TOWARD HEALTHY INTERNAL DIALOGUES: EXAMINING SECONDARY-LEVEL MUSIC STUDENTS' PERCEPTIONS OF SELF-TALK, RESILIENCE, AND SOCIAL ENVIRONMENT

by

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(Under the Direction of Brian C. Wesolowski)

ABSTRACT

Due to the demands of today's achievement-driven educational environment, increased attention is now being given to students' mental health. Specific areas of inquiry include students' perceptions of internal dialogue and its effect on daily academic and nonacademic activities. Educational research suggests that self-talk, resiliency, and social environment affect student achievement and perceptions of learning environments. Investigating students' internal dialogue may better inform teaching practices aligned to improved health and wellness in the music classroom.

Self-talk is a person's inner dialogue, examined in the context of valence, motivation, and/or instruction. Resilience is the ability to overcome adversity, and in educational contexts, refers to students' abilities to overcome challenges despite adverse educational, social, psychological, and societal barriers. Classroom social environments include both academic and social considerations toward student learning and relationships with peers and teachers.

The purpose of this study was to examine students' perceptions of self-talk, resilience, and social environment in the context of secondary-level instrumental music performance classrooms. The questions guiding this study include:

1. What are the psychometric qualities (i.e., validity, reliability, and fairness) of the self-talk, resiliency, and social learning environment scales used in this study?
2. What relationships exist between the constructs and domains of self-talk, resiliency, and social learning environment in the context of secondary-level music teaching and learning?
3. What interaction effects exist between resiliency, social environment, and sex-type and how do they explain variability in self-talk?
4. What size of Differential Item Functioning (DIF) effect exist for items when used to measure subgroups of students based on their sex-type?

Secondary-level instrumental music students ($N = 402$) enrolled in United States middle and high schools responded to a 69-item Likert-type rating scale embedded within the three constructs: Self-talk, Resilience, and Social Environment. Measures of each construct were validated using modern measurement theory. Several strong positive relationships were identified between the constructs and embedded domains. Interaction effects between resiliency, social learning environment, and sex-type were identified, suggesting that variability in students' self-talk is explained by both resiliency and social environment as conditioned by sex-type. Implications toward students' music performance achievement, motivation, and developmental needs are discussed.

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DEDICATION

This document is dedicated to my family for their unwavering support in my music journey. Andrew and Bennett, none of this would be possible without your patience, kindness, and love.

This document is in memory of my undergraduate flute professor, Dr. Eldred Spell, who dedicated his life to respecting, loving, and protecting his students' mental and emotional well-being, as well as music making.

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CHAPTER 1

INTRODUCTION

Self-talk is the internal dialogue, or the inner voice individuals communicate with daily (Hardy, 2006). There are four domains embedded in self-talk: positive, negative, motivational, and instructional. The second area of interest in this study is resilience. Resilience is the ability to overcome life's challenges (Martin, 2013), and there are two domains: self-efficacy and tenacity. The last closely related area of inquiry is the social environment in music classrooms. The social environment is made up of individual and group norms embedded within a unique society, such as a classroom, school, community, region, or nation (Ryan et al., 2011). The classroom environment includes two domains: social assessment and mastery goals. How instrumental musicians talk to themselves when they are practicing and performing is largely unknown. When faced with difficult or negative situations, such as practicing a challenging instrumental passage and becoming frustrated, or when a performance does not go as well as desired, the internal dialogue musicians engage with, and the effects of internal dialogue have not yet been investigated.

Examining self-talk, resilience, and students' and teachers' perceptions of classroom social environments has shown increased attention in educational (Lantolf, 2006; Lawrence & Valsiner, 2003; Perkos et al., 2002), psychological (Abernethy, 2001; Hardy et al., 2006; Shui-Fong & Yin-Kum, 2007), and behavioral research (Bandura, 1997; Brown et al., 2005; McAuly et al., 2007; Weinberg, 1986), however in the context of music education these areas have not been explored. Musician physical and mental well-being has been largely investigated (Clift et

al., 2017; Clift & Morrison, 2011; Coulton et al., 2015; Detari et al., 2020; Gross & Musgrave, 2020; Jacukowicz, 2016; Loveday et al., in press; Musgrave, 2022; Vaag et al., 2016; Williamon et al., 2009), however how musicians talk to themselves in their music practice and performance has not yet been examined. How individuals talk to themselves to enhance performance has largely been examined in sports psychology (Brinthaupt et al., 2009; Hardy, 2006; Hardy et al., 2008; Hatzigeorgiadis et al., 2004; Landin, 1994; Theodorakis et al., 2000; Van Raalte et al., 2000), clinical psychology (Beck, 1976; Calvete & Cadeñoso, 2005; Frawley, 2008; Kelly et al., 2009; Lazarus, 1991) and academic performance (Burnett, 1999; Lee et al., 2020; Nielsen, 2008; Peters & Williams, 2006; Tod et al., 2011).

Professional musicians report to suffer from high levels of anxiety, depression, and other mental health conditions (Detari et al., 2020; Gross & Musgrave, 2020; Jauckowicz, 2016; Loveday et al., in press; Vaag et al., 2016). Therapies through music are suggested to heal and improve mental well-being for most individuals, but those who are making the music continue to struggle with their mental health (Musgrave, 2022; Richter, 2021). Listening to music (Lin et al., 2011), playing music (Perkins et al., 2016) singing (Clift et al., 2017; Clift & Morrison, 2011; Coulton et al., 2015; Williams et al., 2018) and drumming (Fancourt et al., 2016; Perkins et al., 2016) are all suggested to improve the mental health and well-being of individuals who suffer with depression and anxiety (Musgrave, 2022).

Music-making is personal, social, and culturally significant (Ascenso et al., 2018) and is both physical and psychological (Williamon, 2009). Music performance anxiety is a broad concept that relies on personality traits, cognitive processing, autonomic arousal, and overt behavioral responses (Craske & Craig, 1984; Lang, 1993; Osborne et al., 2014). Music education is suggested to promote creativity, self-efficacy, and social skills among developing adolescents

(Boyce-Tillman, 2000; Schellenberg et al., 2015), however many student musicians suffer from music performance anxiety, or fear of performing (Osborne, 2013; Osborne et al., 2014; Sinden, 1999; Spielman, 2009). While specific and independent underlying factors of music performance anxiety have been examined, musicians' self-talk has only been identified as an intervention to overcome music performance anxiety (Allan, 2016; Clark et al., 2014; Weiss, 2008) without examining the quality and content of musicians' self-statements.

Self-talk is the internal dialogue, or the inner voice individuals communicate with and is classified as positive or negative, motivational or instructional, or the regulation of thoughts (Hardy, 2006). Self-talk is the "dialogue the individual interprets feelings and perceptions, regulates and changes evaluations and convictions, and gives him/herself instructions and reinforcement" (Hackfort & Schwenkmezger, 1993, p. 355). In the context of academic performance, research suggests that positive self-talk results in a stronger performance, and negative self-talk results in a less rewarding performance (Sánchez et al., 2016). In the context of athletic performance, Hardy (2006) and Landin and Herbert (1999) identified two broad types of self-talk, motivational and instructional self-talk. Motivational self-talk refers to statements that focus on enhancing mental and emotional positivity, and confidence, and improving effort in performance. Instructional self-talk refers to statements that center on attentional, technical, and directive cues specific to the task at hand (Brinthaupt, et al., 2009).

An individual's internal dialogue is the constant companion that forms an autobiographical point of view of daily occurrences and experiences (Hughes, 2009). The inner voice communicating does not question an individual's existence in the world, but does reflect (p. 455), perceive (Nurbaity et al., 2018), evaluate (Zayas et al., 2022), and informs future action (Dulany & O'Connell, 1963).

Internal dialogue is conversational and is used as a coping mechanism, or strategy for developing resilience in performance (Neck & Manz, 1992). The familiar words spoken by the Little Blue Engine (Piper, 1930) "I think I can – I think I can – I think I can – I think I can" illustrate the perseverance to literally climb a mountain, however, those reinforcing self-statements encourage individuals to positively adapt to adversity (Fergus & Zimmerman, 2005; Luthar et al., 2000). Resilience is not a personality trait or a fixed attribute of individuals (Khanlou & Wray, 2014). Resilience in academic settings is linked to how students interact with and adapt to their learning environments (Ye et al., 2021). Similar to self-talk, resilience is a mental skill that evolves and is a factor in mental and emotional well-being, anxiety, motivation, and drive to succeed (Trigueros et al., 2021). An individual's immediate surroundings either construct or destruct his or her ability to adapt (Martin, 2002; Rudd et al., 2021).

As children develop cognitively, they become more aware of their inner voices (Chohan, 2010), their perception of the world around them (Bandura, 1971; 1997), and how their contribution to their immediate surroundings is perceived by others (Kaplan et al., 2017). There is a common misconception that if an individual speaks to him or herself out loud that individual might have a mental illness (Launer, 2020). However, the inner voice all individuals interact with daily, verbalized or internalized, guides self-reflection (p. 507), self-concept (Lantolf, 2006), self-regulation (Patrick et al., 2007), and self-efficacy (Bandura, 1997).

Reflection is often discussed in visual terms, such as looking at yourself in the mirror, where inner speech becomes your mirror (Launer, 2020). Internal dialogue, however, is used to self-evaluate (Zayas et al., 2022), and to enhance task concentration, preparation, and attentional control (Abernethy, 2001). Through reflection and self-evaluation, the way individuals define themselves, or self-concept, an intrapersonal communication emerges to guide future action and

behavior (Purkey, 2000), which leads to behavioral change, such as self-regulation and self-efficacy (Theodorakis et al., 2000).

Self-evaluation and reflection occur internally and is not only made up of observations of the self, but also of the evaluation and feedback provided from others. Internal ideas and beliefs about the self are born out of and shaped by external forces, such as peers and teachers, that perpetuate or change an individual's sense of self (Lantolf, 2006) and abilities to succeed (Bandura, 1977, 1982). Social environments are interpreted by individuals' character traits, background, and inner thoughts (Ames, 1992; Maehr, 1984; Nicholls, 1984).

The literature examining self-talk is often paired with other mental skills (i.e., mental imagery) or performance interventions (i.e., goal setting), but as a stand-alone convention, self-talk is often overlooked. Hardy, Oliver, and Tod (2009) designed a framework to outline self-talk, specifically, and how it is affected by situational (e.g., task difficulty, interactions with others, classroom environment) and personal factors (e.g., personality traits, interpretation of self-talk content) and also influences cognitive (e.g., focus of attention), motivational (e.g., self-confidence), behavioral (e.g., performance), and affectual mechanisms (e.g., anxiety or depression).

