. Early research on mindsets focused on understanding how behaviors are shaped based on beliefs and expectations, as well as on how a person's mindset can be measured in relation to achievement (Diener & Dweck, 1978; Dweck, 1975). This work provided the foundation for our understanding of goal orientation and why people differ in their approaches to challenging situations and responses to failure. It is now well established that the goals a person pursues, either learning or mastery, are influenced by their mindset, whether growth or fixed, and that this shapes their behavioral and affective responses to their life experiences. Chiu et al. (1997) was one of the first researchers to extend mindset research into domains outside of academic achievement and established the importance of

mindset theory in the context of understanding social behavior. Yeager et al. (2014) further established the importance of investigating personality mindsets for psychological functioning and coping responses. Subsequent work on emotion mindsets provided insight into regulation and affective reactions, as well as the coping responses that a person might exhibit during difficult and distressing times in their life (Kappes & Schikowski, 2013; Tamir et al., 2007). More recent work on anxiety mindsets has affirmed the value of growth mindsets for mitigating psychological distress; such work also underscored the clinical applicability of changing mindsets in the mental health field. Specifically, a person's anxiety mindset can predict the coping strategies that they are likely to use in challenging situations (Schroder et al., 2015, 2018), making a person's mindset a relevant indicator of psychological treatment outcomes (Schroder, 2021). The domains in which mindsets have been explored continues to grow; recent studies have even examined physiological changes as a result of the effects of a person's mindset, indicating an even deeper connection between the physical influence that belief systems and thought patterns can have on a person's overall health (Crum et al., 2017). Taken together, it is clear that having a growth mindset in a given domain holds numerous benefits for more adaptive social functioning, emotional regulation, and appraisal of a situation.

2.2 MINDSET EFFECTS

Due to the powerful influence that mindsets have on human behavior in response to challenges and setbacks (Dweck & Leggett, 1988), interventions aimed at manipulating mindsets have been developed in an attempt to facilitate more adaptive responses to adverse life events. The first published research study of a mindset intervention was conducted by Aronson et al. (2002), who explored the effects of an attitude change intervention, now known as a *mindset intervention*, on stereotype threat and academic achievement. The authors contended that

negative racial stereotypes would be related to academic underperformance. Aronson et al. explored these effects in a population of Black students, due to the historically observed academic gap within this population. The intervention aimed to reduce stereotype threat by reducing negative self-views through an intervention that taught the message that intelligence is malleable. Participants were 42 Black college students and 37 White college students who were randomly placed into three groups and assigned to a mindset intervention group or one of two control groups. Participants in the intervention group engaged in an attitude change condition in which they were taught about the malleability of intelligence. They received the message that intelligence can increase with hard work and effort. They were asked to write a letter to a pen pal to discuss (a) the benefits of overcoming a challenge and (b) the idea that intelligence can be developed "like a muscle" (p. 173). Participants in the first control group also wrote a letter that discussed the benefits of overcoming a challenge, but they received an intervention that emphasized the message that people have both intellectual strengths and weaknesses. The participants in the second control group neither participated in an intervention nor engaged in the pen pal task.

Participant's beliefs about the nature of intelligence and ratings of academic enjoyment were measured through self-rating scales, and their perception of stereotype threat was measured through guided interview questions. Their academic achievement was assessed by their grade point average (GPA). These measures were all repeated at the end of the academic school year to identify the long-term effects of the mindset intervention. Prior to the mindset intervention, the Black students reported more stereotype threat than the White students. The Black students also reported decreased perceived stereotype threat following the mindset intervention. The mindset intervention appeared to moderate academic enjoyment as only the participants in the

experimental group reported higher academic enjoyment compared to both control groups. Results were mixed regarding academic achievement operationalized as GPA. In the experimental condition, GPAs were increased in both groups, but these increases were greater for the Black students. The authors regarded this as a function of the previously established lower GPAs of the Black students compared to the White students. The authors concluded that the mindset intervention was capable of creating widespread changes not only in the realm of academic achievement and enjoyment but also in overall attitudes about the self. The reductions in stereotype threat following an intervention aimed at increasing malleability of beliefs of intelligence suggested that a growth mindset can have a profound positive influence across many areas of a person's life.

2.2.1 DOMAIN SPECIFICITY AND GENERALITY OF MINDSETS

Dweck (2006) established the domain-specificity of mindsets; Schroder et al. (2016) expanded the idea in highlighting the generalizability of having a growth mindset across domains, while demonstrating the effects of growth mindsets on psychological well-being. In the first of their two-part study, the authors used confirmatory factor analysis (CFA) to evaluate the structure of seven mindsets of self attributes: anxiety, intelligence, emotion, personality, social anxiety, depression, and drinking tendencies. Participants were 363 college students who completed a series of self-report measures on the seven mindsets identified. Each of the seven measures was adapted from the existing measure of implicit theories on intelligence (ITIS; Dweck, 1999) using a find and replace method. For example, the original implicit theories of intelligence scale states, "You have a certain amount of *intelligence* and you cannot do much to change it." Correspondingly, the first question on the Implicit Theories of Anxiety (TOA) scale states, "You have a certain amount of *anxiety* and you really cannot do much to change it." (p.

517). Latent structure analysis was conducted with the composite scores of each mindset scale to explore the potential underlying relationships between the different mindsets that participants exhibited in the various domains. Bivariate correlations indicated that that all seven mindsets explored were correlated with one another. This suggests a global dimensionality across mindsets in that having a growth mindset in one domain is associated with having a growth mindset in another. At the same time, each mindset is distinguishable from the another, providing further evidence for domain-specificity of mindsets.

In the second study, the authors measured the predictive nature of each mindset for certain psychological symptoms. For example, the researchers examined whether a person's anxiety mindset had a stronger relationship to psychological symptoms of anxiety than psychological symptoms of depression. Participants were 531 college students who were recruited after the first study was completed. This group completed a series of self-report measures on the seven mindsets from the first part of the study, as well as on several symptoms related to psychological distress: problematic worry, as measured by the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990); somatic anxiety, as measured Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991); social anxiety, as measured by The Social Phobia Inventory (Connor et al., 2000); depression, as measured by the Mood and Anxiety DASS-Depression Subscale (Henry & Crawford, 2005), and the Center for Epidemiologic Studies Depression Scale-Revised (CESD-R; Eaton et al., 2004); and alcohol use, as measured by the Patient-Reported Outcome Measurement Information System (PROMIS; Pilkonis et al., 2013).

As predicted, the results indicated that a person's tendency toward a specific mindset was correlated with corresponding psychological symptoms. Anxiety mindset was correlated with

symptoms of worry and somatic anxiety, implying that mindsets hold greater effects within its specific domain. These results further supported the domain-specificity of mindsets as they relate to psychological symptoms, supporting the need for a more individualized investigation of domain-specific mindsets within a person. The authors suggested that a person's mindsets can be leveraged for more personalized treatments related to their specific psychological needs, such as targeting a growth mindset of anxiety for a person with anxiety symptoms. The mindset that a person has regarding a specific attribute, such as anxiety, can act as a mechanism, or psychological process. This process relates to mental health outcomes with growth mindsets facilitating more adaptable reactions to mental health-related symptoms.

In addition to anxiety mindsets being correlated with the psychological symptoms of anxiety, anxiety mindsets were also significantly correlated with psychological symptoms of depression. Such correlations between mindsets in one domain (e.g., anxiety) and psychological symptoms of a different domain (e.g., depression) are consistent with the universality of mindsets, as established in Schroder et al. (2016)'s first study. These results confirm that there is a global dimension across the different mindsets that a person may have regarding their own personal attributes. Of note, having a growth mindset across various domains was correlated with overall reduced psychological symptoms. The participants who had a greater growth mindset of anxiety reported lower levels of problematic worry compared to participants who reported higher levels of problematic worry. Having a growth mindset in general can support psychological process associated with more malleable thinking and adaptive coping responses when faced with adverse events (see Kappes & Schikowski, 2013; Tamir et al., 2007). Altogether, such findings provided further support for the benefits of growth mindset interventions for different domains.

2.2.2 BENEFITS OF MINDSET INTERVENTIONS

Having a growth mindset in a range of domains has been shown to benefit various aspects of a person's psychological well-being. In a meta-analysis of 72 studies, Burnette et al. (2020) investigated the strength of the association between growth mindsets and psychological distress. The mindsets examined were emotion, personality, intelligence, and "another attribute-specific" (e.g., shyness) domains. Psychological distress was defined as symptoms of depression, anxiety, and other distress-related variables (e.g., suicidality). The authors also assessed the effects on increases in growth mindset of potential moderating variables, specifically, treatment value outcomes and active coping skills. Treatment value outcome was defined as behaviors related to treatment seeking and adherence, and active coping was defined as the use of helpful affective, behavioral, and cognitive strategies a person uses when distressed. Analyses revealed that all domains of growth mindsets were negatively associated with psychological distress, though the overall correlation was small ($r = -.220$). The mindset that had the greatest association with psychological distress was emotion mindset ($r = -.291$). As Tamir et al. (2007) previously illustrated, believing in the malleability of emotion predisposes a person to engage in emotional regulation strategies, and this reduces negative emotions during a challenging time. Burnette et al. (2020) explained that a person with a growth mindset believes in the malleability and controllability of their circumstances. This belief leads them to engage in adaptive strategies in response to distress.

Burnette et al. (2020) also found that treatment value outcome and active coping skills were related to growth mindsets as moderating variables; both processes reduce a person's psychological distress when a growth mindset is adopted. The authors suggested that a person's mindset should be initially assessed within a mindset intervention in order to optimize treatment

outcomes. According to the authors, the mindset that a person has regarding the malleability of their circumstances may facilitate or be a potential barrier to their treatment engagement and ultimately treatment outcomes. A person who has a tendency toward a growth mindset will more readily engaged in treatment for lasting behavior changes due to their belief in the controllability and changeability of their situation; that is, they believe that their actions *will* have an effect. A person who has a fixed mindset in a given domain is less likely to believe in the treatment value and adhere to intervention; they do not subscribe to the belief their actions will affect their circumstances. They suggested that clinicians should directly address their client's thoughts and beliefs on the changeability of their specific situation through the use of a mindset intervention to optimize treatment outcomes.

Further illustrating the distinct effects of mindsets, Kyler and Moscicki (2024) conducted a systematic review of 140 mindsets and effects following a domain-specific growth mindset intervention. The authors found positive associations between a mindset domain and intervention results. These findings suggests that the mindset domain targeted within an intervention may be another moderating factor related to the efficacy of a mindset intervention. As an example, an intervention aimed to increase growth mindsets of anxiety would have a greater effect on a person's anxiety mindset compared to a person's emotion or intelligence mindset. Mindset interventions appear to provide benefits in terms of changing mindsets and enhancing treatment outcomes. The range of approaches described by Kyler and Moscicki suggest that there are a number of different ways that mindset interventions can be developed and advanced.

2.2.3 GUIDELINES FOR MINDSET INTERVENTIONS

The beneficial effects of having a growth mindset have been demonstrated, but further understanding of what constitutes an *effective* mindset intervention is still needed. Burnette et al.

(2022) provided guidance on how mindset interventions can be designed to optimize outcomes. The first consideration when implementing a mindset intervention is the population for whom interventions are the most appropriate. Mindset interventions are most effective for groups that are already disadvantaged and frequently experience setbacks. As exemplified by Aronson et al. (2002), implementing a growth mindset intervention to facilitate beliefs in the malleability of self-attributes in a population of Black students who were already at risk for stereotype threat allowed for even greater effect compared to a population that was not at risk for stereotype threat, such as the White students in their study. Likewise, an intervention aimed at developing beliefs about the malleability of anxiety would be more effective in people with heightened anxiety symptoms, and the expected outcomes would be a reduction in anxiety symptoms. Another set of considerations in the development of effective mindset interventions involves implementation practices and the specific approaches used for the mindset intervention. There is no standardized approach for implementing a mindset intervention, but Burnette et al. (2022) proposed several "core components" of a mindset intervention (p. 9) based on their systematic review of mindset intervention research. There must be a message that the attribute being targeted is malleable, and there must be an activity aimed at changing attitudes regarding that attribute. This often involves a "pen pal" activity in which the participant writes a letter to another individual about the opportunities for growth in a challenging situation (see Aronson et al., 2002). Another key feature of a mindset intervention is delivery competence, or the effectiveness with which content is delivered. Interventions should include the following: (a) neuroscience information, (b) credible sources, (c) scientific evidence for the potential to change, (d) respect of autonomy (e.g., ask the participant to collaborate), (e) social norms for social modeling content, (f) content focused on avoiding self-blame and encouraging self-compassion,

ensuring that the content is personally relevant for participants, and (g) metaphors that make the message "sticky" (Yeager et al., 2016, p. 9). The last consideration recommended by Burnette et al. involves the amount of oversight the researcher(s) has on the content being delivered. Researchers have more control when they are delivering the intervention synchronously and in person compared to delivering content asynchronously online through a computer. Researchers have less control over the delivery of the content of online interventions, but such interventions are more accessible and cost-effective (Schleider, 2023).

2.2.4 SINGLE-SESSION MINDSET INTERVENTIONS

Single-session interventions are treatments that are carried out through one visit or encounter with a clinic, school, or program (Schleider & Weisz, 2017). These interventions can be therapist-administered, such as a solution-focused brief therapy (Burns & Northcott, 2022), or self-administered, such as a 20-minute online module focused on mental health (Lab for Scalable Mental Health, 2023). Single-session interventions have been found to be effective for a variety of issues across populations. For example, Schleider and Weiz (2016) conducted a meta-analysis of 50 randomized control trials of single-session interventions that addressed youth mental health problems (e.g., anxiety). The authors found that single-session interventions demonstrated an overall significant effect in addressing youth mental health problems. The magnitude of effects of the interventions depended upon the outcome being targeted, with the largest effect size seen for decreasing anxiety symptoms (g = -.058). Taken together, the findings from their meta-analysis indicate that single-session interventions may be more beneficial in reducing mental health symptoms for some domains compared to others.

In particular, Schleider and Weisz (2018) explored the effects of a single-session mindset intervention on reducing symptoms of depression and anxiety in adolescents. The participants

were 96 adolescents who were randomly assigned to either a mindset intervention or a control condition. The mindset intervention was designed to promote the belief that personality is malleable; it followed a similar format to the mindset interventions in Aronson et al. (2002) and Miu and Yeager (2015). The intervention was self-administered and delivered through a computer. The control condition was also self-administered and delivered through a computer, but this condition promoted the idea that participants could express their thoughts and feelings with others. For example, participants were asked how they would feel after positive and negative hypothetical situations. Both the intervention and control condition were designed to last between 20 and 30 minutes. All participants completed self-report measures on their anxiety symptoms, as measured by the Screen for Child Anxiety and Related Disorders-Child version (SCARED-C; Birmaher et al., 1999); depressive symptoms, as measured by the Children's Depression Inventory (CDI; Kovacs, 2001); perceived primary control, as measured by Perceived Control Scale for Children (PCSC; Weisz et al, 1987); perceived secondary control, as measured by the Secondary Control Scale for Children (SCSC; Weisz et al., 2010); and personality mindset, as measured by the Implicit Personality Theory Questionnaire (IPT-Q; Yeager et al., 2013). These measures were conducted pre-intervention, and at three, six, and nine months post-intervention. The participants who partook in the single-session mindset intervention reported reduced depressive symptoms and increased primary control, both of which persisted at the nine-month follow up. As suggested by the authors, having a growth mindset and having more perceived control within a situation, allowed for more adaptable coping responses to setbacks, such as active problem solving. A person with a fixed mindset does not perceive this control and may subsequently avoid situations or even ruminate on negative experiences. These

findings further support the efficacy of a brief mindset intervention in facilitating more adaptable responses to adverse events.

2.2.5 SUMMARY OF MINDSET EFFECTS

The well-established relationship between growth mindsets and positive coping reactions in times of distress and adversity (Kappes & Schikowski, 2013; Tamir et al., 2007; Yeager et al., 2014) led to the development of mindset interventions. Growth mindset interventions facilitate adaptive responses to negative events by emphasizing the malleability of beliefs and self-attributes (Burnette et al., 2020; 2022). The earliest mindset intervention (Aronson et al., 2002) explored the effects of having a growth mindset of intelligence on a person's reaction to stereotype threat. The results demonstrated that growth mindsets were associated with reduced stereotype threat, supporting the relationship between growth mindsets and adaptive responses to adversity. Growth mindsets were also associated with an increase in academic enjoyment. These additional findings expanded knowledge of the wide-ranging, beneficial effects that holding a growth mindset may have across different domains.

Although mindsets are domain specific (Dweck, 2006), mindsets about different self-attributes (e.g., anxiety) have been found to be positively correlated; holding a growth mindset in one domain is correlated with holding a growth mindset in another domain (Schroder et al., 2016). Schroder et al. (2016) empirically established mindset generality, or the underlying global dimension between mindsets, pointing to the value of growth mindset interventions in broadly reducing psychological distress. These brief interventions can be delivered in a single session (Schleider & Weisz, 2017), highlighting the accessibility and feasibility of such interventions.

Although mindset interventions have shown efficacy across a range of participants, it appears that they may be more effective for some individuals and less effective for others.

Burnette et al. (2022) suggested that mindset interventions are the most effective for groups that are already disadvantaged and frequently experience setbacks. This finding is relevant for the present investigation because people who stutter frequently encounter setbacks in many areas of their lives, such as employment (Klein & Hood, 2004; Gerlach et al., 2018), education (Ellis & Hartlep, 2017), and social relationships (Beilby et al., 2013). Their reactions to setbacks can be either adaptive or maladaptive, with adaptive reactions being related to reduced psychological symptoms and distress (Schroder et al., 2015). Because a person's expectations, thoughts, and beliefs about the malleability of self-attributes (such as reactions to stuttering) can influence their appraisal of a given situation, it is valuable to explore the role that mindsets related to stuttering reactions may play in a speaker's use of positive coping responses and development of protective mechanisms in response to stuttering.