Self-talk is multidimensional and can act as a moderator between an individual and their performance (Hardy, 2006; Theodorakis et al., 2000). The dimensions of self-talk include frequency, overtness, valence, interpretation, and its function, self-instruction or self-motivation (Hardy, 2006). How often individuals speak to themselves aloud or internally, positively or negatively, and how they interpret those self-statements have implications for athletic performance (Hardy et al., 2009). The same might be assumed for musical performance,

however, how musicians speak to themselves and how that inner speech affects their ability to overcome performance difficulties have not been explicitly addressed.

The purpose of this study was to examine students' perceptions of self-talk, resilience, and social environment in the context of secondary-level instrumental music performance classrooms. The well-being of instrumental musicians has often been examined by their physical well-being or their music performance anxiety, without targeting a particular underlying factor that could cause both physical and mental tension. Self-talk, resilience, and the interactions within the social environment of secondary-level instrumental music students could play a significant role in their music practice and performance behaviors. Examining these three constructs explicitly could provide a richer understanding of how instrumental music students talk to themselves and how curricular change could make music teaching and learning more focused on musician well-being.

The following research questions guided this study:

1. What are the psychometric qualities (i.e., validity, reliability, and fairness) of the self-talk, resiliency, and social learning environment scales proposed in this study?
2. What is the relationship between the constructs of self-talk, resiliency, and social environment in the context of secondary-level music teaching and learning?
3. What interaction effects exist between resiliency, social environment, and sex-type, and how do they explain variability in self-talk?
4. What size of Differential Item Functioning (DIF) effect exist for items when used to measure subgroups of students based on their sex-type?

CHAPTER 2

LITERATURE REVIEW

Self-talk is a mental skill that has been examined in psychological interventions (e.g., Hanton & Jones, 1999), critical cognitive processes (Bunker et al., 1993), and emotions (Lazarus, 1982). One of the significant issues in the literature is the lack of agreement on a definition of self-talk that encompasses each aspect of the construct (e.g., valence, frequency, content, and quality), therefore not assigning a specific theory to investigate self-talk in the social sciences (Hardy, 2006). The development of theoretically based self-talk investigations could expand the available literature for empirical examination of the effects of self-talk (p. 82). The aim of this literature review is to discuss how individuals develop their unique self-definitions, how they cope with challenges, and how they perceive the world around them through the mechanism of internal dialogue.

The Construction of Self

Human thought is a powerful tool, a tool that can be used to develop the concept of self (Cooley, 1902; Festinger, 1954; Bandura, 1977). A person's self-concept is a "complex, dynamic, and organized system of learned beliefs that an individual holds to be true about his or her personal experiences," (Purkey, 2000, p. 14). The intrapersonal communication a person engages in (Roberts et al., 1987) and the interpretation of that internal dialogue (Chohan, 2010) along with a person's learned beliefs establish a person's construction of self and their belief system. A person has a greater understanding of himself or herself through their internal

dialogue, often called self-talk (Hardy et al., 2006) which is influenced by everyday experiences and messages that are both verbal and nonverbal (Purkey, 2000).

Self-concept is developed by an individual defining who they are (Bandura, 1977; Cooley, 1902; Chohan, 2014; Festinger, 1954). An individual's ability to define themselves and understand how they interact with others is how individuals draw meanings from the world around them. The individual sense of self, feelings, and behaviors are strongly influenced by an individual's internal dialogue (Butler, 1992). Self-definitions and self-talk are unique to the individual, and these inner speech patterns are an ongoing and constant personal voice influencing processing, behaviors, and actions (Chohan, 2010). Individuals' recognition of personal self-definitions leads to recurring evaluations of the self and can impact outcomes, such as student achievement (p. 14).

Inner speech occurs before, during, or after daily experiences, and it influences how people filter their perceptions, interpretations, and meanings extracted from conversations and events embedded in those experiences (Chohan, 2010). The quality and substance of an individual's internal dialogue substantially and inescapably alter their emotional responses and reactive behaviors (p.11). Pessimistic self-talk leads to sadness, anxiety, or depression, as well as feelings of giving up. Whereas optimistic or positive self-talk leads to happiness, hopefulness, and perseverance (Payne & Manning, 1998). An individual's inner thoughts are the inner voice that builds a person's awareness of self, rational or irrational (positive or negative, respectively), which can determine the ability to push through and overcome life's hurdles (Denmark, 1993; Osborne, 2013). Self-concept and the accompanying internal dialogue can be transformed in a person's immediate surroundings, or the interactions embedded in the social environment (Ambrose, 1995).

Identifying symbols, messages, and meanings materializes from the interactions between individual people (Carter & Fuller, 2015), which is explained in the interpretive theory of symbolic interactionism. In any societal context, such as a classroom, there is a collection of individual selves that compiles interactions between people, places, and things to construct a unique self (Denzin, 1992). Human beings make sense of the world from their particular perspectives, their consciousness of thinking, and their interpretation of observed and lived experiences (Dowling, 2005). With the subjective meanings that exist within societal communications and individual interactions, people are constantly interpreting and analyzing the structure of their human experience and how they fit within the structure of perceived norms within society (Denzin, 1992).

Feedback from an individual's own experiences as well as the observations of others' experiences develops inner thoughts and perceived predictions about the behavior necessary to succeed (Bandura, 1977). The perceptions of how to succeed could guide future actions, both to avoid failure and achieve success (Dulany & O'Connell, 1963). Patterns of behavior are learned through direct experience and the observation of others, and the presence (or absence) of others, and their behaviors. These experiences and observations transform individual inner thoughts and self-dialogue (Bandura, 1977). An individual's conversational self is a mechanism used to evaluate social interactions, messages, and influences (Lawrence & Valsiner, 2003).

Self-Talk Defined

Self-talk is the inner speech a person has with themselves and has been assigned several terms, including inner monologue or dialogue, auditory or mental imagery, private or inner speech, self-talk, and self-statements (Brinthaupt, et al., 2009, p. 82). Internal dialogue has been widely investigated in psychological research, specifically in cognition, perception, and

information processing (Duncan & Cheyne, 1999; Landin & Herbert, 1999; Siegrist, 1995). The current literature focuses on task and performance anxiety in academics (Hooda & Saini, 2017; Huberty, 2012; Mazzone et al., 2007), music performance anxiety (Farnsworth-Grodd, 2012; Fogle, 1982; Helding, 2016; Hoffman & Hanrahan, 2012; Huang & Song, 2021; Kendrick, 1979; Osborne, 2013; Osborne & Franklin, 2002; Sinden, 1999; Spielman, 2009), and athletic performance anxiety and interventions (Brinthaupt et al., 2009; Hatzigeorgiadis et al., 2014; Mahoney & Myers, 2021; Raglin, 1992). Individual inner speech is unique and functions behaviorally (Brinthaupt et al., 2009) and cognitively (Bunker et al., 1993). "Self-talk should be defined as (a) verbalizations or statements addressed to the self; (b) multidimensional in nature; (c) having interpretive elements associated with the content of statements employed; (d) is somewhat dynamic; and (e) serving at least two functions; instructional and motivational," (Hardy, 2006, p. 84).

Self-talk is a mental skill and cognitive function that processes information internally (Abernethy, 2001). Inner speech moves in the same neural pathways as spoken language and can affect emotional reactions based on the tone of the inner voice (Cheal, 2014). Internal voices can either be the individual's own voice, as if a person is narrating their life or can be in the voice and tone of other individuals, such as a parent, teacher, or coach (p. 20). Previous research suggests that males' and females' self-talk differs, where males' self-talk is largely influenced by their parents or guardian figures, and females' self-talk is largely influenced by their teacher or coach (Flanagan & Symonds, 2022).

Self-talk is either constructive (e.g., positive, motivational, or instructional) or destructive (e.g., negative) (p.10). The development of the constructive mental skill can lead to performance success (Dagrou & Gauvin, 1992; Perkos, et al., 2002; Ziegler, 1987), concentration

(Hatzigeorgiadis, et al., 2004; Landin, 1994; Landin & Herbert, 1999), self-efficacy (Bandura, 1997), and self-regulation (Vygotsky, 1987). Whereas the development of destructive or negative self-talk can lead to fear of failure, disengagement, and lack of confidence in personal abilities (Martin, 2013)

Self-efficacy is an individual's expectation of performance success (Bandura, 1977, 1987, 1997). Motivational self-talk can increase a person's self-efficacy through encouragement, which increases their self-confidence and effort in performance (Weinberg, 1986; Brown et al., 2005; McAuley et al., 2007). Self-regulation strategies can be applied through instructional self-statements that are developed over time (Bodrova, 2006). Self-talk transports individuals to their future as well as their past, and when self-efficacy and self-regulation are refined, positive reinforcement through internal speech is increased (Cheal, 2014).

Behavioral definitions analyze self-talk as verbal or non-verbal communication, such as tone of voice or facial expressions (Theodorakis, et al., 2001, p. 310). Cognitively, however, self-talk is defined as the voices inside an individual's mind that are internalized as thought and guide action (Bunker, et al., 1993; Cheal, 1994). Self-talk is a factor in thought processing and cognitive control in both behavioral and cognitive views. Whether self-talk reflects one's consciousness or whether it impacts the self-regulation one engages in is one facet of how self-talk fits into the behavioral and cognitive processes (Fields, 2002).

Self-statements are the voices assigned to an individual's inner thoughts (Llave, 2020). The frequency of self-statements is predominant in inner dialogue research (Brinthaupt, et al., 2009; Duncan & Cheyne, 1999; Llave, 2020; Siegrist, 1995). When and how individuals talk to themselves is interpreted through their defined self-concept as a coping mechanism and their frequency has been the predominant source of measuring self-talk. Measurement scales have

been developed to investigate self-talk in specific situations such as athletic performance (Siegrist, 1995) and self-talk as information recall (Duncan & Cheyne, 1999). Self-verbalizations, or self-statements, have a more universally agreed-upon definition, unlike the various definitions of self-talk specifically. Self-statements have been more recently defined "as the voice of my thoughts that only I can hear" (Llave 2020, p. 129).

Self-related measures such as self-esteem, self-consciousness, automatic self-statements, and social desirability are all suggested to be affected by and impact internal dialogue through social assessment, self-criticism, and self-reinforcement (Brinthaupt et al., 2009). Self-talk is driven by self-statements, which help people get through situations, and decision-making, as well as impact self-perceptions (Llave, 2020). Self-regulation strategies are used to understand and manage reactions and behaviors in specific contexts (Vygotsky, 1987). The ability to self-regulate and talk to oneself, or to self-instruct is a part of the leading research into the frequency of and the causation of self-talk (Vygotsky, 1987). The relationship between social assessment, self-criticism, self-esteem, self-consciousness, self-reinforcement, or instruction suggests behavioral and cognitive processes of self-talk (Abernethy, 2001; Rudd, et al., 2021; Rutter, 2012).

Private self-consciousness and frequency of self-talk are suggested to have a positive relationship and are consistent with research on the nature of private self-consciousness (Zayas, et al., 2022). Self-consciousness is synonymous with self-awareness (Chohan, 2010). Self-awareness is developed through reflection and critically thinking about the inside voices that are responsible for creating individual perspectives of the world (p. 11). Bringing awareness to an individual's quality and content of internal dialogue could provide a richer meaning about the impacts of self-talk (Hardy, 2006).

Quality and Content of Self-Talk

The foundation of self-talk is multidimensional because it is behavioral, generative, and aural or perceptual (Brinthaupt et al., 2009). Self-talk is complex and dynamic and has been investigated as a multi-factor mental skill intervention package (Cumming et al., 2006; Elko & Ostrow, 1991; Hanton & Jones, 1996; Thelwell et al., 2006), or for improved skill execution (Dagrou & Gauvin, 1992; Perkos et al., 2002; Ziegler, 1987), and not as a stand-alone construct.

Self-talk is classified as positive or negative, motivational or instructional, or the regulation of thoughts (Hardy, 2006). Self-talk is the dialogue in which the individual interprets feelings or perceptions, regulates and changes evaluations and convictions, and provides instructions and reinforcement (Hackfort & Schwenkmezger, 1993, p. 355). In academic performance, it is suggested that positive self-talk results in a more positive performance, whereas negative self-talk results in a less positive performance (Sánchez et al., 2016). In athletic performance, Hardy (2006) and Landin and Herbert (1999) identified two broad types of self-talk, motivational and instructional self-talk. Motivational self-talk refers to self-statements that focus on enhancing mental and emotional positivity, confidence, and improving effort in performance. Instructional self-talk refers to statements that are attentional, technical, and directive cues specific to the task at hand (Brinthaupt et al., 2009). The valence of self-talk can impact performance outcomes.

Valence

The valence dimension is one of the strongest emphases in self-talk research (Harvey et al., 2008; Masciana et al., 2001; Rushall & Shewchuk, 1989; Theodorakis et al., 2000; Tynes & McFatter, 1987; Weinberg et al., 1984). Valence is the quality of self-talk in terms of positive or negative internal self-statements (Theodorakis, et al., 2000). Approval or disapproval of oneself

or one's performance on any given task directs the quality of one's self-talk (Siegrist, 1995). Though the celebration or condemnation of oneself has not been formally declared the most significant aspect of self-talk, it is the largest part of the self-talk literature (Brinthaupt et al., 2009; Burgoyne et al., 2020; Duncan & Cheyne, 1999; Macnamara, 2018). Both positive and negative self-statements can enhance athletic performance (Goodhart, 1986; Van Raalte et al., 1995), which suggests that the content and internal interpretation of self-statements must be examined (Harvey et al., 2002; Masciana et al., 2001; Rushall & Shewchuk, 1989; Tynes & McFatter, 1987; Weinberg et al., 1984).

Overtness

The overtness dimension of self-talk is on a continuum spanning from external self-statements to covert internal dialogue (Hardy, 2006). Overt self-statements can be observed and heard by others; however, these statements are directed to the individual speaking, not to other individuals (Van Raalte et al., 1995, 2000). Covert self-statements are situated as an inner voice in one's head based on the phonological understanding of speech (MacKay, 1992). Self-statements out loud, or overt private speech, is not addressed to others, while covert self-statements are internal thoughts turned to speech (Diaz, 1992, p. 62; Theodorakis et al., 2000). Self-talk has largely been viewed as containing both overt and covert self-statements, suggesting that people do not use one or the other, but both (Diaz, 1992). Self-statements are based on an individual's belief in their ability and mindset for achievement (Theodorakis et al., 2000).

Mindset

Growth and fixed mindsets are the two predominantly examined mindsets in psychological and academic research (Yeager & Dweck, 2020). A growth mindset is a belief that

a person's characteristic traits can be developed over time, whereas a fixed mindset is a belief that these traits are unchangeable (Dweck, 1999; Dweck, 2012). Individuals with a growth mindset can face adversity and continue to improve, whereas individuals with a fixed mindset may fear failure and avoid challenging tasks or situations (Yeager & Dweck, 2020). Research suggests that mindsets do affect student outcomes in academic contexts (Macnamara, 2018; Burgoyne, Hambrick, & Macnamara, 2020). Growth and fixed mindsets determine the quality or valence of a person's self-talk (Moran, 1996; Theodorakis et al., 2000). Growth mindsets exist more in the motivational realm where a person encourages themselves through their internal dialogue (Hardy, 2006). Fixed mindsets occur in a person's unchangeable attributes with a critical tone when speaking to themselves (Dweck, 1999). How an individual interacts internally with him or herself guides current and future behaviors (Chohan, 2010). The mindset an individual has about his or her abilities interacts with the quality and content of their internal dialogue for desired outcomes (Dweck, 1999; Macnamara, 2018).

Self-Determination

Self-Determination Theory (SDT) is a broad theory of motivation that suggests two key assumptions: (a) the need for growth drives behavior (i.e., development of a sense of self); and (b) the desire for autonomy is important (i.e., intrinsic motivation). SDT suggests that developmental and psychological growth are inherent properties of human beings (Deci & Ryan, 1985). Self-determined statements are either "assigned" or "freely chosen" (p. 7). Assigned and freely chosen self-statements refer to the control or determination a person has over how they talk to themselves. The generation of internal dialogue is either determined naturally or controlled by an outside individual (Cheal, 2014; Chohan, 2010).

Assigned self-statements are statements pre-designed either by a researcher, teacher, or coach or by the person participating in a specific task (Hatzigeorgiadis et al, 2004; Landin, 1994; Landin & Herbert, 1999). These self-statements are controlled and are suggested to be instructional directives a person tells themselves internally or is preempted by a coach, teacher, or experimenter (Abernethy, 2001). Freely chosen self-statements occur naturally and automatically as a task is being performed by an individual. A more naturalistic approach determined by the performing individual is used to motivate or encourage themselves (Day & Allen, 2004; Scully & Lowry, 2002; Shui-Fong & Yin-Kum, 2007). Research suggests that inner speech that is freely chosen by the individual enhances task performance (Hardy et al., 2008) and as a coping mechanism for motivation (Oliver, 2010).

Self-Talk Operations

Initially, psychologists referred to self-talk as part of cognitive developmental processes resembling thinking and speaking (Vygotsky, 1962). Self-talk is a mental skill that operates in positive or negative, and motivational or instructional self-statements (Hardy, 2006). Motivational and instructional self-talk are two primary functions examined, specifically in athletic performance (Hardy, 2006; Hardy et al., 2008; Theodorakis et al., 2000). The function of motivational self-talk is to boost confidence, mental toughness, preparation, as well as focus (Hardy, 2006). Motivational self-talk enhances self-confidence (Theodorakis et al., 2000) and is used for encouragement (Hardy et al., 2008). The function of instructional self-talk is to refine the accuracy of skills through strategy-based directives while performing a task (Theodorakis et al., 2000). Research suggests that athletes have been examined using both motivational and instructional self-talk frequently (Brinthaupt et al., 2009; Hatzigeorgiadis et al., 2014; Theodorakis et al., 2000).

Motivational

Motivational self-talk functions as a source of encouragement and confidence in one's own abilities in task performance (Theodorakis et al, 2000). Channeling positive self-talk has been suggested to enhance self-efficacy, self-confidence, and performance ability, specifically in athletic performance (Scully & Lowry, 2002). Motivational statements (e.g., "I can do this") have been shown to occur naturally among individuals (Brown et al., 2005; McAuley et al., 2007; Weinberg, 1986) and improve one's success in each task. Motivational and positive self-talk viewed separately is ambiguous (Theodorakis et al., 2000). Motivational self-statements are largely viewed as positive self-statements.

Instructional

Instructional self-statements function as a source of guided direction focusing on the technical aspects of a task (Masciana et al., 2001; Rushall & Shewchuk, 1989; Tynes & McFatter, 1987). The quality of instructional self-talk is ambiguous, and how individuals interpret self-statements is both positive and negative instructional self-statements (Goodhart, 1986; Van Raalte et al., 1995). Instructional self-statements can be positive in nature but exist more in the directive tone, such as sitting in an instrumental music rehearsal setting an individual telling him or herself what note is to be performed to be correct. Instructional statements critically dissect what might or might not be working in a person's performance but remains positive and directional (Weinberg, 2012).

Frequency

The frequency of self-talk is significant because it examines how much someone uses internal dialogue while also taking into consideration the quality of self-talk (Hardy et al., 2008). Previous research has examined the frequency of self-talk in combination with the valence of

self-talk (Hardy, 2006; Perkos et al., 2002; Theodorakis et al., 2000). How much someone talks to themselves and the quality of how they talk to themselves suggests that self-talk is a constant and dynamic processing function.

The amount people talk to themselves and the quality of their self-statements either hinders or enhances confidence, performance, and self-esteem (Harris & Harris, 1984; Perkos et al., 2002; Theodorakis et al., 2000). Positive self-talk used in a motivational context is suggested to increase performance (Brinthaupt et al., 2009; Dagrou & Gauvin, 1992; Perkos et al., 2002; Theodorakis et al., 2000; Ziegler, 1987). However, too much instructional self-talk may be detrimental to performance due to concentration on the internal dialogue rather than focusing on the task (Van Raalte et al., 1995). Each function of self-talk overlaps one another and works together, making the investigations of the effectiveness of self-talk complex (Harvey et al., 2002; Masciana et al., 2001). The landscape of self-talk includes every facet of self-talk requiring researchers to examine all for a full understanding of internal dialogue.

Self-Talk and Resilience

Individuals can choose the way they think, and how they speak to themselves affects their choice of feelings and behaviors (Seligman, 1991). Resilience is a person's knowledge and development of coping mechanisms to have the capability to positively adjust to challenging situations (Flach, 1989; Keye & Pidgeon, 2013; Lightsey, 2006). Resilience is an increasingly investigated concept in psychological research (Aburn et al., 2016; Folk, 2016), and has been examined in areas such as healthcare (Jeffcott et al., 2009; Monroe & Oliviere, 2007), childhood development (Khanlou & Wray, 2014), and academic contexts (Martin, 2002; Trigueros et al, 2020; Rudd et al, 2021; Yang & Ye, 2021). Academic resilience, specifically, refers to students' abilities to succeed in educational settings, regardless of their background (Martin, 2002).