2.3 EXPERIENCE OF STUTTERING

Stuttering is a condition that involves disruptions in the forward flow of speech (Bloodstein et al., 2021; Yairi & Ambrose, 2005), but involves much more than overt speech observations (Tichenor & Yaruss, 2018, 2019b). For a person who stutters, stuttering is an *experience* that involves a sensation of feeling stuck or losing control of speech, combined with the thoughts and feelings about that loss of control; these can negatively impact self-esteem and an overall sense of self (Daniels & Gabel, 2004; Tichenor & Yaruss, 2019b). Viewed through Tichenor and Yaruss (2019b)'s adaptation of the World Health Organization's *International Classification of Functioning, Disability, and Health* (ICF) (WHO, 2001), the experience of stuttering involves personal factors related to stuttering in addition to observable speech disfluencies. Personal factors are the affective, behavioral, and cognitive reactions that occur as a result of the impairment in body structure or function (e.g., the sensation of feeling stuck).

Affective reactions may include feelings of increased anxiety surrounding speaking situations or embarrassment following a negative reaction from a communication partner. Behavioral reactions may then include avoiding specific words or entire speaking situations in an attempt to reduce potentially negative affective reactions (Constantino et al., 2017). Cognitive reactions include low self-efficacy, reduced self-confidence (Carter et al., 2019), and a reduced sense of self (Daniels & Gabel, 2004). The beliefs and expectations that a person has about their experience of stuttering are based on their appraisal of communication experiences, and this further influences their behavioral reactions and subsequent thoughts and feelings about stuttering. Together, these factors have significant implications for the adverse impact of stuttering. This cyclical process is similar to the effects that a person's mindset has on their affective, behavior, and cognitive reactions within a given situation.

2.3.1 ADVERSE IMPACT OF STUTTERING

The adverse impact of stuttering is the cumulative effect of the negative thoughts, feelings, and behaviors that a person who stutters develops in response to the impairment of stuttering. This effect is combined with environmental factors, participation restrictions, and activity limitations which all contribute to the adverse impact of stuttering (Tichenor & Yaruss, 2018; Yaruss & Quesal, 2004). People who stutter experience a range of psychosocial consequences as a result of the negative impact associated with stuttering. Previous research with adults who stutter has shown that higher rates of unhelpful thoughts about speaking situations are associated with negative social-psychological effects (Iverach et al., 2011; St. Clare et al., 2009). The fear of negative evaluation when speaking may lead to reduced communication participation, resulting in further adverse impact (Bricker-Katz et al., 2009). Adults who stutter are also likely to appraise social situations differently than adults who do not stutter. Specifically,

they are more likely to attribute negative reactions from their listeners to their stuttering as opposed to circumstantial factors (e.g., the person was having a bad day) (Brundage et al., 2022). This attribution can lead to repetitive negative thinking (RNT) about speaking situations and the perceived or anticipated negative reactions of others (Tichenor & Yaruss, 2020). The anticipation of a moment of stuttering when speaking with others may become habitual and lead to reduced feelings of self-worth based on the reactions of others (Tichenor & Yaruss, 2020), further driving negative thought patterns specific to stuttering. People who stutter are at risk for experiencing negative reactions due to the well-documented adverse life events and impact that are continually influenced by their thoughts, beliefs, and expectations of stuttering.

2.3.2 MINDSET THEORY AND STUTTERING

Mindset theory postulates that the mindset a person has about a specific domain (e.g., intelligence) helps them create personal meaning systems based on their thoughts, beliefs, and expectations, and this then influences their goal-seeking behavior (Molden & Dweck, 2006). This mental framework shapes their perception and understanding of their experiences, and these, in turn, further influence their affective, behavioral, and cognitive reactions (Dweck, 2017; Dweck & Yeager, 2019; Molden & Dweck, 2006). The development of a specific mindset is a dynamic process that is influenced by past experiences and personal factors related to each person. Within the mindset theoretical framework, personal factors include a person's response to praise or criticism, and subsequent coping response, such as active problem solving (Diener & Dweck, 1978; Molden & Dweck, 2006). This is similar to the way that personal factors are associated with the experience of stuttering. In stuttering, a person's reactions to their perceptions of an event and subsequent coping style are shaped by previous speaking experiences (Tichenor & Yaruss, 2019b). Similar to conjectures on personal experiences

fostering the development of other domain-specific mindsets (see Molden & Dweck, 2006), the mindset that a person creates about stuttering is based on the cyclical interaction between personal factors related to stuttering and past speaking experiences. These factors shape whether a person's goals when speaking are to either stutter openly or avoid stuttering (Tichenor & Yaruss, 2019a). These goals when speaking continually influences a person's reactions to stuttering. The above described process creates a *stuttering reactions mindset,* or a person's inherent beliefs about their personal reactions to stuttering.

2.3.2.1 ANTICIPATION OF STUTTERING

Although mindset theory has not been comprehensively explored in people who stutter, previous studies have examined key aspects of the experience of stuttering that are related to a person's thought patterns about stuttering and their subsequent reactions. Specifically, anticipation of stuttering, or the sense that stuttering will occur (Jackson et al., 2015), is one such phenomenon that may be influenced by a person's stuttering reactions mindset. Jackson et al. (2015) explored anticipation in people who stutter using self-reported ratings and qualitative analysis of open-ended responses related to personal experiences of anticipation of stuttering. All respondents experienced anticipation of stuttering to some extent; the majority (63%) reported that they *Often* experience the feeling of anticipation. In response to this feeling, people who stutter engaged in an *action response* and/or a *non-action response*. Action responses included avoidance strategies, such switching words or not speaking altogether to prevent stuttering, self-management strategies, such as changing their speech rate, or approach responses, such as moving forward with their intended speech plan even if this meant that they might stutter overtly. Non-action responses included experiencing feelings of tension or anxiety. The findings established that people who stutter engage in at least one form of action strategy when reacting to

their stutter, whether that be avoidance or self-management strategies. Further, their action responses may also be accompanied by negative feelings that are further exacerbated by the anticipation of stuttering. The majority of people who stutter regarded some action strategies, such as avoidance, as harmful and even hindered their ability to communicate (Jackson et al., 2015). These findings established the influence of anticipation on personal reaction to stuttering. It was concluded that a person's "anticipation profile" (p. 47) may be assessed to better understand a person's personal reactions to stuttering, and if those reactions are considered beneficial or harmful. More adaptive coping responses can be addressed in a stuttering therapy setting based this anticipation profile. It is currently unknown the extent to which a person's stuttering reactions mindset may influence their anticipation of stuttering and how they respond to their stutter.

2.3.2.2 GROWTH AND FIXED MINDSET OF STUTTERING REACTIONS

A person who stutters creates a personal meaning system (Molden & Dweck, 2006) of stuttering based on their speaking experiences, whether these are considered positive or negative, and this mindset shapes the goals they pursue in future speaking situations. As exemplified by mindset theory, a person who holds a *growth mindset of stuttering reactions* would believe in the malleability of their reactions to stuttering. They would believe that through their actions, they could develop adaptive coping strategies, such as cognitive reappraisal of the speaking situation (Menzies et al., 2009). They may develop the goal of stuttering openly, as they would be less concerned about the judgments of others (i.e., be less likely to focus on performance in front of others). This is similar to a person having a growth mindset of intelligence and pursuing learning goals; a person is more concerned about their own personal development than the approval of others. The opposite would be true for people who hold a *fixed mindset of stuttering reactions.* A

person who has a fixed mindset of stuttering would be more likely to believe that they cannot change their reactions to stuttering. They might engage in avoidance behaviors, such as switching words, to conceal their stuttering so that they would be perceived as a person who does not stutter (Douglass et al., 2018). They might also be more likely to avoid challenges, such as difficult speaking situations, in which there is even the potential to stutter. They might seek the approval of others through the use of perceptively fluent speech, as this is considered to be the "ideal" way of speaking (Tichenor et al., 2022). This example is similar to having a fixed mindset of intelligence and pursuing performance goals for the approval of others (Dweck, 2006) rather than having a growth mindset of intelligence and focusing on development of a skill without being concerned with the reactions of others.

2.4.3 GOALS WHEN SPEAKING

Having the goal of stuttering openly when speaking is associated with less adverse impact of stuttering (Tichenor & Yaruss, 2019a). This underscores the role that a person's mindset and associated speaking goal orientation have on the individual experience of stuttering and its resultant adverse impact. Tichenor and Yaruss (2019a) conducted an online survey study with over 500 adults who stutter regarding their personal reactions surrounding the moment of stuttering and individual experiences of stuttering. Their detailed questionnaire included questions related to various aspects of stuttering, such as the overall experience of stuttering and cognitive-affective components of stuttering. The authors also included questions related to the participants' speaking goals. The results indicated that people who stutter have common experiences, such as the "sensation of being stuck" (p. 4338), but they also found differences in participants' reported goals when speaking. The majority of participants (69.5%) reported that they *often* or *always* have the goal to "not stutter" when speaking, whereas 36.3% participants

reported that they *often* or *always* have the goal "to stutter openly and trying not to hide stuttering." These responses correlated with their reported participation in self-help groups as well. Specifically, having a history of participation in self-help/support groups was associated with the goal of stuttering openly, whereas having a negative history of participating in stuttering support groups was associated with the goal of not stuttering. These relationships were further found to predict negative behaviors and cognitive/affective states and adverse impact of stuttering (Tichenor & Yaruss, 2019a). Having a negative history of support group participation combined with the goal of not stuttering was predictive of negative feelings related to stuttering. It was concluded that individual perceptions of stuttering and subsequent reactions were influenced by the respondent's past experiences and beliefs about stuttering.

A person's mindset about of their reactions to stuttering would influence their speaking goal orientation and affective and cognitive reactions. Their goal orientation is initially shaped by their past speaking experiences and anticipation of stuttering. Dweck (2017) contended that prior to and after pursing a goal, a person experiences various emotions. These feelings are both "encoded and activated" when similar goals are pursued (p. 698). Continually feeling a loss of control when stuttering during specific speaking situations may lead to specific feelings surrounding a person's experience of stuttering. The person may think, "I'm going to stutter when I call that restaurant, and then I will feel embarrassed." In response to this anticipated feeling, they may engage in avoidance strategies to prevent future negative experiences based on the interpretive framework of the experience of stuttering that they have constructed. Stuttering reactions mindsets encompass a dynamic psychological interaction between past experiences, beliefs, anticipation, and subsequent reactions that influence the overall experience of stuttering and its adverse impact. Examining the mindsets of people who stutter will provide better

understanding of how a person appraises speaking situations and subsequently copes with the challenges associated with stuttering.

2.4.4 RESILIENCE AND STUTTERING

Recent exploration into *resilience mindsets* in people who stutter elucidates the protective mechanisms that may be employed through the development of growth mindsets (Caughter & Crofts, 2018). Resilience is the process of responding to challenging life experiences in adaptive or helpful ways. Resilience can be cultivated through emotional flexibility and specific coping strategies (Boullion et al., 2021). As a trait, resilience affects how a person responds to life stressors; it is influenced by how they view the world (APA, 2018). For this reason, an improved understanding of resilience can help to explain how a person who stutters copes with the adverse impact of stuttering. Caughter and Crofts (2018) suggested that fostering resilience in children who stutter may allow them to "view challenges as opportunities to 'bounce back' from adversity" (p. 1113). Using mindset theory (Dweck, 2006), the authors argued for the clinical utility of promoting a growth mindset to cultivate a resilient mindset in the context of stuttering. Resilience can help children handle stress related to stuttering so that they can face feared speaking situations more easily. The authors argued that a growth mindset allows children to be more open to stuttering and to handle setbacks more productively.

Walsh et al. (2023) furthered Caughter and Crofts (2018)'s conjectures by investigating the association between the adverse impact of stuttering and resilience in children who stutter. Participants were 148 children who stutter aged five to 18 years who took a series of online surveys. Adverse impact of stuttering was measured by the Overall Assessment of the Speaker's Experience of Stuttering (OASES; Yaruss & Quesal, 2006), a 100-item self-report assessment that measures the adverse impact and negative consequences related to stuttering. Resilience was

measured by the Child and Youth Resilience Measure CYRM-R (CYRM-R; Jefferies et al., 2019). The authors found that reduced adverse impact of stuttering was associated with higher levels of resilience in their sample. It was suggested that resilience may be a protective factor in children that would mitigate the development of adverse impact of stuttering. These findings in children suggest the value of having a growth mindset specifically related to a person's reaction to stuttering. Such a mindset can help to reduce the adverse impact of stuttering and improve a person's quality of life.

2.4.5 QUALITY OF LIFE IN PEOPLE WHO STUTTER

Quality of Life (QOL) is defined by the World Health Organization (WHO) as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals expectations, standards, and concerns" (2012). QOL is a multidimensional construct that describes a person's overall well-being and how they view their personal circumstances (WHO, 2012). QOL includes a person's physical health, in addition to their psychological health (WHO, 2012). For people who stutter, the experience of stuttering is closely tied to overall to their QOL due to the influence that stuttering can have on their self-perception, social relationships, and participation in daily activities, such as speaking (Boyle, 2015; Boyle & Cheyne, 2024; Craig et al., 2009; Croft & Byrd, 2020; Koedoot et al., 2011; Norman et al., 2023; Tichenor & Yaruss, 2019b; Yaruss, 1998, 2010; Yaruss & Quesal, 2004). More so, people who stutter experience reductions in QOL compared to people who do not stutter (Craig et al., 2009; Koedoot et al. 2010).

Craig et al. (2009) surveyed adults who stutter (N = 200) and adults who do not stutter (N = 200) to better understand specific aspects of QOL that are influenced by the experience of stuttering. QOL was measured using the Medical Outcomes Study Short Form-36 (SF-36; Ware

et al., 1993), a questionnaire that assesses overall health statues across eight domains: (a) vitality, (b) physical functioning, (c) bodily pain, (d) general health perceptions, (e) physical role functioning, (f) emotional role functioning, (g) social role functioning, and (h) mental health. The authors found that the group of adults who stutter had significantly reduced QOL in the domains of vitality, social function, emotional function, and mental health, as well as overall SF-36 scores, compared to the group of adults who do not stutter. The authors suggested that the social disadvantages of stuttering, namely the anticipatory anxiety related to speaking, may have been an influence on a person's behavior related to speaking. QOL of people who stutter was negatively affected by their anticipated anxiety and avoidance of speaking situations in response to their anxiety about speaking. Similarly, Koedoot et al. (2011) explored QOL in people who stutter and potential associations with the adverse impact of stuttering, as measured by the Adult version of the Overall Assessment of the Speaker's Experience of Stuttering (OASES; Yaruss & Quesal, 2006). Conceptualizing QOL through the framework of Wilson and Cleary (1995), Koedoot et al. (2001) proposed that there are various underlying features that may influence QOL in people who stutter. These features include a person's psychological characteristics (i.e., coping styles), personality, and expectations related to speaking, in the case of stuttering. The authors found that a greater adverse impact was associated with reductions in QOL. More specifically, a person's coping style or personal reaction to speaking events, influenced their QOL. In other words, a person's reaction was a mediating variable of QOL, with avoidance-oriented coping style being associated with greater reductions in a person's QOL, and greater adverse impact of stuttering. The findings from Koedoot et al. (2010) complemented the findings from Craig et al. (2009) in that a person's perception, anticipation, and ensuing reactions hold significance in their overall QOL and experience of stuttering. Together, these findings confirm

the importance of understanding potential underlying determinants of a person's well-being, specifically how a person views their current circumstances and subsequent reactions. A stuttering reactions mindset may be a moderating variable between a person's anticipation of a stuttering and subsequent response with significant implications for their QOL. The relationship between health-related mindsets and QOL are only beginning to emerge with potential for improving a person's overall well-being.

Zeidman et al. (2022) explored the association between a person's cancer mindset and QOL in a population of 273 women cancer survivors, including both metastatic and non-metastatic cancers. Participants' mindset of cancer was measured using an adapted version of The Brief Illness Mindset Inventory (Cancer Brief IMI) created for the study and health-related QOL through the Functional Assessment of Cancer Therapy-General (FACT-G; Brucker et al., 2005). The results indicated that participants who endorsed the *cancer is a catastrophe mindset*, analogous to a fixed mindset, reported lower health-related QOL. The participants who endorsed the *cancer is an opportunity mindset*, analogous to a growth mindset, reported higher health-related QOL. Notably, having the mindset that cancer is an opportunity was not associated with participants' stage of cancer. In other words, a person may believe that cancer provides meaning in their life, can make them stronger, and even empower them regardless of cancer status, either metastatic or non-metastatic. This finding suggests the value of understanding the influence of a person's mindset on their overall well-being and quality of life, beyond a diagnostic label. Within the context of stuttering, this highlights the necessity of holistically understanding a person's experience of stuttering, including their perception and personal reaction to stuttering, apart from the observable speech characteristics.