Students use internal dialogue to perceive, understand, and guide their academic success (Martin, 2013). The more resilient a student is, he or she is more likely to have positive quality and content of inner speech (Sánchez et al., 2016).

Personal antecedents, or personal factors such as personality traits and cognitive processing preferences, have been largely examined as fixed or unchangeable in individuals (Luthar et al., 2000; Pavio, 1971; Rudd, 2021; Rutter, 2012). Situational antecedents, such as task difficulty, performance circumstances, or the influence of others, are complex and change with the interactions between individuals and their surrounding environment (Rudd, 2021; Trigueros et al., 2021). Resilience is a psychological trait that affects mental and emotional well-being, anxiety, motivation, and direction to succeed, and individuals' internal dialogue (Trigueros et al., 2021).

Academic Motivation and Resilience

Academically, student motivation and efforts are provoked by interest and enjoyment of learning (Martin, 2002). Academic resilience has largely been measured by students' social, cultural, and economic "capital," (Bourdieu, 1986). Individuals understand the world around them through what they possess monetarily, culturally, and socially. Social "capital" allows individuals to move up in the world and provides students with the ability to succeed in school, particularly if they have positive social and cultural influences (p. 17). Though monetary resources have been to impact academic resilience, more of the literature is moving toward the educational environment and less on the students' background outside of school (Federici & Skaalvik, 2013; Patrick et al., 2007; Rudd et al, 2021; Trigueros et al, 2019; Trigueros et al, 2020; Yang & Ye, 2021).

Cognitive and non-cognitive functions have been examined for educational outcomes (Ames, 1992). Non-cognitive skills are the ways people interact with others and with themselves (Ryan & Patrick, 2001). Communication, motivation, and self-efficacy have all been examined as non-cognitive skills in relation to factors that contributed to being resilient (Abernethy, 2001; Yang & Ye, 2021). Test scores and content knowledge are considered the cognitive functions examined to measure students' abilities to positively adapt to learning environments (Yang & Ye, 2021). Academic resilience, in the cognitive view, is developed and used as a protective measure in vulnerable situations an individual student encounters internally and externally (Ames, 1992; Bandura, 1997; Fraser & Fisher, 1982; Goodenow, 1993; Maehr, 1984; Ryan & Patrick, 2001).

Resilience and Others

How individuals view themselves in situation-specific contexts, such as students in a classroom setting, impacts motivation, effort, and engagement (Church et al., 2001; Nolen & Haladyna, 1990). Adaptive behaviors are learned skills to cope with challenges (Rudd, 2021; Rutter, 2012; Trigueros et al., 2020). Motivational, instructional, and positive internal dialogue as well as an individual's concept of self in constructive environments enhances an individual's ability to adapt (Purkey, 2000). Whereas learned helplessness or failure accepting behaviors such as negative self-talk, negative self-definitions, and destructive environments decrease an individual's ability to cope or adapt (p. 75).

Resilience evolves and is not a fixed personal trait (Trigueros et al., 2020). It is acquired from unique personal experiences and the ability to control emotional reactions (p. 3). Resilience is developed internally (Méndez-Aguado et al., 2020), however its development is impacted by external factors (e.g., others, environment) (Rudd et al., 2021). Internal factors, such as intrinsic

motivation, are explicitly linked to the evolution of resilience (Martin, 2002), and positive or motivational self-statements increase an individual's capacity to deal with a setback (p. 36). Internal and external factors play individual roles simultaneously as individuals deal with their surroundings and impact their interpretations of who they are and their perceived ability to succeed (Purkey, 2000).

Success Orientation

Theories such as need-achievement theory and self-worth motivation theory suggest that success-oriented individuals are typically optimistic, engage in positive (motivational or instructional) self-statements, and do not usually get negatively sidetracked by setbacks (Covington & Omelich, 1991; Martin, 1998, 2001; Martin, 2001). Individuals who feel the need to achieve view success as linked to their self-worth, but do not feel a fear of failure (Alpert & Haber, 1960). Individuals who are failure-avoidant are typically anxious in performing tasks which implies student motivation (Covington & Omelich, 1999). Academically, fear-avoidant students are disengaged, could be perceived as helpless, and ultimately give up on challenging tasks (Abramson et al., 1978; Covington, 1992). The practice of constructive self-statements (e.g., positive, motivational, instructional) help individuals overcome failure-avoidance and failure-accepting behaviors (Cheal, 2014). Negative, or destructive self-statements perpetuate negative feelings of worth, and confidence, and lead to negative outcomes, personally (p.20), academically (Martin, 2013), and athletically (Scully & Lowry, 2002).

Control

Humans are curious creatures and need to make meaning of why and how things occur (Manusov & Spitzberg, 2008). Attribution theory focuses on the causes that lead to events and how those events may determine individuals' reactions or behavior in future events (Weiner,

1994). The factors individuals attribute to failure or success could lead to the development or hindrance of developing resilience through a sense of control over their outcomes (Martin, 2013). In the classroom context, events and causations may lead students toward optimism and academic achievement (Craven et al., 1991; Weiner, 1994). Three components of perceived causation are locus, stability, and controllability (Weiner, 1994).

Control is when an individual feels that they can avoid a failure or can achieve success (Husman & Fishman, 2017). It is a fundamental function of human-beings to need the feeling of control and guides current and future behavior (Heckhausen & Schulz, 1995). Individual's perceived control is the internal locus, or belief of control without external forces, to internally dictate daily events and behaviors (Thompson, 2002). When students feel that they have no control, they engage in self-sabotaging behaviors, or "learned helplessness" (Martin, 2001). Students with a high amount of internal locus of control are linked to tenacity, focus of attention, effort, motivation, and mastery (Connell, 1985; Harter & Connell, 1984; Patrick et al., 1993). This suggests that students who perceive themselves without control are not as likely to be engaged with positive or adaptive behaviors and do not practice constructive self-statements leading to the development of personal resilience (Cleary & Zimmerman, 2001). The need for control and attributing internal and external factors to success or failure leads to causal thinking (Husman & Fishman, 2017). Causal thinking is typically generated by unexpected, negative, or significant experiences that create a sense of no control among individuals (Lazarus & Folkman, 1984; Wong & Weiner, 1981).

Self-Efficacy and Expectancies

Self-efficacy is an individual's belief in his or her capability to complete a task (Butz & Usher, 2015), influences behavior (Wentzel & Miele, 2016), and is influenced by an individual's

specific environments (Bandura, 1986, 1997). Academically, students who practice self-efficacy typically take alternative routes toward a solution when they are not met with success in their initial attempt (Butz & Usher, 2015). Students function at a higher level when they are in an environment that requires elevated levels of persistence and problem-solving situations, which suggests their expectancies of task-outcome (Bandura, 1997; Zimmerman & Kitsantas, 1999). Students who do not possess high levels of self-efficacy typically make small issues more difficult hurdles to overcome and get bogged down in the effort required (Bandura, 1997). Like self-belief and motivation, self-efficacy plays a key role in academic achievement and resilience (Marsh, 1990; Martin & Debus, 1998; Meece et al. 1990; Schunk, 1990).

Expectancy-value theory is based out of the fundamental human need to succeed (Lewin, 1938; Murray, 1938; Tolman, 1932). An individual's belief in their competence or ability leads to their internal outcome expectancies (Bandura et al., 1996). Expectancy-value theory suggests is a framework that considers how students perceive themselves, academically or otherwise, perceptions of how others see them, and factors in their classroom environments, and how these elements affect individual choices, ambitions, and achievement in educational contexts (Rosenzweig et al., 2019). Students' personal expectations of their academic outcomes have been linked to their self-efficacy, resilience, and motivation (Martin, 2013, p. 38).

Performance Motivation

An individual's motivation orientation describes the reason why he or she becomes interested in any task (Eccles, 1984). Intrinsic motivation is comprised of the internal motivating factors driving a person's actions, such as interest, whereas extrinsic motivation is made up of external factors enticing a person's action (e.g., good grades) (Durik et al., 2006). Individuals face different modes of focus, first is the learning focus. Students who are learning-focused are

more likely to complete a task for the satisfaction of completion and progress than for external rewards (Martin & Marsh, 2003).

The second is the performance-focused student. Students who are performance focused are typically externally motivated by their personal perception of how they are performing the task (Martin, 2013). When a student is motivated to learn a task for mastery, rather than comparing their performance to others, their learning is learning-focused (p. 4). Learning-focused students view academic achievement in terms of effort and progress, rather than a fixed ability or intelligence, leading to a deeper practice of self-efficacy and self-regulation strategies (Middleton & Midgley, 1997). The strategies of learning-focused students include instruction, goal setting, planning, study management, and persistence (Martin, 1998, 2013).

Self-Talk and Social Environment

The physical, social, and cultural elements that surround a person in specific places is the social environment (Ryan et al., 2011). Social environments include physical infrastructure and social relationships based on accepted cultural norms (Kaplan et al., 2007). A social environment is unique to its immediate surroundings; however, it interacts with other social environments simultaneously and evolves (Ryan & Patrick, 2001). How people live at home, interact with their family or community, and maneuver through accepted ways of life is layered and decides a person's perception of their immediate surroundings. (Barnett & Casper, 2001). Students face daily challenges in their home lives and school lives that may or may not provide appropriate social and emotional support (Morrison & Allen, 2007). School environments that provide developmental opportunities, as well as emotional and motivational supports, are likely to enhance student engagement, student resilience, and student internal dialogue (MacDonald & Valdivieso, 2000).

A social environment is comprised of cultural norms, and the accepted culture affects all aspects of daily life (Deal & Peterson, 2016). School and classroom cultures have strong significant relationships with student engagement and academic achievement (p. 14). How students feel about themselves within classroom environments is also suggested to affect academic effort and engagement (Church et al., 2001; Nolen & Haladyna, 1990). The messages students receive in their classroom environments are perceived as student ability and are internalized as internal thoughts and dialogue, and guide future action (Ames, 1992; Anderman & Maehr, 1994; Nicholls, 1984).