2.3.6 SUMMARY OF STUTTERING REACTIONS MINDSETS

Mindsets shape the human experience (Molden & Dweck, 2006); the same can be said for the experience of stuttering. The experience of stuttering includes a person's unique affective, behavioral, and cognitive reactions to stuttering (Tichenor & Yaruss, 2019b). A person creates a stuttering reactions mindset, or inherent beliefs of their experience of stuttering, from the continual interaction between personal reactions and speaking experiences. Their goals when speaking, either to avoid stuttering or stutter openly, is directly influenced by their stuttering reactions mindset, whether growth or fixed, with implications for the adverse impact of stuttering (Tichenor & Yaruss, 2019a). Specifically, reactions to setbacks can be either adaptive or maladaptive; reductions in psychological symptoms and distress are associated with more adaptive reactions (Schroder et al., 2015, 2017). These reactions contribute to the adverse impact of stuttering and a person's QOL. Understanding a person's mindset of the experience of stuttering is critical for developing interventions that seek to change maladaptive reactions to stuttering and thereby improve the overall experience of stuttering.

2.4 CHANGING REACTIONS TO STUTTERING

Mindsets can be changed (Burnette et al., 2022), and so can reactions to stuttering (Tichenor et al., 2022). Developing interventions that aim to increase a person's belief in the malleability of their reactions to stuttering can help to reduce the adverse impact of stuttering. Although growth mindset interventions have not yet been researched in people who stutter, established treatment approaches that target thoughts and behaviors related to stuttering have demonstrated positive effects for people who stutter. For example, clinicians and researchers have demonstrated the value of a range of therapy approaches that help to reduce negative reactions to stuttering.

Acceptance and commitment therapy (ACT) is an approach that aims to increase a person's psychological flexibility or their ability to change persistent behaviors while remaining in the present moment (Hayes et al., 2006). ACT emphasizes acceptance of feelings, and this, in turn, helps a person to make lasting behavioral changes in their lives. Beilby et al. (2012) explored the effects of an ACT group program in adults who stutter on their psychosocial functioning. Following an eight week intervention, participants reported significant reductions in the adverse impact and negative consequences related to stuttering as measured by the Overall Assessment of the Speaker's Experience of Stuttering (OASES; Yaruss & Quesal, 2006), as well as an increase in their readiness for change as measured by the Stages of Change questionnaire (SOQ; McConnaughy et al., 1983). Participants noted the influence that ACT had on reducing avoidance behaviors related to speaking by accepting and reducing unhelpful thinking patterns related to speech. Where ACT focuses on accepting negative thought patterns, cognitive behavior therapy (CBT) focuses on actively changing those negative thought patterns through strategies such as cognitive reappraisal. CBT is grounded in the concept that a person's unhelpful thoughts and behaviors are contributing factors of their mental health problems. People can learn to recognize distorted ways of thinking and ultimately change their patterns of thinking and subsequent behavior for more effective coping (Hofmann et al., 2010). Menzies et al. (2008) explored the effects of a CBT program on speech anxiety and social phobia in adults who stutter. Following the ten week program, participants reported significant reductions in their anxiety about speaking situations. As a result, participants were able to more fully participate in daily speech activities and reduce the use of avoidance strategies.

Another approach to helping people who stutter change their thinking about stuttering is seen in Avoidance Reduction Therapy for Stuttering (ARTS). This approach aims to reduce fears

and avoidance related to speaking. ARTS is based on the avoidance-approach conflict theory (Sheehan, 1953), which postulated a conflict between a person's desire to avoid speaking and their desire to speak. Fears and avoidance behaviors related to speaking perpetuate fears about stuttering (Sheehan & Siskin, 2005), and in turn perpetuate negative thought patterns and maladaptive behaviors surrounding speaking. The theoretical framework of approach-avoidance conflict has been utilized in the creation of ARTS. ARTS focuses on confronting feared speaking situations through desensitization strategies, which aim to reduce emotional distress and avoidance of speaking situations through gradual exposure (Sheehan & Sisskin, 2001; Sisskin & Goldstein, 2022). ACT, CBT, ARTS are all approaches that focus on a person's thought patterns related to stuttering for more optimal responses to adverse events. Taken together, these existing cognitive approaches point to the feasibility and benefits of interventions that target thoughts and behaviors surrounding the experience of stuttering and individual coping responses.

Mindset interventions—or even simple verbal statements promoting the idea that mindsets can be changed—are simple yet effective methods for enhancing treatment outcomes and improving quality of life (Crum & Zuckerman, 2017). This positive benefit appears to be due to the cascading effect that having a growth mindset can have on various aspects of functioning. Burnette et al. (2020) established that growth mindsets are predictive of positive coping responses and more adaptive reactions to distress. In the context of stuttering, growth mindsets may predict or facilitate positive coping strategies. For example, a person may opt to approach challenging speaking situations instead of avoiding, or they may use cognitive reappraisal to reframe a perceivably negative social situation instead of engaging in repetitive negative thinking. Growth mindsets are also positively correlated with treatment value or seeking and engaging in treatment (Burnette et al., 2020). A person who has a growth mindset of stuttering

may be more likely to seek support, either through formal stuttering intervention or self-help organizations. Such supports are associated with reductions in the adverse impact of stuttering (Iimura & Ishida, 2022). A growth mindset of stuttering may allow a person to believe in their potential to grow and engage in more difficult speaking situations or therapy activities, as they value their personal development over the (potentially negative) reactions of others.

2.4.1 READINESS TO CHANGE

The findings from Burnette et al. (2020) illustrate potential therapeutic benefits of understanding a person's stuttering reactions mindset and their beliefs in the malleability or controllability of their thoughts related to their reactions to stuttering. Growth mindsets are correlated with reduced psychological distress, positive coping responses, and perceived treatment value (Burnette et al., 2020), all of which can potentially reduce the adverse impact of stuttering. In order to reap the benefits of therapy, a person needs to be initially invested in their ability to change. As explained by Burnette et al. (2020), therapy involves self-regulatory behaviors, such as completing homework or attending treatment sessions. Progress will not occur if a person is not ready for these lifestyle changes if they do not believe in the malleability of their circumstances. That is, they believe that their actions will not change their current circumstances. An examination of a person's mindset regarding their issue, in this case, stuttering reactions, will reflect their readiness to engage in treatment focused on changing their reactions to stuttering. It is relevant to understand a person's readiness to change as this potentially influences their likelihood to shift toward a growth mindset of stuttering reactions.

An examination of a person's propensity towards change-seeking behavior can be evaluated using the Transtheoretical Model (TTM). The TTM, more commonly referred to as the Stages of Change Model (Prochaska & DiClemente, 1983), is a theoretical framework for

modeling a person's intention to change behaviors. It has been applied to many health-related fields in order to understand the cognitive processes underlying actionable and lasting changes in a person (Hashemzadeh et al., 2019). Originally developed to understand the motivational differences underlying smoking cessation, the TTM assesses an individual's readiness towards intentional change through a temporal process of six stages. *Precontemplation* is the earliest stage of the model. People in this stage have no intention of taking action to change their behavior and are typically not even aware of the need to change. *Contemplation* is the next stage, in which people intend to begin a new behavior in the near future (i.e., six months). The person recognizes that their current behavior may be problematic, and they consider the costs and benefits of change. *Preparation* is the stage in which a person is ready to take actionable steps. They hold the belief that changing their behavior can improve their current life. *Action* involves recent behavior change and intention to continue this change. In this stage, a person has modified their behavior and can acquire new behaviors. *Maintenance* is when a person has sustained their behavior for a given period of time and they are working to prevent *relapse* of the old behavior, which occurs when a person resumes their previous behaviors. Notably, relapse is not a separate stage of the model; it can occur within any stage, and it is expected that a person will relapse (Prochaska et al., 1997). *Termination* is the stage in which people have no intention of returning to their old behaviors. In addition to the stages and processes, there are three core constructs that underly the TTM: *processes of change*, which includes different activities people use to progress through each stage; *decisional balance*, which includes weighing the pros and cons of behavior change; and *self-efficacy*, which includes their situation-specific confidence (Prochaska et al., 1997).

The TTM has recently been applied to study the effects of mindset interventions (Parada & Verlhiac, 2022). The TTM attempts to explain how a person's decision-making processes influences their behavior changes. The focus is not on the outcome, such as, quitting smoking, but rather *how* people make lasting changes in their lives. The TTM could also be valuable for exploring a person's use of positive coping strategies and their perception of treatment value. In the context of stuttering, this may include either the person's propensity toward approach or avoidance of speaking situations, or their willingness to engage in therapeutic or support activities.

2.4.2 READINESS TO CHANGE REACTIONS TO STUTTERING

TTM was initially applied to stuttering by Turnbull (2000) who suggested that an understanding of a person's readiness to change can better inform the therapeutic techniques used by speech-language pathologists when designing interventions. Turnbull suggested that the TTM provides a foundation for advancing the change process in adults who stutter, including attitude and behavioral changes related to stuttering. The TTM can be used to conceptualize a person's readiness to change their previously held negative attitudes and maladaptive behaviors about stuttering by understanding the stage of change in which they lie. As an illustration, if they are in the preparation stage, therapy can capitalize on their decision to make changes by setting specific goals, such as stuttering openly when speaking. If they are in the action stage, therapy can then focus on providing opportunities to meet those speaking goals through desensitization or participation in group therapy.

Floyd et al. (2007) concurred with Turnbull (2000) that an understanding of where a person lies in the stages of change can better inform therapeutic focus and optimize outcomes. Stuttering therapy often involves changing behaviors related to stuttering; it involves a cyclical

process that frequently includes relapse. Therefore, it mirrors some of the foundational ideas of the TTM (Prochaska et al., 1997). Floyd et al. (2007) sought to empirically establish whether the TTM can be applied to stuttering by developing a stuttering-specific tool for measuring stages of change. Participants were 44 adolescents and adults who stutter who were given a modified Stages of Change Questionnaire specifically adapted by the authors for people who stutter. Test items replaced the word "problem" for "stuttering" (e.g., "I am actively working on my stuttering.") and the word "here" for "in speech therapy" or "in therapy" (e.g., "Being in therapy is pretty much a waste of time for me because stuttering doesn't have to do with me.") The result was a 32-item survey with four 8-item subscales that measured four distinct stages of change (precontemplation, contemplation, action, maintenance). Responses were measured using a 5-point Likert scale (1 = *Strongly agree*, 5 = *Strongly disagree*). Confirmatory and exploratory factor analyses determined the predictive validity of the authors' modified Stages of Change Questionnaire. The results suggested that the stuttering-specific Stages of Change Questionnaire provided a relatively good fit with 26 of the 32 items, demonstrating a significant relationship with each hypothesized stage of change. The authors concluded that additional items that reflected the specific experiences of stuttering would bolster the instrument more and that further work should continue validating a measure of stages of change specific to stuttering.

Zebrowski et al. (2021) extended this preliminary work on the applicability of the TTM to stuttering by developing a scale that measured stages of change in adolescents who stutter. Additionally, they developed scales that measured decisional balance and situational self-efficacy in adolescents who stutter, as these processes are contended to underlie a person's readiness for change (Prochaska et al., 1997). The stages of change (SOC) scale aimed to measure participants' readiness to manage stuttering across four areas: (a) overall readiness to manage

stuttering, (b) learning and using speech strategies, (c) changing negative thoughts and feelings about stuttering, and (d) talking without avoidance. The decisional balance (DB) scale measures participants' perceptions of the pros and cons of stuttering therapy, and the situational self-efficacy (SSE) scale measures participants' confidence in managing stuttering. Participants were 24 adolescents who stutter and 26 speech-language pathologists who self-identified as specializing in stuttering therapy. Participants engaged in either a one-on-one key informant interview or a focus group, in which they provided feedback on the definition of stuttering management for the SOC scale, pros and cons of managing stuttering for the DB scale, and challenging situations for managing stuttering for the SSE Scale. Transcripts from the interviews and focus groups were qualitatively analyzed using thematic analysis. Initial drafts of a SOC scale, the DB scale, and the SSE scale were created and tested on an additional nine adolescent participants who were not included in the initial interviews or focus groups. This process resulted in stuttering-specific versions of the SOC scale, DB scale, and SSE scales, all of which were validated in a follow-up study (Rodgers et al., 2021).

Rodgers et al. (2021) explored the use of these stuttering-specific versions of the SOC scale, DB scale, and SSE scaled by Zebrowski et al. (2021) in a population of 173 adolescents. The participants were also given the Overall Assessment of the Speaker's Experience of Stuttering (OASES; Yaruss & Quesal, 2006). The OASES was given to better determine how each stage of change and underlying cognitive process (DB and SSE) may be related to the adverse impact of stuttering. Results suggested that a person's readiness to change in the context of stuttering management can meaningfully be conceptualized through the TTM and SOC. Specifically, a greater adverse impact of stuttering was found to be correlated with the stages of contemplation, preparation, and action. This suggests that the participants who were intending to

manage their stutter (contemplation), who were ready to take action to manage their stutter (preparation), or who were actively managing their stutter (action), were more negatively impacted by stuttering. The maintenance stage of change was correlated with learning and using speech strategies, changing negative thoughts and feelings, and speaking without avoidance; all of these behaviors were further correlated with reduced adverse impact of stuttering. The authors suggested that when adolescents who stutter are in the maintenance phase, they understand that their hard work is "worth it" (p. 2522). The authors concluded that the TTM is a viable framework for assessing outcomes for adolescents within a stuttering intervention.

2.4.3 SUMMARY OF CHANGING REACTIONS TO STUTTERING

Previously established therapy approaches, such as ACT, CBT, and ARTS, highlight the benefits of changing thought patterns and behaviors related to stuttering (Beilby et al., 2012; Menzies et al., 2008; Sheehan & Sisskin, 2001). Similarly, growth mindset interventions promoting the idea that a person can change their thoughts and behaviors are effective at reducing psychological distress (Burnette et al., 2020). In order for a person to shift their mindset towards a growth mindset, they initially must be ready for this change in their mindset. The TTM is a theoretical framework for understanding lasting behavioral changes (Prochaska & DiClemente, 1983) that has been applied to many health-related fields (Hashemzadeh et al., 2019), and more recently to stuttering (Turnbull, 2000, Zebrowski et al., 2021, Rodgers et al., 2021). The use of TTM to understand behavior changes related to stuttering has been limited, but it may hold significant implications for understanding a person's mindset and the process (and potential benefits) of changing their mindset. A client's mindset may be a potential barrier or a facilitator to making lasting changes (Burnette et al. 2020), as a person's mindset influences their perceived treatment value and engagement. By understanding a person's readiness to change,

clinicians can more directly address their clients' current mindset through therapy. This in turn would achieve more optimal treatment outcomes.

2.5 SUMMARY OF REVIEWED LITERATURE

Mindsets are a person's beliefs and expectations that create a "meaning system" that helps them understand the world around them (Molden & Dweck, 2006). Their mindset within a specific situation underlies their goal-directed behavior and how they react to adverse events (Diener & Dweck, 1978; Dweck et al., 1988). A person can have a growth mindset, in which they believe in the malleability of an attribute. Growth mindsets are associated with more-adaptive coping responses, such as cognitive reappraisal (Schroder et al., 2015). In contrast, a person can have a fixed mindset, in which they believe in the immutability of an attribute. Fixed mindsets are associated with less-adaptive coping responses, such as engaging in avoidance or rumination (Diener & Dweck, 1978). A person can have specific mindsets within different domains, including personality (Chiu et al., 1997), emotion (Tamir et al., 2007), and anxiety (Schroder et al., 2015). To date, a stuttering reactions mindset has not been established, but prior research in stuttering lends theoretical and empirical support for the idea that this is a valid construct that is distinguishable from other mindsets.

If a stuttering reactions mindset is similar to other previously established mindsets, it would encompass the inherent beliefs and expectations that a person has regarding their personal reactions to stuttering. A person who has a growth mindset of stuttering would believe in the malleability of their reactions to stuttering, whereas a person who has a fixed mindset of stuttering would believe that they cannot change their reactions to stuttering[3]. An examination of

[3] Although a person may hold beliefs regarding their ability to change the overt speech behaviors associated with stuttering, the present work examines a person's ability to change their *personal reactions* to stuttering, that is, their feelings and thoughts related to their stuttering.

mindsets in people who stutter would thereby elucidate how a person's behavioral, affective, and cognitive reactions to adverse life events caused by stuttering might influence their overall experience of stuttering—and, subsequently, contribute to the overall adverse impact of stuttering.

Adults who stutter tend to appraise speaking situations differently than adults who do not stutter (Brundage et al., 2022) and anticipate when a movement of stuttering will occur (Jackson et al., 2015). Maladaptive coping responses in response to stuttering, such as avoidance or reduced self-esteem, are commonly reported in people who stutter (Constantino et al., 2020; Daniels & Gabel, 2004; Tichenor & Yaruss, 2019b). Differences in goals when speaking are also reported (Tichenor & Yaruss, 2019a), suggesting that different beliefs and expectations about the experience of stuttering underlie speaking goal orientation in people who stutter. At present,, there is a gap in our understanding of how a person's thoughts, beliefs, and expectations about stuttering shape their reactions to stuttering and subsequent goals when speaking. Having a growth mindset within a given domain holds numerous benefits for more adaptive social functioning, improved emotional regulation, more adaptive appraisal of a difficult situation, and overall improvements in QOL. A better understanding of whether a person who stutters holds a growth or fixed mindset related to their stuttering reactions could lead to interventions that cultivate a growth mindset of stuttering reactions and thereby help people who stutter reap the resulting benefits.

2.6 STATEMENT OF PURPOSE

People who stutter experience a range of consequences as a result of stuttering, including difficulties related to employment (Klein & Hood, 2004; Gerlach et al., 2018), education (Ellis & Hartlep, 2017), social relationships (Beilby et al., 2013). Mindset interventions can benefit a

wide range of populations, as these treatments help people develop more adaptive responses to adversity. Such interventions are most effective for groups that frequently experience setbacks (Burnette et al., 2020). For this reason, a better examination of the effects of a growth stuttering reactions mindset intervention in people who stutter holds promise for reducing the adverse impact cause by stuttering. The purpose of this research is to better understand how the study of mindsets can be used to inform the experience of stuttering. The primary aim of this research is to determine if a stuttering reactions mindset is a distinct construct that can be measured and correlated with outcomes related to stuttering, primarily adverse impact of stuttering. A secondary aim is to explore whether a person's stuttering reactions mindset can be changed following a brief growth mindset intervention. These aims were accomplished through three research questions.