The nature of a classroom can be better understood through the inner voice students and teachers interact with and the subsequent interactions occurring in a specific classroom (Ambrose, 1995). Teachers play a significant role in the signals they send students who get a sense of their ability, value, and responsibility, or the lack thereof from these internalized messages passed from teacher to student (Chohan, 2010, p.13). Intrapersonal communication is the internal thought and dialogue involves only the self but determines a baseline for all other communication (Pearson & Nelson, 1985, p. 12). Intrapersonal communication research has been examined in business, education, and sociology and suggests that an individual's inner speech shapes their interaction with the world (Manz & Neck, 1999; Roberts et al., 1987). Students and teachers both engage in intrapersonal communication individually and interpret classroom interactions differently based on their unique character traits and historical and cultural background (Ames, 1992; Maehr, 1984).

Cognition and Perception

Social cognitive motivation theories (Bandura, 1986, 1997, 2001) place significance on how humans function and interact with the social environment, and how individual motivation is

affected by the social environment (Schunk & DiBenedetto, 2020). There is a reciprocal relationship between student motivation and perceptions of the social environment (p. 2). The role of the social environment can change or perpetuate the student's internal feeling of abilities in educational contexts (Usher & Schunk, 2018). For example, music students who exhibit high self-efficacy (personal) might be more likely to engage in persistent learning behaviors. Music teachers who provide positive feedback regarding the learning process rather than explicitly mastery promote a productive learning environment that develops individual growth, resilience, and positive internal dialogue (Bandura, 1986).

Classroom social environments are made up of students' and teachers' perceptions of their daily lives inside and outside of school (Deal & Peterson, 2016). Students and teachers bring their background knowledge, ideas, beliefs, and attitudes into the classroom environment (Ryan & Patrick, 2001). Classroom social environments have been suggested to impact students' and teachers' motivation and engagement (Ryan & Patrick, 2001; Kaplan et al., 2007), teacher feedback (Burnette, 2002), teacher and student relationships (Elhay & Hershkovitz, 2019), and goal orientation (Ryan et al., 2011).

Academic achievement is dependent on student engagement and motivation in the classroom (Bandura, 1997). Pedagogical practices and academic tasks are the most investigated components examining student motivation and engagement (Fraser & Fisher, 1983; Nolen & Haladyna, 1990; Goodenow, 1993; Ryan & Patrick, 2001; Church et al., 2001). However, there are newer claims indicating that the classroom environment, specifically the social environment, is a direct link to how students feel about themselves in the classroom (Kaplan et al., 2007).

The social perceptions students have of their peers, teacher, and themselves have been suggested to be a predictor of student engagement. Past research suggests that the social-

cognitive component of a classroom indicates school-related outcomes (Fraser & Fisher, 1982). The social environment of a classroom, including belonging, fairness, respect, structure, inclusion, and support from teachers, is consistent with adaptive behaviors that enhance student engagement and motivation (Kaplan et al., 2007). Examining the social environment as a contributor to student engagement and motivation is relatively new research.

The classroom social environment is comprised of teacher and student support. Students perceive how their teachers care about them and how they help them succeed (Trickett & Moos, 1973). Students also perceive how their peers care about them, relate to them, and how they interact in academic tasks (Johnson et al., 1983). There is an inherent power dynamic that differs between students and teachers, and students with one another. Teachers hold authority and responsibility, whereas students hold reciprocity and familiarity. Both power structures include emotional support, academic and personal investment, and learning goals leading to academic success and mutual respect (Wentzel, 2003).

Mutual respect exists in an environment where all students are treated the same by their teacher. Teachers are responsible for their authority, and how they make their students' learning the top priority, while also making the students feel cared for and respected (Kaplan et al., 2007). Students are required to show their teachers respect, as well as their peers to create a nurturing and safe learning environment. Mutual respect in the classroom is linked to cognitive engagement and self-regulated learning (Ryan & Patrick, 2001). Self-regulation strategies allow students to reflect on their learning and understanding. Driven by mutual respect, task-oriented, and socially motivated goals can help student achievement.

Individuals make sense of themselves and their surroundings through explicit or implicit messages concealed in everyday life (Purkey, 2000). Self-talk is constant internal voice for

processing thoughts and perceptions, guide self-evaluation, and give individuals their sense of belonging in any social context (Chohan, 2010). Student motivation is largely driven by mastery or performance goals, student self-efficacy, and the interal processing of information (Darnon et al., 2007). The employment of self-regulated learning strategies is associated with self-efficacy. Classroom environments that implement mastery goals instead of performance goals are likely to create positive self-efficacy and motivation among students (Patrick et al., 2001).

Mastery goals are set for individual growth with learning as the long-term outcome (Poortvliet & Darnon, 2010). Individuals who set mastery goals associate other people as helpers or allies. Performance goals are short-term target-specific expectations, and individuals who set performance goals view others through a more critical threatening lens (p. 325). Creating a respectful learning environment can enhance the setting of mastery goals where students do not feel the pressure to be competitive with other students (Patrick et al., 2001; Patrick et al., 2003). Self-motivation, self-efficacy, and self-regulated strategies create a desirable environment for increased student effort, engagement, and achievement (Bandura, 1986; Bandura et al., 1996).

Achievement goals, mastery or performance, are a reflection of an individual's belief system of how to achieve and succeed (Darnon & Poortvliet, 2010; Poortvliet et al., 2007). Within educational and sports social contexts, goals are set for an individual's own performance or as a competitive incentive to outperform other individuals (Darnon et al., 2007; Dweck, 1986; Nicholls, 1984; Poortvliet et al., 2007). The presence of others in an achievement-oriented context (i.e., classroom), opens the possibility for individuals to speak to themselves about their own adequacy as well as how they compare to others (Darnon et al., 2007). Social interactions that exist within performance outcome contexts provide information for individuals to process who they are, what their goals are within a learning environment, and how their skills and

abilities measure against other individuals' abilities and skills (p. 62). Teachers' feedback is a moderating tool for student self-concept, self-evaluation, self-confidence, and self-talk (Lantolf, 2006).

Self-talk Applied

Measuring self-talk has predominately focused on self-statements made, and how often they occur within the clinical realm of research, though Siegrist (1995) is noted for "publish[ing] an 18-item scale of self-talk designed to reflect specific situations in which people talk to themselves about themselves," (Brinthaupt, Hein, & Kramer, 2009, p. 83). Duncan and Cheyne's (1999) research focused on a 27-item measure of verbalizations; what people say and think to themselves, such as trying recall information. Using this research, the authors developed a scale that would differ from existing self-talk measures, providing a measurement for a range of adult inner and private speech in several behaviors and contexts.

Brinthaupt, Hein, and Kramer's (2009) development and preliminary validation method was designed in several steps made up of 7 studies. Generating an in-depth pool of 90 self-statements in the cognitive, affective, and behavioral self-regulatory domains of self-talk, the authors determined the factor structure by testing different models. Running a one-factor model, the authors determined that this structure did not fit, tested for multiple factors using principal axis extraction and promax rotation, determining the following top four factors: Social Assessment, Self-Reinforcement, Self-Criticism, and Self-Management. There were high correlations among the four self-talk factors therefore the authors tested a higher order factor structure for two samples, with the second sample being a cross-validation sample. Though the higher order factor structure determined a support of a hierarchy to self-talk frequency, the

authors decided to use the first model because they had an expectation that the frequency of self-talk may be less than the relationship between self-talk and four determined factors.

Next, the authors compared self-related measures, including self-esteem, self-consciousness, positive and negative automatic self-statements, and social desirability to scores on the self-talk scale. Self-esteem had a negative correlation to Social Assessment and Self-Criticism but had a positive relationship with Self-Reinforcement and was unrelated to Self-Management. Private self-consciousness and frequency of self-talk had a positive relationship, and consistent with research on the nature of private self-consciousness, the Internal State Awareness factor and Self-Management self-talk scale factor had a strong relationship. Findings in the fourth study provide initial evidence that the self-talk scale is valid. Then, refining the self-talk scale, cross-validated as a means of reviewing the factor items resulting in the 16-item version showing an acceptable fit for the four-factor model, then assessed the test-retest stability of the revised 16-item version. The correlation between the total self-talk scale scores for both test and retest significant indicated that the construct of self-talk frequency is different in all individuals and using the four-factor structure shows that self-talk serves multiple purposes whether through reflection of emotional or behavioral problems, self-talk can impact mood and leave different people with different experiences. The self-talk scale can measure situational effects of self-regulation as well as self-regulation as an individual difference.

The Self-Talk Questionnaire (S-TQ) was specifically designed to measure motivational and cognitive functions that athletes use to enhance their performances in sports. Zervas, Stavrou, and Psychountaki's 2007 study, Development and Validation of the Self-Talk Questionnaire (S-TQ) for Sports, was designed to describe the development and validity of the Self-Talk Questionnaire (S-TQ). There are two different explanations for self-talk that is discussed in the

study beginning with "…that self-talk increases confidence and regulates arousal (Hardy et al., 1996; Hardy, et al., 2001). A second explanation is that self-talk is linked to the concepts of information processing and focus of attention (Landin & Herbert, 1999)." The authors go on to describe that successes in performance ability and quality depends on cognitive processes and how humans observe and deal with these cognitive processes, both internally and externally, (Zervas, Stavrou, & Psychounaki, 2007, p. 142-43).

The development of the Self-Talk Questionnaire was designed in three phases, beginning with the construction of the questionnaire in the first phase. Using the guidelines set out by the Standards for Educational and Psychological Testing (1999), phase 1 assessed how athletes use self-talk to enhance their athletic performance and the frequency of self-talk. The initial questionnaire consisted of 14 items as well as three open-ended questions outlining content relevance, understanding, phraseology, and the need for or lack of certain items (Zervas, Stavrou, & Psychountaki, 2017). Participating in a meeting to be informed of the construction of the questionnaire and population in the validation process, four sport psychologists consultants rated the items based on content relevance using a 5-point Likert-type scale.

Using 373 volunteer athletes, phase two tested the factor structure for the scale, while also testing internal consistency, test-retest reliability coefficients, and the correlations between the S-TQ and social desirability. The participants, who were involved in a variety of individual and team sports completed a demographic questionnaire detailing their age, gender, sport participation, category, and competitive experience. Participants used the initial 14 item S-TQ using the 5-point Likert-type format describing how frequently they experienced each statement with 1 being a rating of *never* to 5 being a rating of *always*. To assess social desirability, the authors administered the Marlowe-Crowne Social Desirability Scale (Reynolds, 1982) and reiterated to each participant

that the questionnaire was not evaluated, to minimize possible tendency to provide answers participants thought were desirable, as well as keeping each participant's anonymity and confidentiality. The 13-item Marlowe-Crowne Social Desirability Scale was dichotomous in nature by utilizing a true/false response format. To eliminate participants for socially desirable bias, a cut-off value of nine was set on a value system of 0 (non-socially desirable) to 13 (socially desirable). With 52 participants scoring a nine or higher, they were excluded from any further portion of analysis dropping the sample size from 373 to 321 participants.

By randomly splitting the participants into two-subsamples of equal numbers, the data analysis was run using the exploratory factor analysis, as well as several tests to estimate the sufficiency of the overall fit using: a Chi-square, Satorra-Bentler ratio, *Non-Normed Fit Index*, *Comparative Fit Index*, *Robust Comparative Fit Index*, *Standardized Root Mean Squared Residual*, *Root Mean Squared Error of Approximation*, as well as the 90% CI of the RMSEA. The means and the range of item means, inter-item correlations, and item-total correlations as well as Cronbach's a coefficient were all used to test the internal consistency.

Using Cronbach's alpha, the internal consistency for the two factors of the S-TQ was suggested to be acceptable for both motivational self-talk and cognitive self-talk. Finally, the test-retest reliability for motivational and cognitive self-talk indicated high values, implying that the development of this instrument might help researchers and coaches explore and understand different aspects of the self-talk that occurs within athletes, and how self-talk impacts their athletic performance.

Weinberg, Miller and Horn's 2012 study, The Influence of a Self-Talk Intervention on Collegiate Cross-Country Runners, is divided in three purposes: (a) to determine the effect of motivational and instructional self-statements separately, as well as the combined motivational

and instructional self-statements used on a one-mile performance with competitive NCAA distance runners, (b) to distinguish an effect between assigned statements versus self-set statements in relationship to performance, and (c) to explore any additional effects of different types of self-talk, and to determine where this self-talk was self-determined or determined externally.

Self-talk can be thought of in two ways: "assigned" and "freely chosen." To have assigned self-talk means that the statements are generated externally, and the self (individual) has no control over these statements, whereas freely chosen statements are self-determined by the individual. In this study, 81 collegiate runners were recruited to participate in the baseline trial followed by an assignment to different experimental conditions, then finally a post-test to determine the effect of the experimental conditions. The baseline trial was an individually run mile long run, the coaches timed these runs and instructed their runners to do their best. At the conclusion of the one-mile run, each participant was given a list of 25 motivational self-statements and a list of 25 instructional self-statements, with additional space for the individual to include self-generated statements. The provided lists of motivational and instructional statements were generated from runners in a previous study (Donohue et al, 2000). The participants used a 5-point Likert-type scale to rate each of the 25 statements and were then instructed to circle their top 12 statements from each list. These 12 statements from both the motivational and instructional statement lists were then used to create a personalized self-talk script.

Based on their time of the baseline run, each participant was assigned to a condition where the six runners with the top run times (lowest times) were assigned to each of the six experimental conditions, and then the seventh fastest time was assigned to the same group as the

runner with the sixth fastest time, the eighth fastest time was paired with the fifth fastest time and so on. After being matched by times, the participants were then matched based on their choices of motivational and instructional self-talk statements.

The six conditions of self-statements that were recorded by the experimenter and provided for each individual participant included: (a) motivational statements/chosen, (b) motivational statements/assigned, (c) instructional statements/chosen, (d) instructional statements/assigned, (e) instructional plus motivational statements/chosen, and (f) instructional plus motivational statements/assigned. Throughout the week (approximately) after the baseline run, the experimenter recorded individual 3-minute CDs that included two full cycles of the 24 statements (12 motivational and 12 instructional). A week (approximately) after the baseline run, the participants ran the post-test one mile run under a similar weather condition, hence why the exact post-date was chosen as close to one week after the pretest as possible (8 days).

On the day of the post-test, all participants were instructed to engage in their normal routine and stretching activities, and all participants ran the one-mile post-test individually. On the post-test day, all participants were provided with their CDs and at approximately five minutes before the post-test run, were instructed to listen to them away from the other participants. The researcher told each participant what type of statements they would be listening to (instructional, motivational, or combination) as well as if they were selected by the coach or if they were self-selected statements. Though the coaches did not select any of the statements, the authors believed this deception was necessary to provide greater external validity to the study due to real-life situations where the coach would typically select the self-statements for each of the runners. At the conclusion of the post-test mile-run, all participants completed a post-experimental questionnaire. This questionnaire assessed the participants' reactions to and

perceptions of the intervention. The content of the questions focused on if the participants thought the intervention helped their performance, and if so how, as well as if they enjoyed the intervention, and the top three motivational and instructional self-statements. (Weinberg et al., 2012, p. 128).

In the post-experimental questionnaire, the participants were asked about their effort in both runs, as it has been indicated in previous research that self-talk can enhance performance through increased effort (Theodorakis et al., 2000). Using a 5-point Likert-type scale with 1 being *not tried hard* to 5 being *tried extremely hard*, the mean was 3.8, which showed no significant difference among the six conditions. Between the six conditions, there seems to be no consistency in the type of combinations that produced performance improvements. The combined self-set group had the most improvement, though the combined assigned group showed the least amount of improvement, therefore indicating in the combined self-statements, self-selected would seem to have impacted the most improvement. On the other hand, the instructional assigned group performed with more improvement than did the instructional self-selected group, therefore these results suggest that the assigned statements impact more improvement.

Multiple collegiate cross-country coaches indicated that an improvement of two seconds in one week is quite significant. These findings combined with discussion with collegiate cross-country coaches indicate that regardless of whether the statements were assigned, or self-selected, self-talk does appear to improve running performance. This does suggest that the variable carrying the most weight is whether the statements are motivational or instructional. The authors suggest further research to investigate if the athletes participating in the study should be

part of choosing their statements, as well as if the statements should be recorded by the participant, by their coach, or continue to be recorded by the experimenter.

Utilizing three objectives, the purpose of Sánchez, Carvajal, and Saggiomo's (2016) study was to examine the relationship between the type of self-talk used by university students and its effect on their academic performance. The first objective was an attempt to identify patterns in the valence of the participants' self-talk. The second objective was an analysis of the existence of a possible relationship between the type of self-talk that participants use in everyday situations (general self-talk) and the self-talk that participants use in academic evaluations (academic self-talk). Lastly, the third objective examined and determined the relationship between self-talk (general and academic) with the participants' academic abilities and outcomes (self-reported statements). Investigating the patterns of internal messages students tell themselves, the frequency of their internal dialogue, and the productivity of student self-talk this study highlights the need for increased attention to self-talk in the academic psychology field.

177 undergraduate students in the first year of their Psychology degree participated in this study. The authors employed the Self-Talk Inventory (STI) (Calvete et al., 2005) which uses 52 items divided into two scales of 26 items each. One scale identifies negative self-talk and the other identifies positive self-talk. The Self-Talk Inventory describes ten daily life situations where the participants are asked to imagine what they might think and say to themselves while in those situations, rating responses on a scale of 1 (*very unlikely*) to 4 (*very likely*). The investigators took the sum of scores for each item to determine a positive or negative self-talk value for each participant. Positive self-talk resulted in a .78 value, and negative self-talk valued a .90 with a correlation of -.02 (close to zero), which suggests independence of positivity and negativity in self-talk.

To analyze academic self-talk, the authors developed the Self-Talk Academic Scale (STAS) made up of six items. These items were taken from students at the conclusion of an exam and the conversations they had with themselves in that academic situation (Sánchez et al., 2011). Two outside judges selected three positive valence items and three negative items to build the scale of six total items. The students used a 4-point Likert-type scale with 1 (*very likely*) to 4 (*very unlikely*) to answer whether they would say these statements to themselves when found in two different academic situations. This scale does show acceptable reliability with a .78 for positive, and .72 for negative academic self-talk (Cronbach's Alpha), and a significant negative correlation between positive and negative academic self-talk of $r = -.24$.

These results suggest that positive self-talk is used more than negative self-talk in individuals' daily lives as well as in academic situations. Students placed in varying academic situations used both negative and positive self-talk, yet in daily life, they are more likely to use positive self-talk and in difficult academic situations are more likely to use negative academic self-talk. The relationship between general and academic, positive, and negative self-talk as well as daily life or academic performance, suggests that when students use positive self-talk, performance is more likely to be successful.

Resilience Applied

The goal of Martin's (2002) article, Motivation and Academic Resilience: Developing a Model for Student Enhancement, is to explore motivation and academic resilience and show that these two concerns "are complementary but not necessarily overlapping constructs," (Martin, 2002, p. 34). The author also develops a model to be of assistance to educators in their attempt to guide student motivation and academic resilience in a way that is relatable and obtainable by students. This study discusses that while students may have the motivation (drive), if they face

academic setbacks, without some level of resilience (ability to bounce back), students may not overcome these issues and motivation could be lost.

Motivation as a concept has been identified as the energy and drive within an individual to achieve a goal. In education, this drive can be used by students to work effectively to fulfill their potential in school, which is a component of the student's interest and overall enjoyment while in a learning environment. Academic resilience has been described much like motivation, however, considers whether students possess the ability to overcome academic adversity. Research of academic resilience is limited, where resilience has been studied in different ethnic groups, or in more broad terms dealing with individual backgrounds and life events. Through these different areas of research, it is noted that there are protective factors within people who are identified as resilient, such as: "(a) reduce the impact of negative events, (b) help individuals avoid or resist problematic pathways, and (c) promote positive and successful pathways," (Martin, 2002, p. 35).

Martin (2002) details several theories that play a part in academic resilience as a concept: achievement theory, self-worth motivation theory, self-efficacy theory, expectancy x value theory, attribution theory, control theory, and motivation orientation theory. "[T]hese theories tell us (a) why students do what they do, (b) how they do it, (c) their confidence in being able to do it, (d) their ability to surmount obstacles and challenges before them, and (e) their capacity to pick themselves up after academic setback or hold their ground in the face of study pressures," (p. 36). The purpose of developing a model is to utilize these theories together so that both concepts (motivation and academic resilience) could be tangible for educators and students.

When studying the need achievement and self-worth motivation theories, success-oriented students are typically optimistic and do not usually get negatively sidetracked by

academic setbacks (Covington & Omelich, 1991; Martin, 1998, 2001; Martin & Marsh, 2022; Martin et al., 2001). Failure-avoidant students are typically seen as anxious and the fear of failing is a trend in their motivation (Alpert & Haber, 1960; Covington & Omelich, 1991). Failure-accepting students are those who ultimately give up and are disengaged, and could be seen as helpless (Abramson et al., 1978; Covington, 1992). The factors that emerge from these studies for success-oriented students are high self-belief and control. For students who fear failure, anxiety, and failure avoidance, and lastly in both fear of failure as well as the failure-accepting student is self-sabotage.