2.7 RESEARCH QUESTIONS

Research Question One: *Is there a stuttering reactions mindset that is distinguishable from other domain-specific mindsets that can be measured in people who stutter?*

Hypothesis for Research Question One: Based on the work conducted by Schroder et al. (2016) on the domain-specificity of mindsets, it was hypothesized that a stuttering reactions mindset will emerge as a unique construct that is distinguishable from mindsets of intelligence, personality, emotion, and anxiety. It was also hypothesized that each mindset will be positively correlated with one another, as there is a global dimension that is observed across mindsets (Schroder et al., 2016).

Research Question Two: *Does a stuttering reactions mindset predict the adverse impact of stuttering?*

Hypothesis for Research Question Two: Based on the associations between mindsets and mental health outcomes (Schroder et al., 2017), it was hypothesized that holding a fixed mindset of stuttering reactions will predict a greater adverse impact of stuttering.

Research Question Three: *Can a single-session mindset intervention aimed to promote a growth mindset of stuttering reactions influence a person's readiness to change*?

Hypothesis for Research Question Three: As this as an exploratory research question, no a priori hypothesis was developed. It was expected that there would be differences in readiness to change between both groups, as observed in prior mindset interventions (Parada & Verlhiac, 2022) and interventions that target thoughts and beliefs in people who stutter (e.g., Beilby et al, 2012).

3.0 METHOD

This study sought to answer the following three research questions:

1. Is there a stuttering reactions mindset that is distinguishable from other domain-specific mindsets that can be measured in people who stutter?
2. Does a stuttering reactions mindset predict the adverse impact of stuttering?
3. Can a single-session mindset intervention aimed to promote a growth mindset of stuttering reactions influence a person's readiness to change?

These questions were addressed through a series of online studies that included two sets of self-report questionnaires and a novel online intervention.

3.1 POWER ANALYSIS

The number of participants required to answer the three research questions in this study was based on reviews of the literature and power analyses conducted through G*Power (Faul et al., 2007). The analysis in this study with the highest requirement for sample size was the confirmatory factor analysis, so that was the analysis that was used for determining the number of participants. The literature suggests that at least ten participants per variable are needed to ensure that confirmatory factor analysis has sufficient power. In this study, there were 19 variables distributed across five mindset measures, suggesting that a minimum sample size of 190 participants was needed to answer the first question (White, 2022). Although this figure was taken as the target *N* for research question one, analyses of model fit were conducted regularly throughout the recruitment phase, and based on the actual data collected, model fit statistics yielded an acceptable model structure at $N = 160$. Therefore, the total number of participants for study one was 160 adults who stutter. (Participant demographics are presented in Table 1.)

The power analysis for the second research question was based on a simple linear regression model for one predictor with a medium effect size of 0.15, an alpha of 0.05, and power of 0.8. Results indicated that a sample size of 55 was necessary to detect a medium effect size. A total of 64 participants were recruited to answer this research question, exceeding the suggested sample size.

The power analysis for the third research question was based on a one-tailed independent samples t test with a power of 0.80, an alpha of 0.05, and a large effect size of 0.8. Results indicated that a sample size of 21 was necessary for the control group and a sample size of 21 was necessary for the intervention group in order to detect a strong effect size. As with research question one, power analyses were conducted throughout recruitment. Post hoc analysis was conducted when 15 participants had been recruited for each of the two groups. This analysis revealed a power of 0.69. The total *N* for research question was 30 (*N* = 15 per group).

3.2 PARTICIPANTS

Eligibility criteria for all three studies included self-reporting as being a person who stutters and being age 18 years or older. Exclusion criteria included prior participation in a mindset intervention as defined by Burnette et al. (2020). Responses were also excluded if fraudulent activity was detected using Expert Review Fraud Detection Technology via Qualtrics (Qualtrics, 2023). Examples included failed CAPTCHA (i.e., scores below 0.5) or flagged Relevant ID. In addition, responses were manually reviewed for suspicious activity. Examples included multiple and identical open-ended consecutive submissions.

Participants were enrolled in one, two, or all three studies depending upon their level of interest to engage in each of the three studies. Participants for the first study included 160 adults who stutter. Participants for the second study were a subset of the 160 participants from the first

research question ($N = 64$). Participants for the third study were a subset of participants from the second research question ($N = 30$) who were randomly assigned to either the control group ($N = 15$) or experimental group ($N = 15$). All participants ($N = 160$) completed the mindset measures for the first research question (see Procedures for more information). They were then given the option to continue their participation in the second study and third study. Recruitment was targeted to ensure an equivalent average age between the participant groups for each of the three groups, and the male-to-female sex ratio was similar to that typically seen in the stuttering population (2-3:1) (Bloodstein et al. 2021). Demographic information, including age, self-reported gender, racial category, ethnicity, and education is shown in Table 1. Experience of stuttering and therapy experience were also collected via open-ended response. Demographic data, informed consent, and responses for all three research questions were collected online via Qualtrics software (Qualtrics, 2023). All computations and analyses were conducted using RStudio (R Core Team, 2025).

Table 1

Demographic information for Study One, Study Two, and Study Three

Demographic Variable	Study One (N = 160)	Study Two (N = 64)	Study Three (N = 30)
	Raw Number or M	Raw Number or M	Raw Number or M
Age	38.72 (SD = 14.93)	41.38 (SD = 16.75)	38.70 (SD = 13.05)
Sex			
Female	54	21	11
Male	101	42	18
Prefer not to say	5	1	1
Gender			
Woman	3	1	0
Man	8	3	2
Not reported	149	60	28
Racial category			
American Indian or Alaskan Native	1	0	0
Asian	11	3	2
Black or African American	19	9	4
Native Hawaiian or Other Pacific Islander	0	0	0
White	121	49	21
Other	7	2	2
Prefer not to say	1	1	1
Ethnicity			
Hispanic or Latino	12	4	2
Not Hispanic or Latino	143	59	27
Not reported	5	1	1

Table 1 (cont'd)

Highest educational experience			
High school graduate	10	2	1
Some college	23	9	3
College graduate	72	27	12
Graduate school	45	21	12
Professional degree	10	5	30

The study was deemed exempt by the institutional review board (IRB) at Michigan State University Human Research Protection Office of Regulatory Affairs under 45 Code of Federal Regulations (CFR) 46.104(d) 3(i)(A). Participants were recruited via fliers posted in and around Michigan State University (MSU), social media posts, communication to past participants in other MSU research projects, local and national stuttering associations, referral by other Michigan-based researchers and clinicians, and via word-of-mouth. Compensation was provided on a sliding scale in which participants received a $5 online gift card for participating in the first part of the study, a $10 online gift card for participating in the second party of the study, and a $20 online gift card for participating in the third part of the study. All participants were briefed about the study's purpose and provided informed consent prior to engaging in one or all parts of the study.

3.3 PROCEDURES

3.3.1 STUDY ONE: STUTTERING REACTIONS MINDSET

Participants for the first study (N = 160) completed a battery of self-reported mindset measures, for intelligence, personality, emotion, and anxiety, as well as a novel measure for

stuttering to answer the first research question, "*Is there a stuttering reactions mindset that is distinguishable from other domain-specific mindsets that can be measured in people who stutter?*"

3.3.2 STUDY TWO: ASSOCIATIONS WITH THE EXPERIENCE OF STUTTERING

Participants for the second study was a subset of the first group ($N = 64$) who completed the research version of the Overall Assessment of the Speaker's Experience of Stuttering for Adults (OASES-A-R; Tichenor & Yaruss, 2024) in addition to the battery of mindset measures to answer the second research question, "*Does a stuttering reactions mindset predict the adverse impact of stuttering?*"

3.3.3 STUDY THREE: SINGLE SESSION GROWTH MINDSET OF STUTTERING PILOT INTERVENTION

Participants for the third study ($N = 30$) were given the option to pilot a single-session growth mindset intervention aimed at increasing a growth mindset of stuttering following completion of the second study to answer the third research question, "*Can a single-session stuttering reactions mindset intervention aimed to promote a growth mindset of stuttering reactions influence a person's readiness to change?*" Participants met with the researcher via videoconference to be briefed on the purpose of the intervention and the potential limitations of the intervention. Participants were also given ample opportunity to ask questions about the intervention and the study as a whole. Following this initial meeting, all participants were sent a link for an online, single-session mindset intervention and randomly assigned via "randomization" feature in Qualtrics. The control group completed the University of Rhode Island Change Assessment (URICA; Dozois et al., 2004) prior to the mindset intervention, and the experimental group completed the URICA after the mindset intervention. This was done to

ensure that all participants received an intervention, but directional effects of the intervention were assessed by differentiating when this outcome measure was completed by participants.

3.4 MEASURES

3.4.1 INTELLIGENCE MINDSET

Intelligence mindset was measured using The Implicit Theories of Intelligence Scale for Adults (ITIS; Dweck, 1999). The original ITIS includes eight items that measures people's beliefs about the nature of their intelligence (Dweck 1999). Typically, only four fixed mindset items from the original ITIS are used (i.e., one, two, three, and seven) (Scherer & Campos, 2022). Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree*) to 6 (*Strongly Disagree*) for the following statements:

1. You have a certain amount of intelligence, and you really cannot do much to change it.
2. Your intelligence is something about you that you cannot change very much.
3. You can learn new things, but you cannot change your basic intelligence.
4. No matter who you are, you can change your intelligence a lot.
5. You can always greatly change how intelligent you are.
6. No matter how much intelligence you have, you can always change it quite a bit.
7. To be honest, you cannot really change how intelligent you are.
8. You can change your basic intelligence level considerably.

Participants for the present study were given the version of the ITIS that included four fixed mindset items as opposed to all eight items. The fixed mindset items are reverse scored, indicating that higher composite scores based on these four items are reflective of a higher growth mindset. Prior research has shown that the ITIS is a reliable and valid measure of intelligence (Dweck et al., 1995; Hong et al., 1999). Based on these findings, mindset measures

for personality, emotion, and anxiety have been previously adapted for use in research (Chiu et al., 1997; Tamir et al., 2007; Schroder et al., 2015).

3.4.2 PERSONALITY MINDSET

Personality mindsets were measured using The Implicit Theories of Personality Scale (TOP; Chiu et al., 1997). This scale was originally used by Chiu et al. (1997) as part of a battery of measurements used to assess ways of coping in response to negative events (Chiu et al., 1997). These items have since been used as a stand-alone scale in other studies (see Schroder et al., 2015). Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree)* to 6 (*Strongly Disagree*) for the following three fixed personality mindset statements:

1. The kind of person someone is is something very basic about them, and it can't be changed very much.
2. People can do things differently, but the important parts of who they are can't really be changed.
3. Everyone is a certain kind of person, and there is not much that can be done to really change that

Items are reverse-scored and then averaged such that higher composite scores reflect greater endorsement of the growth mindset of personality. This scale has been shown to have high internal reliability ($\alpha = .91$) (Dweck et al., 1995) and construct validity (Chiu et al., 1997).

3.4.3 EMOTION MINDSET

Emotion mindsets were measured using the Implicit Theories of Emotion Scale (TOE; Tamir et al., 2007). This scale was initially adapted from the ITIS (Dweck, 1999) by Tamir et al. (2007). This scale includes two fix-minded items and two growth-minded items about emotion. Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree*) to 6 (*Strongly*

Disagree) and participants reported the extent to which they agree or disagree with the following statements:

1. Everyone can learn to control their emotions.
2. If they want to, people can change the emotions they have.
3. No matter how hard they try, people can't really change the emotions that they have.
4. The truth is, people have very little control over their emotions.

The fixed-minded items (items three and four) are reverse-scored. Scores are then averaged such that higher composite scores reflect greater endorsement of the growth mindset of emotion. This scale has been shown to have high internal reliability ($\alpha = .81$) and construct validity ($r = .69$) (Congard et al., 2022).

3.4.4 ANXIETY MINDSET

Anxiety mindsets were measured using the Implicit Theories of Anxiety Scale (TOA; Schroder et al., 2015). This scale was initially adapted from the ITIS (Dweck, 1999) by Schroder et al., 2015. This scale includes four fixed-minded items about anxiety. Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree*) to 6 (*Strongly Disagree*) and participants reported the extent to which they agree or disagree with each of the following fixed personality mindset statements:

1. You have a certain amount of anxiety and you really cannot do much to change it.
2. Your anxiety is something about you that you cannot change very much.
3. To be honest, you cannot really change how anxious you are.
4. No matter how hard you try, you can't really change the level of anxiety that you have.

Items are reverse-scored and then averaged such that higher composite scores reflect greater endorsement of a growth mindset of anxiety. The TOA has been shown to have acceptable reliability and validity in previous research (Schroder et al., 2015, 2016).

3.4.5 STUTTERING REACTIONS MINDSET

Stuttering reactions mindsets were measured based on a scale developed for this study using the "find and replace" method employed by Schroder et al. (2016) for studying mindsets of depression, social anxiety, and drinking tendencies. "Anxiety" was replaced with "reactions to your stuttering." Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree)* to 6 (*Strongly Disagree*), and participants reported the extent to which they agree or disagree with the following four fixed stuttering reactions mindset statements:

1. You have certain reactions to your stuttering, and you really cannot do much to change them.
2. Your reactions to your stuttering is something about you that you cannot change very much.
3. To be honest, you cannot really change your reactions to your stuttering.
4. No matter how hard you try, you can't really change the degree of reactions to your stuttering that you have.

Items are reverse-scored and then averaged such that higher composite scores reflect greater endorsement of the growth mindset of stuttering reactions.

3.4.6 OVERALL ASSESSMENT OF THE SPEAKER'S EXPERIENCE OF STUTTERING

Participants in the second study completed the OASES-A-R, a shortened version of the OASES-A that was specifically designed for research purposes (Tichenor & Yaruss, 2024). The original OASES-A is a 100-item self-report assessment for adults that measures the adverse

impact and negative consequences related to stuttering from the speaker's perspective. The OASES is based on the World Health Organization's *International Classification of Functioning, Disability, and Health* (ICF; WHO, 2001) as adapted to stuttering by Yaruss & Quesal (2004). Questions are rated on five-point Likert scales that range from 1 to 5, with higher scores reflecting greater adverse impact. There are four sections within the OASES: Section I, General Information, pertains to the speaker's perceptions of stuttering; Section II, Your Reactions to Stuttering, pertains to the speaker's reaction to stuttering; Section III, Communication in Daily Situations, pertains to the difficulties that speakers may have when communicating in daily situations; Section IV, Quality of Life, pertains to the impact of stuttering on people's overall quality of life. Research has shown that the 25-item research adaptation of the OASES (OASES-A-R) is a reliable and valid measurement of the impact of stuttering on a person's life (Tichenor & Yaruss, 2024).

3.4.7 STUTTERING REACTIONS MINDSET INTERVENTION

Participants in the third study engaged in a single-session pilot growth mindset intervention that followed the guidelines for delivery competence described by Burnette et al. (2020) in their meta-analysis on the effectiveness of growth mindset interventions. This mindset intervention included the following elements:

1. Neuroscience information.
2. Credible sources/
3. Scientific evidence for the potential for change.
4. Respect of autonomy (e.g., ask the participant to collaborate).
5. Social norms and social modeling content.
6. Content to avoid blame and encourage self-compassion.

7. Personally relevant content.
8. Metaphors that make the message “sticky” (Yeager, et al., 2016, p. 9).

The intervention included 13 blocks. The first block included a description of the study and request from participants to contribute to research on stuttering reactions mindsets. The second block included an audio recording of a person who stutters, describing their change in thinking regarding their reactions to stuttering. The third, fourth, fifth, and sixth blocks included neuroscientific information regarding neuroplasticity and how new pathways are created in the brain, along with visuals and metaphors, with a short “recap” of information in the seventh block. The eighth block included empirical information on how lasting changes can be made regarding a person’s reaction to stuttering. The ninth block included a scenario and open-response question that prompted participants to utilize information they learned from the intervention. The tenth block included an audio recording of a person who stutters discussing their personal journey changing their reactions to stuttering, followed by two additional scenarios and open-ended responses about reactions to stuttering in the eleventh and twelfth blocks. The thirteenth and final block of the intervention included four open-ended responses regarding feedback as this was a pilot intervention: (a) What did you like the most? (b) What did you like the least? (c) Would you recommend this program to another person who stutters? Explain your answer. (d) Write any recommendations or changes to this intervention. Please see Appendix A for the complete intervention.

3.4.8 THE UNIVERSITY OF RHODE ISLAND CHANGE ASSESSMENT

The URICA is a 32 item self-report assessment that measures a person’s readiness to change. Although scales assessing stages of change specific to stuttering management have been developed (Floyd et al., 2007; Zebrowski et al., 2021), the validity behind these scales has not

been established. Stuttering-specific scales have been applied to adolescents who stutter (Rodgers et al., 2021). However, the current study only includes adult participants. The URICA was chosen as the outcome measure as the internal reliability ($\alpha = 0.79$) and construct validity of the URICA has been established in previous studies with adults (Dozois et al., 2004). Further, Burnette et al. (2020) suggested that a person's readiness to change may potentially influence their likelihood to shift toward a growth mindset of stuttering reactions and an understanding of a person's process of change would inform intervention development. The URICA includes a series of statements that represent four primary stages of change (precontemplation, contemplation, action, maintenance). Participants rate their level of agreement with statement each using a five-point Likert scales that range from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Each subtest represents one of the four stages of change (Precontemplation, Contemplation, Action, Maintenance), and contribute to an Overall Process of Change score.