The study of the attribution theory and control moves the research focus toward the causes that lead to events and how those events may determine how individuals react or behave in future events (Weiner, 1994). In the classroom, these events and causations may lead students toward optimism and performance (Weiner, 1994). Three components of perceived causation are locus, stability, and controllability. When an individual feels that they can avoid a failure or can achieve success is described as control. When students feel that they have lost control, it is typical to see the engagement of self-sabotage, or learned helplessness (Martin et al., 2001). High levels of control in students can be linked to persistence, attention, effort, participation, mastery motivation, and achievement (Kaplan & Flum, 2010). This research in totality may suggest that students who perceive themselves with low control are not as likely to be engaged with adaptive motivation behaviors, or that their resilience academically is not present.

In research of self-efficacy and expectancy x value theory, it is suggested that the idea of success-oriented students being optimistic and have a strong sense of self-belief brings into question the idea of self-efficacy. Students who practice self-efficacy are seen to typically take alternative routes toward a solution when they are not met with success in their initial attempt,

and they function at a higher level when they are in an environment that requires elevated levels of persistence and problem-solving situations (Bandura, 1997). Students who do not possess high levels of self-efficacy typically make small issues large more difficult hurdles to overcome and get bogged down in the effort these situations require (Bandura, 1997). Self-efficacy, much like self-belief and motivation have been noted in research to play a key role in academic achievement and resilience (Marsh, 1990; Martin & Debus, 1998; Meece et al. 1990; Schunk, 1990). When looking at self-belief and expectancy, Meece et al. (1990) noted that students' expectations of their academic outcomes have been linked to their motivation and achievement (Martin, 2013, p. 38).

A student's motivation orientation refers to their focus on the task at hand (learning focus) or on their performance of the task (performance focus) (Martin, 2013). When a student is motivated to learn a task for mastery, rather than how their performance compares to others, their learning is learning-focused, and they view tasks in terms of effort rather than ability (p. 39). Because of this concept, students who are described as learning-focused are less likely to fear failure, therefore they respond to academic adversity with motivation and effort in a goal-directed manner to persevere, rather than engage in counterproductive behaviors, such as give up (p. 40). Just as there are factors that lead to resilience within individuals, being a learning-focused individual also comes with factors, such as planning, study management, and persistence (Martin, 1998, 2013).

Two steps are taken to construct a model of academic resilience. The first step examines self-belief, the value of schooling, learning focus, persistence, planning and monitoring, study management, failure avoidance, anxiety, low control, and self-sabotage has been given relating to a theory. Step two separates the measures into factor groups that enhance motivation and

academic resilience (booster) or reduce motivation and academic resilience (guzzler) (Martin, 2013, p. 40). Boosters and guzzlers break down into thoughts, feelings, and behaviors. The idea behind having these models is to strengthen the educational value of precisely showing educators and students the relationship between increasing motivation and academic resilience, as well as what may be occurring when they are unsure of their abilities (p. 41).

Mindfulness

Recognizing and defining resilience Lightsey (2006) stated: "the capacity for positive adjustment in difficult life circumstances as opposed to a trait," (Keye & Pidgeon, 2013, p. 1). Resilience is overcoming stressful and challenging events in life with the knowledge to adapt and cope increasing to take forward in their life for future events, which is based on Flach's (1989) theory of resilience. This theory suggests that the psychological strength to navigate change is resilience. Flach's (1989) research centered around the "Law of Disruption and Re-integration," which argues that the discomfort of change is an essential part of learning to adapt to adverse or stressful times in life.

Flach (1989) suggests that individuals have unique mechanisms to cope in specific circumstances, therefore the ability to cope is an individual trait that individual stores within them. Research has attempted to identify specific traits which include self-efficacy, skills for problem-solving, introspection, and the ability to be focused on the present and their relationship with resilience (Van Breda, 2001). These traits, while looked at through the lens of resilience, have also been suggested to have an association with mindfulness (Van Breda, 2001) and self-efficacy (Lightsey, 2006).

Mindfulness, though a Buddhist philosophy, is a relatively new area in the field of psychology (Brown et al., 2013). Described as a skill that can help understand how to cope

through intense life events by self-regulation, focusing attention on the present and current situations through openness to an individual experience, mindfulness examines the thoughts and emotions that an individual observes in high-stress situations (Bishop et al., 2004). Bishop et al. (2004) suggest that mindfulness operates under the abandonment of efforts to "forcibly control," (Keye & Pidgeon, 2013, p. 2) negative thoughts and feelings, and that the skill of mindfulness transcends those negative thoughts and emotions which can focus attention to the present. Through a review of research, it is suggested that there is a positive relationship between mindfulness and resilience. Through Lightsey's (2006) research indicating that resilience can be learned in psychological interventions and Van Breda's (2001) suggestion that training in mindfulness can increase resilience, it is evidenced that these two constructs can work together.

Another component of this study is the examination of self-efficacy and how it relates to resilience. Chemers, Hu, and Garcia (2000) have noted that self-efficacy is associated with an increased sense of resilience. Referring to an individual's beliefs about personal performance and achievement, Hudson (2007) and Pajares (1996) suggest that these beliefs directly impact an individual's motivation. Lightsey (2006) utilizes self-efficacy as a mechanism to enhance an individual's resilience, which has been supported by Speight (2009) in a study examining self-efficacy and resilience in high school students.

Examining 141 university students who participated in the current study, Keye and Pidgeon (2013) utilized the Freiburg Mindfulness Inventory (FMI) (Walach et al., 2006), the Beliefs in Educational Success Test (BEST) (Majer, 2006), and the Connor Davidson-Resilience Scale (CD-RISC) (Connor & Davidson, 2003) measures for each of the components. The FMI is a 14-item scale that measures experiences of mindfulness in an individual, measuring an individual's belief in their personal ability to succeed academically, the BEST is a 10-item scale,

and the CD-RISC is a 25-item scale rating an individual's ability to cope and manage with stress over the course of a month.

The results of this study were determined by summing each participant's scores from each scale within each scale. The findings suggest a significant correlation between mindfulness and academic self-efficacy, and mindfulness and academic self-efficacy are suggested to be significant predictors of resilience. These results are in direct support of Flach's (1989) theory of resilience suggesting that mindfulness and academic self-efficacy are part of psychological strengths in individuals to overcome stressful circumstances and change.

Classroom Social Environment Applied

Many studies examining classroom environments have relied heavily on student perceptions, goal structures, student motivation, cognition, and affect (e.g., Anderman & Midgley, 1997; Church et al., 2001; Lüftenegger et al., 2017). However, there is a growing body of work investigating teacher perceptions along with student perceptions of the classroom social environment (e.g., Wang et al., 2017). Student and teacher perceptions have been examined both separately as well as in comparison.

Ryan and Patrick (2001) examined the dimensionality of 30 middle school mathematics classroom environments investigating the student perceptions of their peers and their teacher. Because of the complex nature of a classroom environment, the research considered both academic and social outcomes (p. 439). The dimensions of the classroom include: (a) teacher support (e.g., caring, understanding, and dependability), (b) promoting interaction (e.g., informal help-giving, small-group activities, whole-class lessons), (c) promoting mutual respect (e.g., comfortable, and safe environment), and (d) promoting performance goals (e.g., competition and ability comparisons).

233 students completed a 5-point Likert-type survey responding from 1 (*not at all true*) through 5 (*very true*) in two waves. The first wave occurred in the spring semester of participants' seventh-grade year, and the second wave examined the same 233 participants' responses in eighth grade. This study measured students' perceptions of their classroom social environment, students' motivation, students' self-efficacy with their teacher and peers, students' engagement, disruptive behavior, and prior achievement.

In eighth grade, the overall classroom social environment positively related to social efficacy with teachers and peers, academic efficacy, and self-regulated learning through the measures of teacher support, promoting interaction and promoting mutual respect. Whereas disruptive behavior and the promotion of performance goals were negatively related to the overall classroom social environment (p. 448). From seventh grade to eighth grade, participants reported a higher level of social efficacy with peers, suggesting that as students become older in their respective schools, their comfort level with their peers increases (p. 449).

Findings suggest that students' perceptions of their teacher's support were the most significant predictor of efficacy in relation to the teacher and that teachers who promote mutual respect in their classroom environments increase student academic efficacy. These findings suggest that social and academic efficacy is not only a within-person characteristic but is also situational in specific educational contexts. Young adolescents are malleable, and their developmental adjustment is associated with the structure of the social contexts they interact (p. 454). A teacher who shows students their support and promotes mutual respect among students and teachers is suggested to enhance student self-confidence in academic abilities, as well as enhance student perception of their comfort and engagement in performing tasks.

Job satisfaction, intrinsic motivation, and occupational stresses have been examined regarding teacher burnout and high attrition rates within the profession (Caprara et al., 2006; Klassen & Chiu, 2011; Schleicher, 2011). Teachers have reported that classroom goals and instruction (e.g., student engagement) have significant impacts on their emotional and mental well-being (e.g., anxiety and motivation) (Bullough et al., 2006; Chang, 2009; Hargreaves, 2004; Jennings, 2011; Keller et al., 2014).

Wang and colleagues (2017) examined 495 teachers' perceptions of how their goal orientations affected the classroom goal structure, environment, and emotions teachers feel in the classroom. Participants responded to a 5-point Likert-type survey answering questions least agreeable (1) to most agreeable (5) for both teaching goal orientations and classroom goal structures. Respondents answered a 4-point Likert-type survey reporting their agreeability (1 for least to 4 most agreeable) of teaching-related emotions.

Teachers' perceptions of ability-approach goals were compared with ability-avoidance goals. Goals that are associated with the approach taken are mastery-oriented achievement goals, whereas avoidance goals are associated with performance-oriented achievement goals (Elliot, 1999; Elliot & Murayama, 2008). In their study, Wang et al. (2017) concluded that teachers who endorse social goals (e.g., competence or success) in their teaching practice report higher job satisfaction which may be due to employing more mastery-oriented goals than performance goals in their classrooms (p. 101). Subsequently, teachers' classroom goals predicted classroom structure and overall teacher emotional response. Teachers who practiced mastery goals instead of performance goals felt more fulfillment in the profession and reported less anger and anxiety at work (p. 102). These findings suggest that teachers' personal goals influence their classroom goals, classroom structure, and overall enjoyment in the classroom.

School psychologist Keri Stewart (2016) investigated instructional and relational aspects of the class and everyone's perception of student perceptions of the social environment. Acknowledging that everyone's perception in a specific classroom will vary across different class and school contexts, Stewart (2016) investigates the relationship between these perceptions and their outcomes by examining the factors that influence these perceptions. Stewart (2016) studied five factors within a sample of fifth- and sixth-grade students and teachers who were in an ethnically diverse elementary and middle school setting by administering a self-reported questionnaire using a 5-point Likert scale (1 = *not at all true*; 5 = *very true*).