3.5 DATA ANALYSIS

3.5.1 STUDY ONE: STUTTERING REACTIONS MINDSET

Study One sought to determine the construct validity of a stuttering reactions mindset and potential relationships to other existing mindsets. The latent structures or underlying constructs of intelligence mindset, personality mindset, emotion mindset, anxiety mindset, and stuttering reactions mindset, were evaluated through confirmatory factor analysis (CFA) modeling to determine if stuttering reactions mindset emerged as a unique construct with correlations to intelligence, personality, emotion, and anxiety mindsets. Confirmatory factor analysis is an appropriate data analysis method to use when testing if hypothesized relationships between observed variables and latent variables exist (Raykov & Marcoulides, 2006). Analysis of latent structures using CFA modeling was selected as mindsets are unobservable (i.e., latent) variables.

In addition, similar analyses have been used in previous studies evaluating the latent structure of mindsets (Shroder et al., 2016). Bivariate Spearman correlations were then conducted for intelligence, personality, emotion, anxiety, and stuttering reactions mindsets to determine potential associations among mindsets measured.

3.5.2 STUDY TWO: ASSOCIATIONS WITH THE EXPERIENCE OF STUTTERING

The second research question evaluated the predictive nature of mindset on the adverse impact of stuttering. Simple linear regression with composite stuttering reactions mindset scores as the predictor variable and adverse impact operationalized as composite OASES-A-R scores as the outcome variable was conducted. Simple linear regression is an appropriate data analysis method when determining relationships between two continuous variables. Specifically, the predictive value of an independent variable on a dependent variable (Hahs-Vaughn & Lomax, 2020). Simple linear regression can be used in hypothesis testing regarding specific directional effects between key variables; the simplicity of which mitigates potential overfitting of models compared to multiple linear regression modeling (Babyak, 2004). Composite stuttering reactions mindset scores for each participant from the first study were calculated by adding and then averaging the four items of the stuttering reactions mindset measure. Adverse impact was measured with composite scores from the OASES-A-R. Simple linear regression models with composite stuttering reactions mindset scores as the predictor variable and scores for each of the four subtests from the OASES-A-R were also created.

3.5.3 STUDY THREE: SINGLE SESSION GROWTH MINDSET OF STUTTERING

Study Three sought to determine the effects of a growth mindset of stuttering reactions intervention on a person's readiness to change. Missing data accounted for 0.5% of responses for both groups. Mean imputation was conducted by replacing the missing data points for individual

responses with the group mean for that item. An Overall Process of Change score based on responses from the URICA was then calculated for each participant by subtracting the mean of the Precontemplation subtest from the summed means of the Contemplation, Action, and Maintenance subtests. The resulting value is considered a person's *Readiness to Change*, with scores below 8 indicating the person is in the Precontemplation state, scores between 8 and 10 indicating the person is in the Contemplation stage, scores between 11 and 13 indicating the person is in the Action stage, and scores of 14 and above indicating the person is in the Maintenance stage. Group means of the Overall Process of Change were calculated for the control group and intervention group. An independent samples t test with a power of 0.80, an alpha of 0.05 was then conducted to determine differences between the two groups. Responses to the open-ended questions were informally reviewed for common ideas and overall trends to determine feasibility and potential development of the intervention.

4.0 RESULTS

4.1 STUDY ONE: STUTTERING REACTIONS MINDSET

Study One sought to determine the domain specificity of a stuttering reactions mindset and potential covariances among other established mindsets using confirmatory factor analysis. Descriptive statistics of all five mindset measures in Study One, Study Two, and Study Three are provided in Table 2.

Table 2

Descriptive statistics of mindsets across Study One, Study Two, and Study Three

Mindset	Mean (SD)		
	Study One ($N = 160$)	Study Two ($N = 64$)	Study Three ($N = 30$)
Stuttering reactions	4.03 (1.26)	4.21 (1.15)	4.31 (1.03)
Intelligence	4.04 (1.34)	4.00 (1.34)	3.98 (1.38)
Personality	3.88 (1.18)	3.91 (1.28)	3.94 (1.35)
Emotion	4.08 (0.79)	4.07 (0.87)	4.23 (0.81)
Anxiety	3.61 (1.2)	3.66 (1.26)	3.71 (1.07)

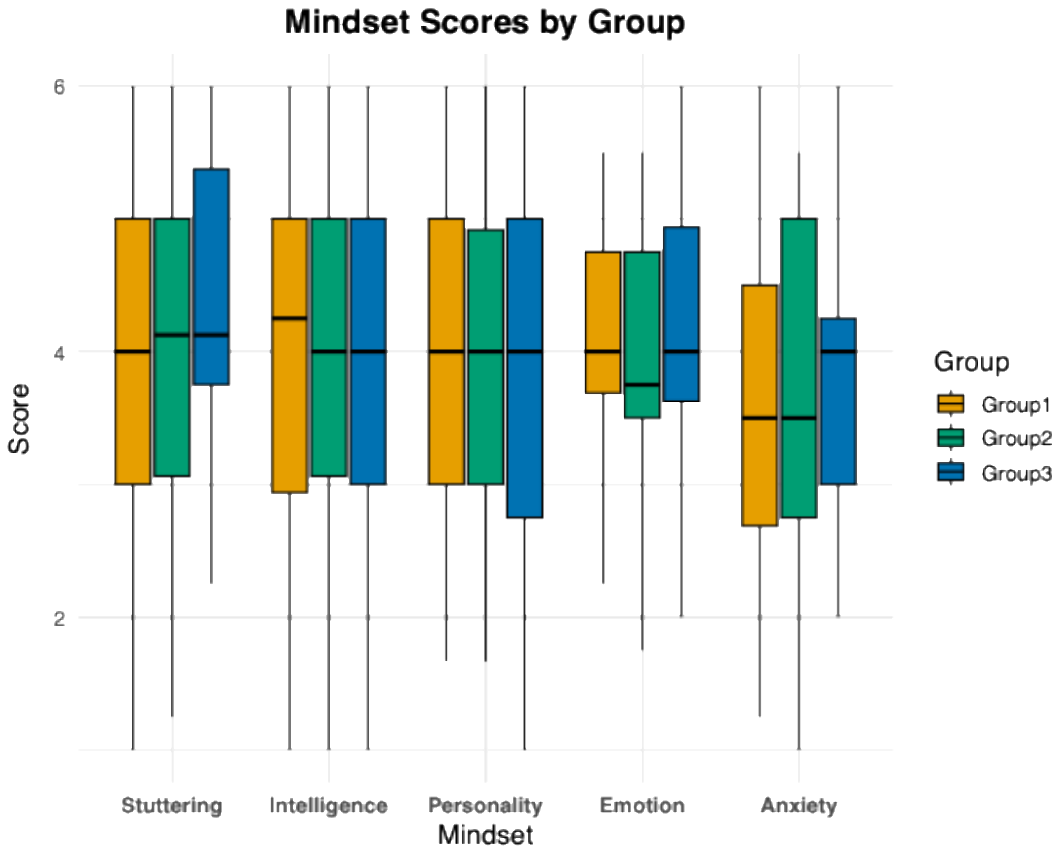
Note: Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree)* to 6 (*Strongly Disagree*). Higher scores indicate a stronger growth mindset. Scores reflect all participants within each study.

In order to determine if there were differences in overall mindset scores across the three studies, participants were divided into three groups depending on their progression in the study. Composite scores for the five mindsets in the first group for analysis were participants who only completed the mindset measures in Study One ($N = 96$). This first group reflected participants who chose not to continue after completing Study One. Composite scores for the five mindset measures in the second group for analysis were only participants who chose to move onto Study

Two but not Study Three ($N = 34$). Composite scores for the five mindset measures in the third group for analysis were only participants who chose to move onto Study Three ($N = 30$). This process was done to eliminate dependence of each group so that participants' composite mindset scores are included in only one group for analysis. Due to the unequal sample sizes across the three groups, a Kruskal-Wallis rank sum test was deemed the most appropriate to determine if differences in composite mindset scores existed between the participants across all three studies. Following Bonferroni corrections for five comparisons (adjusted $\alpha = .01$)., no statistically significant differences were found in mindsets across all three groups. The distributions of stuttering reactions mindset**,** $H(2) = 2.15$, $p = .340$; intelligence mindsets, $H(2) = 0.043$, $p = .979$; personality mindsets, $H(2) = 0.081$, $p = .960$, emotion mindsets, $H(2) = 1.57$, $p = .457$, and anxiety mindsets, $H(2) = 1.81$, $p = .798$ and were not significantly different between the three groups. See Figure 1 for distribution of mindset scores across all the three groups.

Figure 1

Boxplots of group scores across stuttering reactions, intelligence, personality, emotion, and anxiety mindsets



Note: Questions are rated on a six-point Likert scale that ranges from 1 (*Strongly Agree)* to 6 (*Strongly Disagree*). Higher scores indicate a stronger growth mindset.

Various measurement models were created through a reverse stepwise modeling approach in lavaan: An R Package for Structural Equation Modeling (Rosseel, 2012) to determine the extent and strength of relationships between the observed and latent variables. Goodness of fit for each model was evaluated using standard Chi Square value, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Robust Comparative Fit Index, Robust Tucker-Lewis Index (TLI),

and root mean square error of approximation (RMSEA). The confidence interval (CI) was set to 90%, and the standardized root mean square residual (SRMR) (DiStefano & Hess, 2005). In the end, three models were analyzed in an attempt to find the best fit.

Model One was a multi-factor confirmatory model that evaluated the predictive nature of all 19 observed variables (i.e., the total number of questions across all five measures) on the latent structure of corresponding mindsets: stuttering, intelligence, personality, emotion, and anxiety. Model Two was the same as Model One except that Item Two of the emotion mindset measure ("If they want to, people can change the emotions they have") was removed due to poor fit indices observed in Model One. Model Three was the same as Model Two with Item One from the emotion mindset ("Everyone can learn to control their emotions"), also being removed due to poor fit indices. In other words, Model Three included all observed variables except the two growth minded items in the emotion mindset measure (items one and two) due to poor fit statistics.

Model Three, which evaluated the predictive nature of the remaining 17 observed variables on the latent structure of corresponding mindsets, had the best fit. The standard Chi Square value for Model Three was not significant $X^2(109) = 98.873$, $p = .746$, suggesting good fit relative to degrees of freedom. Comparative Fit Index (CFI) was 1.000, and Tucker-Lewis Index (TLI) was 1.000, suggesting excellent fit. Robust CFI was 0.910 and Robust TLI was 0.888, suggesting satisfactory and marginally good fits, respectively. Standard root mean square error of approximation (RMSEA) with the 90% confidence interval (CI) was <0.001, CI [0.000, 0.031], $p = 0.999$, suggested excellent fit, and the standardized root mean square residual (SRMR) was 0.042, suggested good fit. Goodness of fit indicators for all three models are provided in Table 3.

Table 3

Fit statistics of confirmatory factor analysis models in Study One

	X^2	*df*	RMSEA	90% CI [Lower, Upper]	SRMR	CFI	TLI
Model 1	287.930	142	0.080	[0.067- 0.094]	0.067	0.998	0.998
Model 2	130.517	125	0.017	[0.000-0.043]	0.049	1.000	1.000
Model 3	98.873	109	0.000	[0.000-0.031]	0.042	1.000	1.000

Additionally, all factor loadings were significant. Stuttering reactions mindset was indicated by four items with standardized factor loadings that ranged from 0.856 to 0.969, suggesting strong relationships between the stuttering reactions mindset measure items and the latent variable of a stuttering reactions mindset. Intelligence mindset was indicated by four items with standardized loadings that ranged from 0.909 to 0.985, personality mindset was indicated by three items with standardized loadings that ranged from 0.806 to 0.937, emotion mindset was indicated by the two remaining items that ranged from .546 to .750, and anxiety mindset was indicated by four items that ranged from .880 to .946. See Table 4 for the factor loadings of all three models and Figure 2 for a path diagram of Model 3.

Table 4

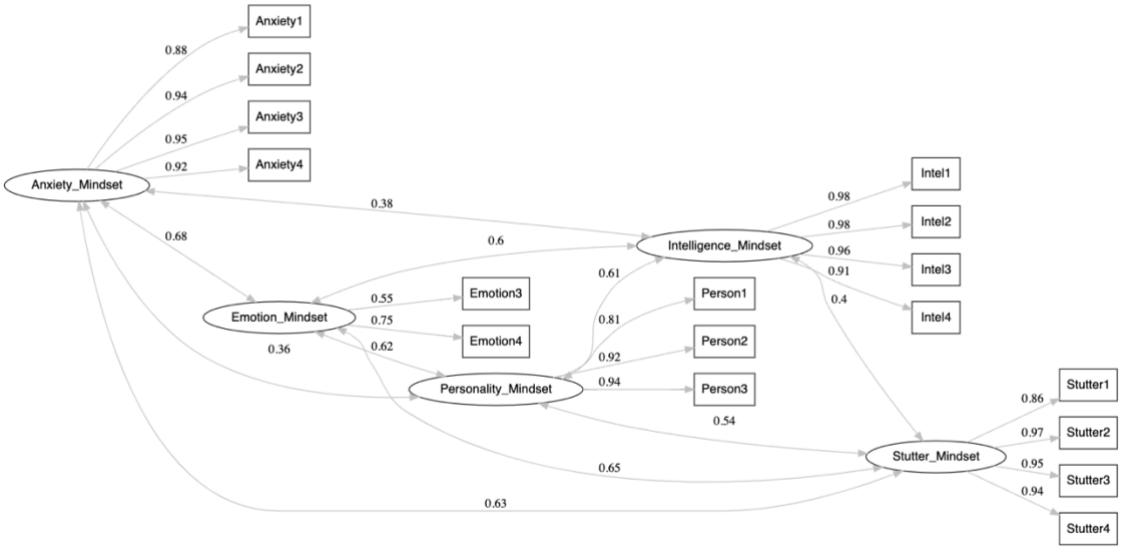
Standardized factor loadings for Model One, Model Two, Model Three

Mindset	Model One	Model Two	Model Three
Stuttering			
Item one	0.855	.855	0.856
Item two	0.969	.968	0.969
Item three	0.950	.950	0.950
Item four	0.935	.935	0.935
Intelligence			
Item one	0.978	0.978	0.978
Item two	0.985	0.985	0.985
Item three	0.964	0.964	0.964
Item four	0.909	0.909	0.909
Personality			
Item one	0.802	0.804	0.806
Item two	0.919	0.918	0.918
Item three	0.939	0.938	0.937
Emotion			
Item one	0.482	0.386	-
Item two	0.359	-	-
Item three	0.654	0.584	0.546
Item four	0.851	0.789	.750
Anxiety			
Item one	0.879	0.879	0.880
Item two	0.942	0.943	0.943
Item three	0.946	0.946	0.946
Item four	0.925	0.924	0.923

Note: All factor loadings were statistically significant $p < .0001$

Figure 2

Confirmatory factor analysis results of Model 3 for Study One



Statistically significant positive correlations were found between each mindset measure following Bonferroni corrections for ten comparisons (Table 5). This suggests that there were significant relationships among mindsets, including stuttering reactions mindset. That is, growth mindsets of stuttering were related to growth mindsets of anxiety, intelligence, emotion, and personality mindsets, with the same being true for fixed mindsets. The strongest correlation was found between anxiety mindset and stuttering reactions mindset ($r = 0.59$, $p = <.001$). Together, the correlations suggest that holding a growth or fixed mindset in one domain is related to holding a growth or fixed mindset in another respectively.

Table 5

Means, standard deviations, and correlations of mindsets

Mindset	M	SD	Stuttering	Intelligence	Personality	Emotion	Anxiety
Stuttering		1.26	_				
Intelligence		1.34	0.37***	_			
Personality		1.18	0.49***	0.55***	_		
Emotion		0.79	0.32***	0.37***	0.39***	_	
Anxiety		1.20	0.59***	0.36***	0.33***	0.39***	_

Note: ****p*-values <.001

4.2 STUDY TWO: ASSOCIATIONS WITH THE EXPERIENCE OF STUTTERING

Study Two sought to understand associations between a person's stuttering reactions mindset and the adverse impact of stuttering using simple linear regression with composite stuttering reactions mindset scores as the predictor variable and adverse impact as the outcome variable. Descriptive statistics for OASES-A-R scores are provided in Table 6. Following Bonferroni corrections for the five outcome measures (i.e., General Information, Reactions to Stuttering, Communication in Daily Situations, Quality of Life, Total Score) (adjusted α= .01). Total Score, Reactions to Stuttering, and Quality of Life were found to have statistically significant relationships with stuttering reactions mindset. General Information and Communication in Daily Situations were not found to have a statistically significant relationships with a stuttering reactions mindset.

The regression model for stuttering reactions mindset and total adverse impact of stuttering was significant, $R^2 = 0.108$, $F(1, 62) = 7.507$, $p = .008$. Stuttering reactions mindset

explained approximately 10.8% of the variance in total impact scores from the OASES-A-R. Stuttering reactions mindset had a negative association with total adverse impact of stuttering, b = -0.231, SE = 0.084, $t(62)$ = -2.74). For every one-unit increase in stuttering reactions mindset scores, adverse impact of stuttering decreased by 0.274 units of the OASES-A-R. Stuttering reactions mindset also predicted individual subtests of the OASES-A-R to varying degrees.

Table 6

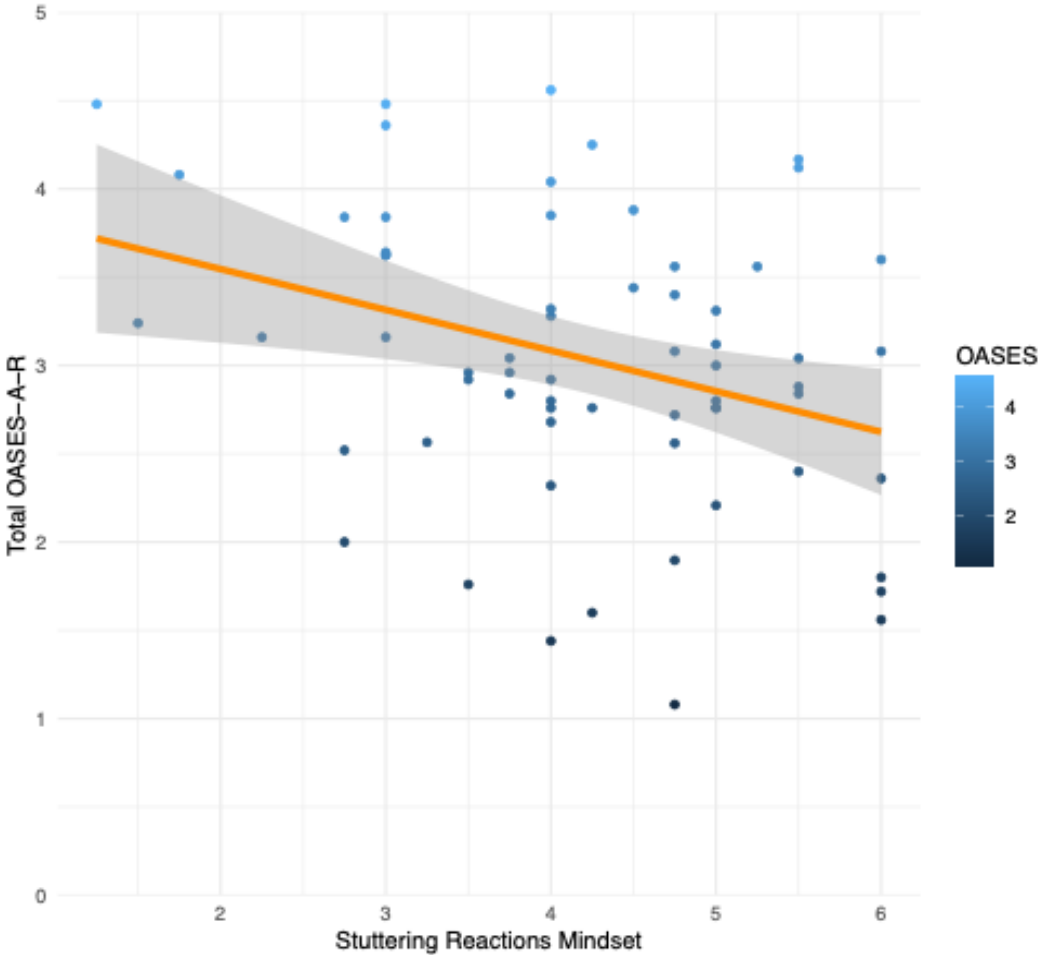
Descriptive Statistics for the Overall Assessment of the Speaker's Experience of Stuttering

Measure	M	SD	Median	Impact
General Information	3.33	0.94	3.38	Moderate-Severe
Reactions to Stuttering	3.22	0.88	3.22	Moderate-Severe
Communication in Daily Situations	2.83	0.86	2.79	Moderate
Quality of Life	2.91	0.93	2.79	Moderate
Total Score	3.04	0.81	3.02	Moderate-Severe

Note: Questions are rated on five-point Likert scales that range from 1 to 5, with higher scores reflecting greater adverse impact of stuttering.

Figure 3

Relationship between Stuttering reactions mindset and Adverse Impact of Stuttering



Note: Higher cores on the OASES reflect greater adverse impact. Higher stuttering reactions scores indicate a stronger growth mindset.

4.2.1 OASES-A-R SUBTESTS

The regression model for stuttering reactions mindsets and General Information about Stuttering was not significant, $R^2 = 0.049$, $F(1, 62) = 3.209$, $p = .078$. Stuttering reactions mindset had a negative relationship with General Information about Stuttering, $b = -0.182$, SE =

0.102, $t(62) = -1.79$. For every one-unit increase in stuttering reactions mindset scores, General Information about Stuttering decreased by 0.182 units of the OASES-A-R.

The regression model for stuttering reactions mindsets and Speaker's Reactions was significant. Stuttering reactions mindset predicted Speaker's Reactions, $R^2 = 0.137$, $F(1, 62) = 9.842$, $p = .003$. Stuttering reactions mindset explained approximately 13.7% of the variance in Speaker's Reactions. Stuttering reactions mindset had a negative relationship with Speaker's Reactions, $b = -0.282$, SE = 0.090, $t(62) = -3.137$). For every one-unit increase in stuttering reactions mindset scores, Speaker's Reactions decreased by 0.282 units of the OASES-A-R.

The regression model for stuttering reactions mindsets and Communication in Daily Situations was not significant, $R^2 = 0.080$, $F(1, 62) = 5.40$, $p = .023$. Stuttering reactions mindset had a negative relationship with Communication in Daily Situations, $b = -0.211$, SE = 0.091, $t(62) = -2.324$). For every one-unit increase in stuttering reactions mindset scores, Communication in Daily Situations decreased by 0.211 units of the OASES-A-R.

The regression model for stuttering reactions mindsets and Quality of Life was significant, $R^2 = 0.114$, $F(1, 62) = 7.934$, $p = .006$. Stuttering reactions mindset explained approximately 11.4% of the variance in Quality of Life. Stuttering reactions mindset had a negative relationship with Quality of Life, $b = -0.272$, SE = 0.097, $t(62) = -2.818$). For every one-unit increase in stuttering reactions mindset scores, Quality of Life decreased by 0.272. Regression coefficients values for all linear models are provided in Table 7.

Table 7

Regression coefficients for linear regression models in Study Two

Outcome	Predictor	β	SE	*t*	*p*
Total OASES	(Intercept)	4.01	0.37	10.90	<.001
	Mindset	-0.23	0.08	-2.74	0.008
Subtests					
General Information	(Intercept)	4.09	0.44	9.25	<.001
	Mindset	-0.18	0.10	-1.79	.078
Speaker's Reaction	(Intercept)	4.34	0.39	11.10	<.001
	Mindset	-0.28	0.09	-3.14	.003*
Daily Communication	(Intercept)	3.71	0.40	9.38	<.001
	Mindset	-0.21	0.09	-2.32	.023
Quality of Life	(Intercept)	4.06	0.42	9.63	<.001
	Mindset	-0.27	0.10	-2.82	.006*

Note: **p*-values <.001 after Bonferroni corrections

4.3 STUDY THREE: SINGLE SESSION GROWTH MINDSET OF STUTTERING

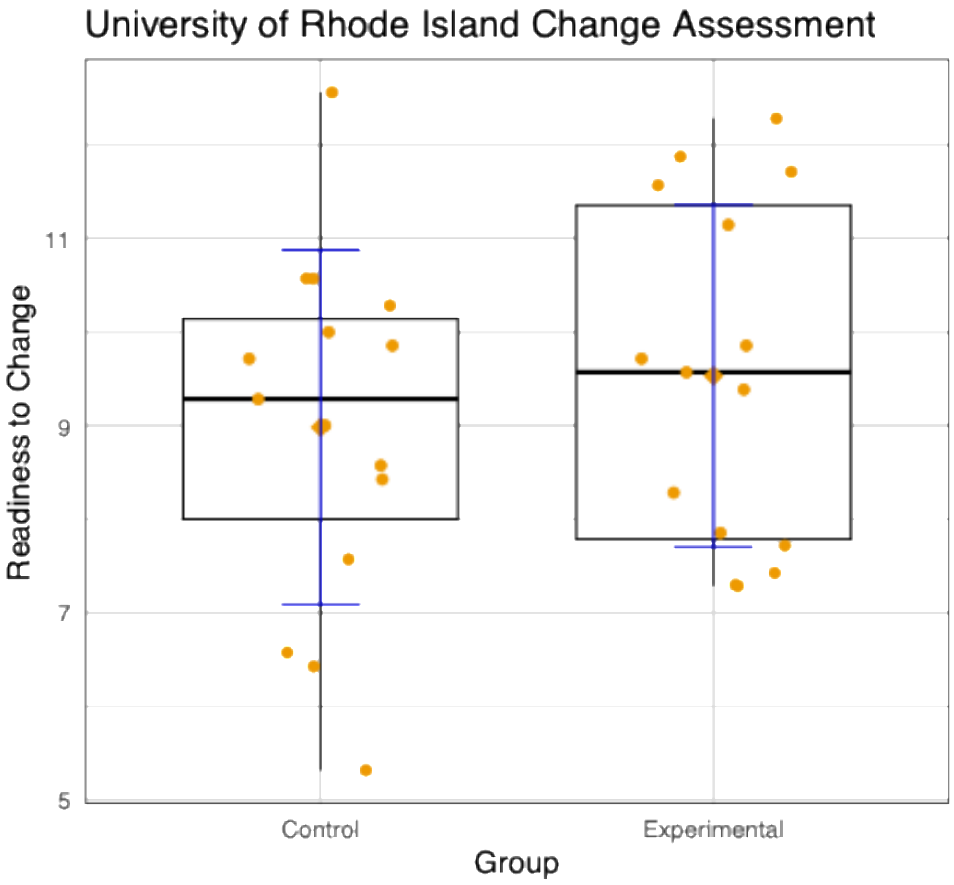
Study Three was a pilot intervention that sought to determine if a single-session mindset intervention aimed to promote a growth mindset of stuttering influenced a person's readiness to change.

4.3.1 OVERALL PROCESS OF CHANGE

The results from the Shapiro-Wilk test suggested that the assumption of normality was met for both groups (Control, $W = 0.97$, $p = .79$; Experimental, $W = 0.90$, $p = .08$). An independent samples t test revealed no significant differences in Overall Process of Change scores between the control group and experimental group ($t(28) = -0.81$, $p = .43$, though the mean for the control group (M = 8.98, SD= 1.89) was slightly lower than the mean for the experimental group (M = 9.53, SD = 1.83). More participants in the experimental group ($N = 4$) were found to be in the action stage of change compared to the control group ($N = 1$). Figure 4 presents a visual summary of the data for both groups.

Figure 4

Box and whisker plot of group means for the University of Rhode Island Change Assessment



Note: Dots represent participants' total scores on the URICA.

Table 8

Participants scores of the URICA and corresponding Stage of Change

Participant	Score	Stage of Change
Control group		
Participant 1	6.57	Precontemplation
Participant 2	5.31	Precontemplation
Participant 3	10.57	Contemplation
Participant 4	8.57	Contemplation
Participant 5	10.29	Contemplation
Participant 6	9.72	Contemplation
Participant 7	9	Contemplation
Participant 8	8.43	Contemplation
Participant 9	10	Contemplation
Participant 10	6.43	Precontemplation
Participant 11	9.86	Contemplation
Participant 12	10.57	Contemplation
Participant 13	7.57	Precontemplation
Participant 14	12.56	Action
Participant 15	9.29	Contemplation
Experimental Group		
Participant 1	12.29	Action
Participant 2	8.29	Contemplation
Participant 3	9.72	Contemplation
Participant 4	9.57	Contemplation
Participant 5	7.71	Precontemplation
Participant 6	7.43	Precontemplation
Participant 7	9.39	Contemplation
Participant 8	7.30	Precontemplation
Participant 9	11.71	Contemplation
Participant 10	7.29	Precontemplation
Participant 11	9.86	Contemplation
Participant 12	7.86	Precontemplation
Participant 13	11.14	Action
Participant 14	11.87	Action
Participant 15	11.57	Action

Note: Scores range from 1-14: more scores below 8 indicate the person is in the Precontemplation stage, scores between 8 and 10 indicate the person is in the Contemplation stage, scores between 11 and 13 indicate the person is in the Action stage, and scores of 14 and above indicate the person is in the Maintenance stage.

4.3.2 OPEN-ENDED RESPONSES

Open-ended responses to the four questions in the pilot intervention were reviewed for overall trends and patterns to better understand the feasibility and participants' perception of the intervention. When asked, "What did you like the most?" many of participants ($N = 8$) mentioned the audio samples from actual people who stutter. One participant wrote, "I liked the audio from a couple people who stutter. It was helpful to hear other people's experiences and also how they stutter as well." Other participants discussed the examples that were presented (e.g., "I think the case stories are really helpful. Since stuttering is so rare, we actually hardly meet other stutterers unless you go to a NSA [National Stuttering Association] event."), scientific information (e.g., "I liked the breakdown of scientific concepts and how they related to a stuttering reactions mindset."), and specific prompts ("I liked that the prompts were broad enough to both answer them and provide responses that more closely connect to my personal experience of stuttering.")

When asked, "What did you like the least?" a range of responses were observed. Some participants discussed wanting more information (e.g., "I wish there was more information about how to change our thoughts and behaviors around our stuttering.") or a lengthier program (e.g., "I wanted more."). Other participants discussed not liking the type of questions given for the case examples. One participant stated, "The questions were vague. Stuttering, like autism, has a large spectrum. Answers can vary greatly." Many participants ($N = 5$) discussed not liking the outcome measure, the URICA (e.g., "The strongly agree-strongly disagree questions at the beginning"). Some responses did not include negative aspects of the study (e.g., "I liked everything about this study.")

When asked, “Would you recommend this program to another person who stutters?” the majority of participants ($N = 29$) answered in the affirmative. When prompted, “Write any recommendations or changes to this intervention, many responses included recommendations that were outside the scope of the present study but worthy of further exploration and development. For example, one suggested included having the content delivered by a speech-language pathologist (e.g., “This study would be more beneficial if it was done through telehealth), whereas another suggested, “How about some questions where we’re asked how we'd like someone to react to a stutterer?” Some participants suggested more specific guidance on stuttering reactions mindsets. One participant suggested, “Real life scenario training” and another wrote, “I think a more defined protocol on how to reframe our mindsets might be more helpful.” Other participants did not have recommendations (e.g., “I have no reccomendations [sic] for improvement!”)

Overall, the qualitative responses highlighted positive perceptions of the intervention, including a feeling of community and desire for a more extensive intervention to target thoughts and feelings related to stuttering. The recommendations provided existing and potential aspects that may be developed for a more comprehensive and effective intervention aimed to promote a growth mindset of stuttering reactions.

5.0 DISCUSSION

The present research sought to determine if a *stuttering reactions mindset* is a distinct and measurable construct that is associated with the adverse impact of stuttering. First, confirmatory factor analysis (CFA) was used to determine whether mindsets of intelligence, personality, anxiety, emotion, and stuttering were distinguishable as independent constructs (though were expected to be related to one another). Next, simple linear regression modeling was conducted to evaluate whether stuttering reactions mindsets were related to the adverse impact of stuttering. Finally, an independent-samples t test and a qualitative review of open-ended responses explored the effects of a pilot intervention aimed to promote a growth mindset of stuttering on a person's readiness to change.

5.1 STUDY ONE: STUTTERING REACTIONS MINDSET

The first study sought to answer if a stuttering reactions mindset can be measured in people who stutter as a construct that is distinct from previously established domain-specific mindsets of intelligence, personality, emotion, and anxiety. The latent structure of a four-factor stuttering reactions mindset measure was evaluated through three CFA models: Model One was a multi-factor confirmatory model that evaluated the predictive nature of all 19 observed variables on the latent structure of the five corresponding mindsets (e.g., stuttering). The second and third models were the same as Model One, except that item two of the emotion mindset measure was removed in Model Two and then item one of the emotion mindset measure was removed for Model Three due to poor model fit statistics. These removals in the emotion mindset measure suggest that items one and two of the emotion mindset measure did not accurately reflect the underlying construct of an emotion mindset in our sample of people who stutter. Notably, these two items of the emotion mindset measure are worded to reflect a growth mindset of emotion

(i.e., “Everyone can learn to control their emotions” and “If they want to, people can change the emotions they have.”). These differences in wording from the other 17 test items may have accounted for the poor fit indices compared to all other mindset measure items that are worded to reflect a fixed mindset. Difference in emotional regulation in people who stutter compared to people who do not stutter have been found (Sarani Yazteppah et al., 2024). Items one and two of the emotion mindset measure may have been interpreted in the context of emotions related to stuttering by the participants and contributed to the weak relationship. As an illustration, participants may have inherently answered the question, “Everyone can learn to control their emotions *related to stuttering.* The emotion mindset measure is meant to capture a person’s malleability beliefs of emotion in general. Interpreting these items within the context of stuttering may have created a weak relationship the observed and latent variables. The results of Model Three that included the 17 remaining variables suggest that there are strong relationships between the observed mindset items of each measure and the respective latent factors (i.e., domain-specific mindsets). Thus, *stuttering reactions mindset* emerged as a unique and distinct construct. Further, analyses showed that a stuttering reactions mindset can be accurately represented through the four-factor measure developed for the present research. The factor loadings for all items in the stuttering reactions mindset measure were above the recommended threshold of 0.80 (Raykov & Marcoulides, 2006), suggesting that these question items captured the underlying construct of a stuttering reactions mindset in our sample of people who stutter. Because the four-factor measure was validated through these analyses, it can be referred to as the Implicit Theories of Stuttering (TOS)[4] scale. The title of this scale is analogous to the naming

[4] The TOS was developed as part of the current study.

conventions of similar mindset scales, such as the Implicit Theories of Anxiety Scale (TOA; Schroder et al., 2015) and the Implicit Theories of Emotion Scale (TOE; Tamir et al., 2007).

Statistically significant correlations between stuttering, intelligence, personality, emotion, and anxiety mindsets support prior work indicating that there is a universal quality among certain mindsets (Schroder et al., 2016). Having a growth mindset of one domain is related to having a growth mindset of another domain, with the same being true for having a fixed mindset of a given domain. As an illustration, a person who has a growth mindset of their ability to control symptoms of anxiety is likely to also believe in their ability to control their reactions to stuttering. A person who has a fixed mindset regarding their ability to control anxiety is likely to also have a fixed mindset of their reactions to stuttering. Again, these findings are consistent with previous research that has explored both the domain-specificity and generality of mindsets of intelligence (Dweck, 1995), personality (Lewis et al., 2020), emotion (Tamir et al., 2007; Gutentag et al., 2023), and anxiety (Schroder et al., 2016). The establishment of a stuttering-specific mindset in people who stutter allows for a more nuanced understanding of the unique thoughts, feelings, and expectations that a person may have about their personal reactions to stuttering. These, in turn, have clinical and research implications. More specifically, a person's stuttering reactions mindset may offer a more precise explanation or be a determinant of their overall experience of stuttering.

5.1.1 GOALS WHEN SPEAKING

It is well-established that people who have a fixed mindset of a particular domain engage in more avoidance behaviors as a means of reducing emotional discomfort (Diener & Dweck, 1978; Kappes & Schikowski, 2013; Rhew et al., 2018; Schroder et al., 2018). Avoidance is a coping mechanism that helps to prevent emotional distress that accompanies a difficult situation

or feeling. People who stutter may engage in avoidance of speaking situations in order to reduce the potential of such emotional discomfort that frequently co-occurs with the experience of stuttering (Beilby & Byrnes, 2012; Menzies et al., 2009b; Sheehan & Siskin, 2005; Tichenor & Yaruss, 2019b; Tichenor & Yaruss, 2020). People who stutter often know they will stutter before doing so (Jackson et al., 2015). In response to the anticipation of stuttering, speakers may employ an action response that involves avoiding specific words or situations, using self-management strategies, or approaching the speaking situation by moving forward with their intended speech plan. It can be inferred from the results of Study One that a person's stuttering reactions mindset, or their collection of thoughts, expectations, and beliefs regarding their reaction to stuttering, mediates their anticipation of stuttering and subsequent goals when speaking. Their stuttering reactions mindset may influence whether they choose to avoid or approach a speaking situation. Having a fixed mindset of stuttering reactions may lead to a greater tendency for avoidance, while having a growth mindset of stuttering reactions may buffer or shield the distress related to speaking situations, as seen in other fields (e.g., having a growth mindset of anxiety buffers psychological distress; Schroder et al., 2017). Having a growth mindset of stuttering reactions would incline a person to approach a speaking situation. This mindset would better enable that person to use adaptive coping responses, such as cognitive reappraisal, to mitigate the distress associated with speaking situations (Schroder et al., 2015).

Prior research has highlighted the importance of a person's goal when speaking in determining how they cope with stuttering (Tichenor & Yaruss, 2019a). More specifically, having the goal to not stutter is associated with more negative affective and cognitive states, such as feeling ashamed, and greater adverse impact (Tichenor & Yaruss, 2019b). Mindset theory attempts to understand why people choose the goals they pursue (Dweck, 2017). In the context

of stuttering, an understanding of a person's stuttering reactions mindset offers insight into how they develop goals when speaking. A growth mindset would precede more adaptive affective and cognitive reactions to setbacks, motivating a person to approach speaking situations as opposed to avoiding. Although avoiding potentially distressful situations may provide immediate relief, chronic avoidance of speaking is related to a greater adverse impact of stuttering (Plexico & Erath, 2023; Tichenor & Yaruss, 2019a). The results of the first study offer a potential explanation for *why* a person may be inclined to have the goal of either stuttering openly or to not stutter. Future research can better disentangle this potential relationship by exploring the predictive nature of a person's stuttering reactions mindset on their goals when speaking through regression modeling. This explanation is crucial for the development of targeted interventions that can facilitate a growth mindset to better enable a person to choose goals related to stuttering openly, thereby reducing the adverse impact of stuttering.

5.1.2 OPTIMIZE TREATMENT OUTCOMES

Growth mindsets have been shown to be good predictors of treatment outcomes in the mental health field (Schroder et al., 2019). People who have growth mindsets of a given domain believe in the controllability of their circumstances and are more motivated and readily engaged in therapy (Burnette et al., 2020; Schroder et al., 2022). Schroder et al. (2015) found that people with a fixed mindset of anxiety chose medication-based treatment options over psychological adjustment treatment options. People with a fixed mindset of anxiety believed that their anxiety symptoms were the result of uncontrollable biological factors, and so they believed that therapy would be ineffective at reducing their anxiety symptoms (Schroder et al., 2015). People with growth mindset of anxiety chose treatment options that targeted more than the biological factors of anxiety, as they believed in the potential for positive change through their actions and effort.

For a person who stutters, having a fixed mindset of stuttering may manifest as seeking treatment options that only target disfluent speech without believing in the potential to change their negative thought patterns related to speaking. On the other end, having a growth mindset of stuttering reactions would allow a person to think beyond the uncontrollable and chronic biological features of stuttering. A person with a growth mindset of stuttering reactions is more likely to address their personal reactions to stuttering as opposed to focusing only on fluent speech. Multidimensional stuttering interventions may begin with developing a growth mindset of stuttering reactions to further optimize treatment outcomes related to affective and cognitive components of stuttering.

Examples of cognitive-focused therapy approaches that have been applied to or developed specifically as part of a comprehensive stuttering treatment plan include ACT (Beilby & Byrnes, 2012), CBT (Menzies et al., 2009), and ARTS (Sheehan & Siskin, 2005). These approaches target negative thought patterns and feelings related to stuttering, as they guide speakers toward more adaptive responses to feared speaking situations (see ARTS; Sheehan & Sisskin, 2005). Growth mindsets are positively correlated with perceptions of treatment value, which includes both seeking and engaging in treatment (Burnette et al., 2020). This suggests that a person who has a growth mindset of stuttering reactions is more likely to seek support for their stuttering, either through a formal intervention or self-help group. In contrast, a person who has a fixed mindset of stuttering reactions may not even seek support for their stuttering. A person with a fixed mindset of stuttering reactions may not believe in their capacity to cope with feared speaking situations or accept the discomfort that accompanies addressing thoughts and feelings related to stuttering.

Results of Study One highlight the value of expanding existing cognitive interventions to include an initial examination of a person's stuttering reactions mindset. Determining whether a person who stutters has a tendency toward a growth or fixed mindset of stuttering can potentially lead to more specific treatment approaches and thereby optimize treatment outcomes. One way to accomplish this is through the administration of the TOS developed for the present study. This questionnaire is brief, with only four questions; still, provides valuable insight into a person's experience of stuttering and predisposition toward positive therapy outcomes. Targeting a growth mindset of stuttering reactions within the framework of an existing comprehensive therapy may facilitate deeper engagement in therapy and promote more optimal outcomes, including reducing the adverse impact of stuttering.

5.2 STUDY TWO: ASSOCIATIONS WITH THE EXPERIENCE OF STUTTERING

Study One established that people who stutter have a mindset specific to their reactions to stuttering; Study Two sought to answer if stuttering reactions mindset are predictive of the adverse impact of stuttering. A simple linear regression model was built with *stuttering reactions mindset* as the predictor variable and the *adverse impact of stuttering* as the outcome variable. Additional linear regression models were built with stuttering reactions mindset as the predictor and the individual subtests of the OASES-A-R (General Information, Speaker's Reactions, Communication in Daily Situations, Quality of Life) as outcome variables.

A statistically significant negative relationship was found between stuttering reactions mindset and the overall adverse impact of stuttering. That is, the more growth-minded a person is about their reactions to stuttering, the less adverse impact of stuttering they experience. Conversely, the more fixed-minded a person is regarding their reactions to stuttering, the more adverse impact of stuttering they experience. Additional analyses revealed statistically significant

associations between stuttering reactions mindset and two individual subtests of the OASES: Quality of Life and Speaker's Reactions to Stuttering. This finding further specifies how stuttering reactions mindsets relate to a person's overall experience of stuttering.

5.2.1 TOTAL ADVERSE IMPACT OF STUTTERING

A person's mindset is related to the overall adverse impact of stuttering. Mindsets are proposed to mediate specific patterns of behavior and personal reactions, particularly when a person is faced with challenges and adversity (Diener & Dweck, 1978; Dweck et al., 1988). People with growth mindsets are more likely to engage in adaptive coping strategies, such as cognitive reappraisal (Schroder et al., 2015), whereas people with fixed mindsets are more likely to engage in maladaptive coping strategies, such as avoidance (Diener & Dweck, 1978). Growth mindsets are associated with a myriad of psychosocial benefits (Burnette et al., 2022, 2023). The results of Study Two support this conclusion by demonstrating that a person's mindset of stuttering reactions is associated with the adverse impact of stuttering. Their particular mindset, whether growth or fixed, is further perpetuated through their experiences. Previous studies have explored relationships between characteristics of stuttering and associated adverse impact, such as repetitive negative thinking (Tichenor et al., 2020) and goals when speaking (Tichenor & Yaruss, 2019a). Fewer studies have explored what specific variables determine or predict the associated adverse impact. The present findings suggest that stuttering reactions mindset may be one underlying factor that influences the adverse impact of stuttering.

Repetitive negative thinking (RNT), or engagement in a persistent cycle of negative thoughts, has been found to associated with the adverse impact of stuttering (Tichenor & Yaruss, 2020). The process of RNT may lead negative views of oneself based on previous experiences and expectations regarding the potentially negative reactions of other speakers. These thought

patterns are continually reinforced by a person's speaking experiences, further ingraining RNT into the experience of stuttering (Tichenor et al., 2020). Growth mindsets are associated with more adaptive responses to setbacks (Dweck et al., 1988; Schroder et al., 2017). Having a growth mindset of stuttering can help a person disengage from or avoid unhelpful thought patterns related to stuttering. Indeed, the cognitive flexibility observed in people with growth mindsets is related to having greater resilience when faced with adversity and setbacks (Boullion et al., 2021). Findings from Study Two suggest that people who stutter who have a growth mindset are more readily able to disengage from negative thoughts related to stuttering or not engage in these negative thought patterns at all. A growth mindset of stuttering thereby contributes to their resilience, or emotional flexibility and use of adaptive coping strategies (Boullion et al., 2021). A person with a growth mindset is better equipped to approach speaking situations as they possess the cognitive tools to "bounce back" when faced with adversity (Caughters & Crofts, 2018, p. 1113). Consequently, they are more likely to participate fully in daily activities, such as speaking and social interactions.

5.2.3 SPEAKER'S REACTIONS TO STUTTERING

A person's stuttering reactions mindset is also associated with their personal reactions to stuttering. Personal reactions of stuttering include affective responses, such as feelings of anxiety, behavioral responses, such as avoidance, and cognitive reactions, such as reduced self-esteem (Daniels & Gabel, 2004). Brundage et al. (2017) established that people who stutter appraise situations differently compared to their non-stuttering peers, due to a heightened fear of negative evaluation. Notably, the authors found that reported fear of negative evaluation was not consistent among all participants who stutter. Participants who stutter were grouped int either a high fear of negative evaluation group or low fear of negative evaluation group. Their fear of

negative evaluation status had distinct effects on perceived social threat. The author suggested that a person's fear of negative evaluation may be a contributing factor in how they judge social situations. Heightened fear of negative evaluation may be a determining factor in how a person who stutters approaches a speaking situation. Related to the present research, having a growth mindset of stuttering may be related to reduced fear of negative evaluation by allowing a more positive interpretation of an event. For example, a person with a growth mindset may attribute a negative social experience due to circumstantial factors, such as their communication partner having a bad day, rather than attributing the negative reactions of others to their stuttering. This is similar to having a growth mindset of personality and not making predictions regarding a person's character from a single observation (Chiu et al., 1997). Having a growth mindset of stuttering may also allow a person to view a negative communication situation as a standalone event that does not necessarily reflect who they are as a person. This again relates to the fact that having a growth mindset can mitigate a person's distress related to adverse events as having a growth mindset allows a person to view their circumstances as changeable (Burnette et al., 2020). For a person who stutters, a growth mindset could diminish a tendency toward negative thought patterns related to speaking situations. A growth mindset would provide a foundation for more positive views of oneself as a communicator, even after a negative social exchange. Findings from Study Two suggest that a person's stuttering reactions mindset potentially underlies their interpretation of a situation, and this could influence whether their personal reactions are adaptive or maladaptive. Taken together, findings from Study Two highlight the importance of considering the influence that a person's stuttering reactions mindset might have on their interpretation of speaking situations and subsequent reactions.

5.2.2 QUALITY OF LIFE

A person's stuttering reactions mindset is associated with their QOL. QOL offers a multidimensional view of a person's overall well-being (WHO, 2001). The Quality of Life subtest of the OASES encompasses a persons' overall satisfaction specific to their communication and self-confidence, along with potential interferences of stuttering on their personal interactions. The relationship between QOL and stuttering reactions mindsets are consistent with findings from other studies that have examined health-related mindsets and QOL (see "cancer mindset"; Zeidman et al., 2022). Mindsets provide a mental framework that influence how a person perceives their situation and experiences, as well as how they respond within a particular situation (Dweck, 2017; Dweck & Yeager, 2019; Molden & Dweck, 2006). People with a growth mindset in a given domain are able to perceive the controllability of their actions and see opportunities amidst the challenges they face (Dweck, 2006). QOL has been found to be negatively impacted by anticipated anxiety and subsequent avoidance of speaking situations (Craig et al., 2009); it can thereby be inferred that having a growth mindset of stuttering reactions would incline a person to approach speaking situations instead of avoiding them. A person's stuttering reactions mindset shapes how they view their circumstances and the controllability of their personal reactions to stuttering. A person with a growth mindset is better equipped to embrace challenges, including anxiety induced anticipation of stuttering (Craig et al., 2009). This sequence of events would reduce communication participation restrictions and, in turn, mitigate the adverse impact of stuttering.

5.3 STUDY THREE: SINGLE SESSION GROWTH MINDSET OF STUTTERING INTERVENTION

Study Three sought to understand the effectiveness of a single-session growth mindset of stuttering reactions intervention on Readiness to Change in adults who stutter. This intervention created for the current study was modeled after established growth mindset (Dweck, 2006) and single-session mindset interventions (Schleider & Weisz, 2018). Growth mindset interventions have been shown to be effective across various populations (Burnette et al., 2020), but the effects of such interventions have not previously been explored in people who stutter. An increase in participants' Readiness to Change in the experimental group was expected given positive findings from previous mindset interventions (Burnette et al, 2020). Quantitative analyses in this study revealed no differences between the two groups in their Readiness to Change. Still, more participants in the experimental group were found to be in the Action stage of change compared to the control group. Further, qualitative findings indicated specific features of the intervention that were found to be beneficial and offer potential in the future development of this type of intervention for people who stutter.

The fact that no differences were found between the control group and experimental group can be interpreted within the context of a pilot intervention and exploratory nature of the research question. The transtheoretical model of change is a framework used to determine underlying motivation to change (Prochaska et al., 1997). A person's readiness to change has been recommended for use as an outcome measure in mindset research due to the importance of believing in change for treatment engagement and optimizing outcomes (Burnette et al., 2020). Nevertheless, Readiness to Change as measured by the URICA may not have been appropriate for use as an outcome measure with an intervention related to growth mindset of stuttering

reactions. In their meta-analysis of 53 distinct growth mindset interventions, Burnette et al. 2022 explored the effects of mindset interventions on various outcomes, including mindset (i.e., "Did the participants internalize the growth mindset message?"), motivation ("Did the intervention foster more positive expectations about the potential for success"), and goal-directed behavior (i.e., "Did the intervention lead to more mastery-oriented behavioral strategies?"), in addition to other outcome measures (i.e., academics, mental health, social functioning). The outcome that had the greatest mean difference was growth mindsets (d = 0.46, 95% CI [.34-.58]). This suggests that mindset interventions are most effective for outcomes that are closely related to the intervention, such as anxiety outcome measures when targeting anxiety mindsets. Targeting the mindset domain that is most strongly related to the outcome of interest may yield more optimal intervention results. A more suitable outcome measure for the current study of stuttering reactions mindsets may have been a measure of stuttering reactions mindset itself (i.e., TOS), or measures specific to the experience of stuttering, such as the OASES, QOL, locus of control, or even a person's goals when speaking (i.e., stutter openly vs not stuttering; Tichenor & Yaruss, 2019a).

Further, behavior-based interventions for adults who stutter are typically delivered via several sessions spread across multiple weeks rather than a single session (see Beilby et al., 2012, for eight-week ACT program). The asynchronous and online nature of the study may have negatively influenced the participants' engagement with the study, and, in turn, the outcome measure. Therapeutic alliance, or the genuine and trusting bond between a client and a clinician (Zetzel, 1956), is a known predictor of therapeutic change (Wampold, 2015). The influence of therapeutic alliance is particularly important in people who stutter on their perceptions of successful therapy outcomes (Plexico et al., 2010). It may be that a person's readiness to change

is better targeted through multiple growth-mindset sessions delivered synchronously by a speech therapist. Delivering the content through a one-on-one interaction between the client and clinician may allow for more opportunities to develop a therapeutic alliance and facilitate greater therapeutic change. Still, the online nature of the intervention allowed for participation across a broader audience, as in-person or even synchronous participation was not necessary.

As such, future directions may include the creation of a website specific to this intervention with varying levels of participation, including synchronous or asynchronous participation. This research website may include a repository of different outcomes measures following completion of the intervention, as noted above (e.g., goals when speaking). Future stuttering reactions mindset interventions could then be developed through an iterative process that includes continual collection of data and analysis with a broader audience via the Internet. Participants may also agree to be followed up by the researcher for longitudinal study designs to determine the long and short term effects of a stuttering reactions mindset intervention.

Promisingly, the majority of the participants indicated that they would recommend this intervention to another person who stutters, suggesting the feasibility of such interventions. Participants expressed wanting more information about changing mindsets ("I wish there was more information about how to change our thoughts and behaviors around our stuttering") or a longer intervention that gave them more time to make the changes that were targeted within the intervention. Future iterations of a stuttering reactions mindset intervention may then include more detailed and specific information on developing a growth mindset of stuttering. Some participants responded enjoying the neuroscientific information ("I liked the breakdown of scientific concepts and how they related to a stuttering mindset") while other responses suggested the opposite ("Too much (academic) content crammed within a few pages."). Different

options regarding the length of the program or difficulty of content level may be chosen based on participants' preference. Further, logic functions within Qualtrics (2025) may be employed to create more dynamic interventions depending on a person's responses and content they seek (e.g., more neuroscientific information) or how they respond to mindset measures provided. For example, if a person has a stronger fixed mindset, the scenarios provided can focus on beginning steps of making changes and teaching a person that they do have the capacity for change.

Additional interventions may be developed from the present single-session stuttering reactions mindset intervention for people who do not stutter. One participant suggested an intervention on changing reactions of speaking partners. The experience of stuttering is shaped by environmental factors and the reactions of others (Yaruss & Quesal, 2004). Although the mindsets of people who do not stutter is outside of the scope of this paper, future directions may include development of interventions for people who do not stuttering, such as reducing stigma through education.

In summary, the results of Study Three suggest the benefit of the pilot intervention in the sample of people who stutter with need for additional outcomes measures to more comprehensively understand the effects. The qualitative findings also point to the feasibility of developing growth mindset interventions for people who stutter.

6.0 LIMITATIONS AND FUTURE DIRECTIONS

The aim of this research was to establish whether there is a stuttering reactions mindset, and to explore potential associations between a stuttering reactions mindset and the adverse impact of stuttering. It further aimed to understand the effectiveness and feasibility of a pilot intervention aimed at increasing growth mindsets of stuttering reactions on a person's readiness to change. Although the results established that stuttering reactions mindsets are a distinguishable construct, there are limitations that should be taken into consideration.

Although efforts were made to recruit participants from various demographic backgrounds, respondents for all three studies were predominately white and non-Hispanic or Latino. The influence of culture on the experience of stuttering has been highlighted in previous studies (see Dean & Medina, 2021). Our findings may lack external validity and generalizability of under-represented demographic groups. Future research should address this potential limitation through more focused recruitment of non-White and Hispanic or Latino populations for a broader and more diverse understanding of how stuttering reactions mindsets influences the experience of stuttering. Likewise, although recruitment efforts were made to reflect the male-to-female sex ratio as seen in the stuttering population (2-3:1; Bloodstein et al., 2021), the resulting male-to-female sex ratio was approximately 2:1. This may impact the generalizability of the results for people who stutter. Future directions of stuttering reactions mindset research may prioritize recruitment efforts to that better reflect the demographic characteristics of people who stutter.

The primary variables assessed in this study (specifically, mindsets of various domains, the adverse impact of stuttering, and readiness to change) were latent variables. Latent variables are hypothetical constructs that can only be inferred through self-report; these variables cannot

be observed directly. Although there are many advantages to researching latent variables, such as improving theoretical insight into lesser known constructs (e.g., stuttering reactions mindset), it can be difficult to determine causal features as these variables are unable to be directly observed (Spirtes, 2001). Latent variable regression is a type of structural equation modeling that can account for the aforementioned limitations but requires large sample sizes for accurate measurement (Burnham et al., 1999). The sample size for Study Two was not sufficient for this particular analysis. Future studies should explore latent regression modeling to better understand the correlation between the adverse impact of stuttering and other latent variables associated with stuttering, such as mindsets. Similarly, simple linear regression modeling was deemed an appropriate statistical analysis method to reduce complexity and prevent overfitting of models (Babyak, 2004). Although the results of the linear regression model from the second study suggests that stuttering reactions mindset predicts the adverse impact of stuttering as measured by the OASES, there are unexplored variables that may explain further the experience of stuttering. These variables include other domain-specific mindsets (e.g., anxiety) or closely related variables to the experience of stuttering, such as goals when speaking (Tichenor & Yaruss, 2019a) that predict the adverse experience of stuttering in addition to a person's stuttering reactions mindset. Multiple linear regression is a statistical method that can analyze the relationship between a single dependent variable, in this case, stuttering reactions mindset, and multiple independent variables (e.g., goals when speaking and anxiety mindset). Although the sample sizes were not sufficient for this study and future studies may explore this statistical method to determine the contributions of other variables on the overall experience of stuttering.

The online nature of all three studies, combined with the fact that compensation was provided for participation, introduced the potential for fraudulent behavior, such as automated

programs ("bots") used simply to collect compensation. Significant efforts were made to ensure that responses were legitimate, such as Expert Review Fraud Detection Technology via Qualtrics (2025) and manually reviewing responses for suspicious activity. Due to the large volume of responses, it may not have been possible to detect all instances of fraud. This is particularly true for Study One because it did not involve direct contact with the researcher, whereas Study Two and Study Three did. Future studies could benefit from more comprehensive vetting processes that include direct contact with all participants as a vetting process before they complete the surveys.

The order of mindset surveys for Study One was not randomized. This may have introduced order bias in which participants' responses may have been influenced by the order of mindset measures provided. The results of Study One demonstrated that each mindset, including stuttering, emerged as a unique construct separate from other mindsets. Future studies may replicate Study One with randomized measures to ensure accurate interpretation and validity of the results.

Additionally, the items that were created for the stuttering reactions mindset purposefully focused on a person's *reaction* to stuttering. It may be that people who stutter hold different mindsets regarding their reactions to stuttering and the diagnosis of stuttering itself. Future directions may seek to disentangle this relationship by determining if people who stutter also hold a mindset specific to the diagnosis or underlying etiology of stuttering that is separate from their mindset about how they react to stuttering. Finally, as indicated, the URICA as the primary outcome measure may not have been the most sensitive for detecting the results of the intervention. The lack of differences between the control and experimental groups may have also be due to other unexplored or potentially confounding variables, such as a participant's

predisposition toward a growth mindset of stuttering reactions. Kruskal-Wallis rank sum test determined that there were no significant differences in participants' mindsets across the three studies, suggesting that baseline mindsets were not a moderating variable of a person's Readiness to Change as measured by the URICA. Still, the participations who chose to engage in any part of the study may have already be predisposed to growth mindset beliefs and capacity for change. The intervention may then have had a minimal effect on a participant's baseline readiness to change as they may have already been aware that their reactions to stuttering were adaptive and did not feel the need to change. Likewise, previously established goals when speaking may have also influenced participants' responses on the outcome measure. Participants may have already had the goal to stuttering openly and did not perceive value in changing their speaking behaviors, as measured by the Readiness to Change. Any changes in their readiness to change were not significant following the intervention as there perceivably was not behavior that needed to "change." Likewise, a ceiling effect is noted when the majority of scores fall on the higher end of a specific measurement tool (Wang et al., 2009). This effect may have occurred in Study Three in relation to participants' stuttering mindset scores. The sample of participants may have demonstrated stronger growth mindsets of stuttering reactions and any effect on readiness to change from the intervention may not have been found. Future studies should continue to develop this intervention with more than one outcome measure, such as stuttering reactions mindset, adverse impact of stuttering, and more specifically QOL, to determine the exact effects of this intervention on a person's experience of stuttering.

7.0 CONCLUSIONS

Research has demonstrated that people have specific mindsets regarding the controllability of personal attributes (Dweck, 1995). This study explored whether this is also true for a person's mindset regarding the controllability of their reactions to stuttering. The results from Study One supported the conclusion that people who stutter hold specific thoughts, beliefs, and expectations about their personal reactions to stuttering that are separate from, yet related to, their thoughts, beliefs, and expectations about their intelligence, personality, emotion, and anxiety. That is, they hold a *stuttering reactions mindset* which can either be growth or fixed regarding their reactions to stuttering. Findings suggested that a person's stuttering reactions mindset may influence their experience of stuttering; this holds significant implications for understanding the adverse impact of stuttering. A person who has a growth mindset of stuttering may be more inclined to approach speaking situations and cope more effectively with setbacks or difficult situations. The cascading effects of a growth mindset of stuttering reactions can thereby reduce the adverse impact of stuttering. Understanding a person's stuttering reactions mindset may lead to more optimized treatment outcomes, as growth mindset in other domains are associated with increased readiness to engage in therapy and help-seeking behaviors. These findings highlight that there may be benefits to foster a growth mindset of stuttering within a comprehensive stuttering treatment plan.

Study Two highlighted the influence that a stuttering reactions mindset has on the adverse impact of stuttering. A growth mindset of stuttering was associated with reduced adverse impact of stuttering, and a fixed mindset of stuttering was associated with increased adverse impact of stuttering. Further, mindsets of stuttering were shown to have a statistically significant relationship with a person's reaction to stuttering and their QOL. These findings suggest the

distinct manners in which mindsets influence a person's experience of stuttering. Stuttering reactions mindsets may underlie how a person responds to their anticipation of stuttering. Those personal reactions to stuttering may be adaptive or maladaptive depending on a person's mindset, and this may influence how their experience of stuttering develops. Having a growth mindset of stuttering was also related to increased QOL. A person with a growth mindset of stuttering is more predisposed to approach situations that involve speaking, and this may allow them to more fully participate in daily activities, positively contributing to their QOL.

Findings from Study Three demonstrated the potential value of a single-session intervention aimed to increase a growth mindset of stuttering. Qualitative findings highlighted the benefits of a single-session growth mindset intervention reported by people who stutter, including increasing a sense of community for stuttering and knowledge about stuttering. The online nature, flexibility, and reduced time commitment of an asynchronous single-session intervention also point to the feasibility of such program, though future research is needed to determine if such interventions are actually beneficial for people who stutter within the context of comprehensive stuttering interventions and outcomes specific to people who stutter. Future iterations may include additional outcome measures to more specifically define the effect of a growth mindset of stuttering on the overall experience of stuttering.

Overall, the present research uncovered a unique and distinct construct unique to people who stutter, a stuttering reactions mindset. These findings support the improving understanding of factors that may influence the experience of stuttering and offer directions for future research that can lead to therapies that can reduce the adverse impact of stuttering.

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APPENDIX A: MINDSET INTERVENTION

Block One

Why do we need your help?

We are researchers from Michigan State University who study stuttering from the speaker's perspective.

We also study the experience of stuttering and the individual factors that contribute to this unique experience.

We believe that someone's mindset, or beliefs and core assumptions that direct us towards specific expectations (Crum et al., 2013), contribute to their experience of stuttering.

We further believe that mindsets about stuttering can be changed. We need your help in determining if and to what extent your mindset about stuttering can be changed.

Please help researchers and the stuttering community by completing the following activity carefully. You will be asked to provide your feedback at the end of the activity as well.

Block Two

A message from someone who stutters

Transcript: I have had a stutter ever since I could remember. Growing up I became aware that I was different from other kids and that they did not have the same difficulties I had when talking. I was very embarrassed to stutter in front of other people, so I became very quiet. The only way for me not to stutter was to not talk. This made it very hard to do things like make friends or ask questions during class. As I further grew up, I realized that there's nothing wrong with stuttering; it is just a different way in which I talk similar to how some people have different accents or speak other languages. Stuttering is a part of who I am, and I found that being able to be myself made me much happier than trying to fit in with others and hide my stutter. I was surprised at how much better things became by shifting my perspective

Block Three

Where do thoughts and feelings come from?

Neuroscientists have determined that our thoughts and feelings, or "mental representations of the physiological changes that characterize emotions" (Damasio, 2001, p. 781) determine our behavior (Eslinger et al., 2021).

Thoughts and feelings have a neurobiological basis. In other words, they come from your brain.

The human brain is made up of nerve cells called neurons. Neurons are constantly creating connections by receiving and transmitting messages between each other through synapses (Ludwig et al., 2023).

Block four

Connections in the brain

Every thought and feeling creates connections between neurons in the brain.

Thoughts can be the words a person says to themselves. “That person didn’t want to hire me because I stutter.”

Feelings can be the emotions in our bodies, such as shame and embarrassment (Tichenor & Yaruss, 2019).

When a person thinks, “I’ll never be promoted because of my stutter,” they may then feel shame and embarrassment. Those connections form between neurons in their brain.

These connections then lead to certain behaviors.

For instance, someone who feels embarrassed about stuttering in front of others, might avoid speaking situations, such as a job interview.

This is called avoidance and is common in people who stutter and detrimental to their quality of life (Connery, 2020).

Block five

Can those connections change?

Yes! Your brain is malleable. This means you can create new connections between the neurons in your brain.

When neurons form new connections, people’s reactions to stuttering can change.

They can learn to have different types of thoughts and feelings about their stutter and respond differently.

This is a form of neuroplasticity, or the brain’s ability to change and adapt by reorganizing its structure, functions, and connections (Puderbaugh et al., 2023).

The more often you engage in new ways of thinking, the stronger these connections become.

Block six

New pathways

Think of this process as creating a new walking path in the forest.
The first time you walk it, it is not so easy. You need to walk through grass, over sticks, and sometimes lose your way.

But if you walk that path every day, or multiple times a day, the easier it becomes to walk and navigate.

Block seven

Just to recap…
Your thoughts and feelings are formed in the brain through connections between neurons.

These connections determine your behavior and reactions.

Your brain is malleable because of neuroplasticity. This means that you can change how you think, feel, and behave by creating new connections in the brain. In other words, your reactions to stuttering are not fixed.

Block eight

How do we know reactions to stuttering can change?

In one study, Dr. Janet Beilby, Dr. Michelle Byrnes, and Dr. J. Scott Yaruss, one of the authors of this study, investigated the effectiveness of an Acceptance and Commitment Therapy (ACT) group program adapted for people who stutter.

ACT is a therapy approach that establishes psychological flexibility or a person's ability to accept their thoughts and feelings in the present moment. ACT acknowledges that people encounter difficult situations every day and teaches them to change the way they interact with their thoughts instead of changing the thoughts themselves (Hayes et al., 2006). A person who stutters may think, "I am an inefficient communicator."

ACT does not focus on changing this thought but rather helps a person become aware that this thought can trigger certain feelings and is just a description of their fluency (Beilby & Byrnes, 2012, p. 38). ACT teaches a person to embrace experiences that cause discomfort and reorient them to the present moment. Thus, changing negative reactions to stuttering.

Each experience is new, and past events do not determine the current experience. In ACT, the person who stutters identifies the most meaningful areas in their lives or what they value. These values direct their life choices instead of thoughts and feelings about stuttering.

Following the 8-week ACT program adapted for people who stutter, all participants reported positive changes in their lives.

These included reductions in the adverse impact of stuttering.

And there was an increase in the awareness of thoughts and feelings about stuttering.

The participants were able to use the strategies they learned from ACT to reduce experiential avoidance patterns, and then engaging in committed action towards change.

Block nine

Now we need your perspective

Imagine there is a person who stutters at your job. When they first start, you notice that they avoided the staffroom (where everyone talks!) and often had lunch alone. During work meetings, they never shared their ideas in the front of the group or speak with others. But by the end of their first month, they start to join conversations more often and even volunteered to present at the annual conference.

What are some of your guesses about how these changes might have happened? When writing your answer, think about what you know about thoughts, feelings, behaviors, and the brain.

Block ten

Overcoming challenges

Transcript: An opportunity presented itself as I was offered a job as a customer service sales rep. I hesitated to accept the offer because of my speech. The hiring manager knew that I was a member of a support group for stuttering. She told she told me that I needed to get out of my comfort zone. After she said that I decided to accept the offer. The job entailed answering the phone, making calls, answering questions, giving quotes, just to name a few for 8 hours a day. Working on the phone would be the last job of my preferred choice. The phone used to be my biggest fear. It started off shaky, but I gained more confidence day by day. Listening to inspirational music help calm my nerves and believing in myself helped me do the job. I answered 150 calls per day which included saying my name 150 times a day! Working on the phone is something that I thought I could never do in the past. I did it and I'm glad I did.

Block eleven

What would you do?

Imagine that you were invited to dinner by some familiar friends. Great! But then they told you a few new people will be joining, and they don't know you stutter. The last time this happened, people finished your sentences and made "that look." You don't want to go now.

Knowing what you know about the brain and developing new ways of thinking, explain what you would do and/or tell yourself?

Block Twelve

What would you tell them?

Imagine you know someone who is in a similar scenario, but this time they are meeting a potential business partner. They have only communicated through email, but now this person wants to meet face-to-face for coffee! They are anticipating a negative reaction from this person and are considering cancelling the meeting. What if they lose their whole job from this, not just a new business account?

Knowing what you know about the brain and developing new ways of thinking, explain what you would tell this person?

Block thirteen

One final request...

Your participation in the Stuttering reactions mindsets: Can you change your experience of stuttering intervention is greatly appreciated. We are excited to continue developing this program for people who stutter. Since you are one of the first people to complete our program, we are asking that you fill out a brief form on your experience. There are only four brief questions, and any information will help the future of our research.

What did you like the most?

What did you like the least?

Would you recommend this program to another person who stutters? Explain your answer.

Write any recommendations or changes this intervention.