Stewart (2016) examined the following factors: (a) the extent to which elementary school students and teachers' perceptions of the classroom social environment differ from middle school students and teachers' perceptions, (b) the extent to which teachers and students in elementary and middle school agree about the classroom social environment, (c) if the degree of convergence between teachers and students differs based on high or low levels of motivation and socio-emotional components of the classroom environment, (d) the extent to which school, classroom, and individual teacher factors help to explain teacher perceptions of their classroom environment, and (e) the extent to which school, classroom, and individual student factors help to explain student perceptions of their classroom environment.

Using exploratory factor analyses for the first two questions, descriptive statistics (e.g., means, standard deviations, and normality) for the third question, multiple regression analyses for the fourth question, and a discussion of design-based multi-level path analyses for the fourth question, this research revealed differences in how teachers and students conceptualize the classroom environment. Regarding the results of the multiple regression and design-model multi-level modeling, socio-economic status, gender, and ethnic diversity within the classroom, as well

as demographics and beliefs of teachers and students are suggested to influence the perceptions of both teachers and students in the classroom social environment.

Self-talk Summarized

Today's classroom structures were designed for the Industrial Age, making education's sole purpose the transfer of skills and knowledge (Arstorp, 2018; Göcen et al., 2020). School curricula and classroom environments are evolving with the times to enhance student development of individual navigation to succeed academically, professionally, and personally (Göcen et al., 2020, p. 85). Student and teacher communication extends beyond the walls of a school building, and with the development of technology, communication is easily accessed by all parties, but what is left unsaid suggests clear messages within the classroom environment (Elhay & Hershkovitz, 2019).

In today's data- and achievement-driven educational environment, students' self-care, and mental health, including students' perceptions of internal dialogue related to students' academic and nonacademic activities, is an important area of research that needs to be investigated further. The intense performance demands in music highlight the need for a deeper understanding of the relationship between practice behaviors and performance quality. Although self-talk, resiliency, and social environment have not directly been linked to music teaching and learning, a systematic investigation of musicians' self-talk might promote healthier music teaching and learning opportunities.

CHAPTER 3

METHOD

Participants

A total of 402 secondary-level instrumental students enrolled in band or orchestra participated in this study. 315 of the 402 participants completed the survey in its entirety, therefore the data will reflect 315 participants. Data were collected from a convenience sample of students from 10 middle and high schools, as well as students attending the Lenoir-Rhyne University (NC) Summer Music Camp from several middle and high school instrumental music programs in the Southeastern United States. Participants ranged from sixth grade to twelfth grade. Demographics collected were students' grade levels (grade 6, $n = 45$; grade 7, $n = 30$; grade 8, $n = 24$; grade 9, $n = 60$; grade 10, $n = 38$; grade 11 $n = 62$; grade 12, $n = 56$), and sex-type (female $n = 142$, male $n = 138$, and do not wish to share $n = 35$).

Procedure

Participants anonymously responded to a 69-question survey through the Qualtrics software on a personal or school-owned device (e.g., cell phone, tablet, or computer) during their regularly scheduled instrumental music classes in their schools and at the summer camp. Covid-19 protocols will allow some participants to complete this survey at their homes. Approval by the University of Georgia IRB as well as approval from school districts was obtained before participation.

Survey Items, Domains, and Response Categories

The survey consisted of 69 items embedded within eight domains across the three constructs: (a) self-talk (n = 28), (b) resilience (n = 25), and (c) social environment (n = 16) (see Appendix A). Survey items for the self-talk construct were adapted from The Self-Talk Scale: Development, Factor Analysis, and Validation (Brinthaupt et al., 2009). Resilience survey items were modified from The Academic Resilience Scale (ARS-30): A New Multidimensional Construct Measure (Cassidy, 2016). Survey items for the social environment were adapted from Stewart's (2016) Examining Student and Teacher Perceptions of the Classroom Social Environment Across School Context: Effects of Individual Factors. Self-talk is operationally defined by four domains: (a) positive (n = 5), (b) negative (n = 5), (c) motivational (n = 8), and (d) instructional (n = 10). Resilience is operationally defined by two domains: (a) self-efficacy (n = 16) and (b) tenacity (n = 8), and social environment is operationally defined by two domains: (a) social assessment (n = 10) and (b) mastery goals (n = 6). The response categories are based upon a polytomous 4-point Likert-type scale format using an agreeability anchor (e.g., *strongly disagree, disagree, agree, strongly agree*).

Psychometric Considerations and Data Analysis

Rasch Measurement

To answer the first research question (*What are the psychometric qualities (i.e., validity, reliability, and fairness) of the self-talk, resiliency, and social learning environment scales proposed in this study?*), Rasch Measurement analyses were used. Rasch measurement models (Rasch, 1960/1980) are a part of the Item Response Theory family of models and are particularly useful for measuring latent constructs in the behavioral, social, and psychological sciences (Wesolowski, 2019). Survey items and related domains can act as operational definitions of

latent, psychological constructs (Wright, 2000; Wright & Masters, 1982). In the current study, the latent constructs investigated are defined as "self-talk," "resilience," and "social environment." A primary benefit of using the Rasch Measurement model in survey research is the ability to examine patterns identified from participants' responses, rather than sample-dependent sums of responses found in more traditional Classical Test Theory (CTT) models. Patterns emerge from simultaneous and independent estimates of respondent measures and survey item measures. This allows meaningful interpretations of the effectiveness and suitability of the items' patterns of responses (i.e., construct validity) (Bond, 2003; Linacre, 2004) and respondents' patterns of responses (i.e., predictive validity) (Linacre, 2004).

In survey research, Rasch analyses provide analysis of fit statistics and related errors of measurement to observe respondent and item idiosyncrasies. The fit index in Rasch Measurement models is between 0.60 and 1.40. Fit indices that fall within the suggested range demonstrate the expected pattern set by the model. Fit indices that are observed within the appropriate range support construct validity for item measures and predictive validity for respondent measures. Fit indices outside the suggested range of 0.60-1.40 establish items and respondents that demonstrate peculiar response patterns expected by the model (Linacre & Wright, 1994). These fit indices outside the suggested range are considered unacceptable for making meaningful measurements. Respondent measures can be interpreted as *the respondents who are most the criterion described in the item* (referred to as "respondents" or "respondent measures"). Item measures are interpreted as *the amount of agreeability in the criterion described in the item* (referred to as "item" or "item measures"). The *FACETS* computer software (Linacre, 2014) was used for all Rasch analyses.

Wright Maps

The growth of scientific methods depends on the development of objective methods of measuring. Objectivity is achieved through two conditions: 1) the calibration of the measuring instrument(s), and 2) the measurement of the objects. The goal of developing instruments or tests is to observe the respondents and test items independently. These conditions allow the measurement to be independent of the instrument, or test or survey used, and for the measurement to be generalized. Wright maps provide the visual representation of where both item and respondent facets fall on a vertical line in an equal measurement unit, the logit. Much like rulers or yardsticks use inches to measure height, the items and respondents are placed on a vertical line measured in logits indicating where they fall on that line for meaningful measurement.

Correlation Coefficients

To answer the second research question (*What is the relationship between the constructs of self-talk, resiliency, and social environment in the context of secondary-level music teaching and learning?),* Pearson's correlation coefficient (*r)* was used to examine the relationship between the self-talk, resilience, and social environment constructs. The Pearson correlation coefficient examines the strength of a linear relationship between two variables (Pearson, 1895). In this study, the Pearson correlation coefficient examined the interrelationships between self-talk, resilience, and social environment, as well as the relationship of the constructs based on sex-type (female or male). Pearson's correlation coefficient, also known as the product-moment correlation coefficient (Heiman, 2006, 2011) is one of the most used measurements to investigate a linear correlation and is represented by a sample *r*. The population the sample (*r*) is drawn from is represented by ρ. The coefficient is measured on a scale with no units and can take a value

between -1 and +1. An existing positive correlation is represented by the positive sign of the coefficient, and an existing negative correlation is represented by the negative sign. If all points on the scatter plot to fall in a straight line, a perfect correlation will be found (a correlation of -1 or +1). If the correlation coefficient is zero, there is no linear relationship between the two variables. Pearson correlation testing in the R program was used in this study (R Core Team, 2013).

Interaction Models

To answer the third research question (*What interaction effects exist between resiliency, social environment, and sex-type, and how do they explain variability in self-talk?*), two multiplicative multiple linear regression models (also referred to as interaction models) were used to determine the interaction effects between resilience and social environment and their overall effect on self-talk conditioned by sex-type. Linear regression is commonly used in educational research (Heiman, 2006, 2011), and uses a discovered relationship between variables to predict scores. Simple linear regression works in conjunction with the Pearson correlation and focuses on the linear regression line on the scatter plot, which summarizes the relationship between variables (Galton, 1894). The regression coefficient is represented by r^2 and suggests the degree of variability in the dependent or predictor variable (y) due to the independent or response variable (x). The regression line created describes the best line of fit between the dependent and independent variables.

Multiple linear regression differs from simple linear regression because there are two independent or predictor variables. The regression coefficients demonstrate the role each independent variable performs to predict the dependent variable and finds the plane of best fit

rather than the line of best fit. Inferences are made by the degree of interaction between each independent variable (Galton, 1886).

In the current study, a multiplicative multiple linear regression was employed because resilience and social environment are each predictor, or independent variables (*x)* with a single dependent or response variable (*y)*, self-talk, as conditioned by a moderator variable, sex-type (*z*) (Wesolowski, 2022). The interaction effect that occurs examines the effect of one predictor (*x*) on the response variable (*y*) as conditioned by the moderator variable (*z*). The first interaction model will examine the effect of resilience (*x*) on self-talk (*y*) as moderated by sex-type (*z*). The second interaction model will examine the effect of the social environment (*x*) on self-talk (*y*) as moderated by sex-type (*z*). The interaction will provide estimations of the effect of resilience or social environment on self-talk varied among individuals by the condition of sex-type. Multiple linear regression testing in the R program was used in this study (R Core Team, 2013).

Fairness and Differential Item Functioning

To answer the fourth research question (*What size of DIF effect exist for items when used to measure subgroups of students based on their sex-type?*), differential item functioning analyses were conducted. Testing the validity of a test has evolved to include test and item bias. The study of bias is important to examine the fairness of tests and test items among various groups of people. The AREA et al. (2014) *Standards for Educational and Psychological Testing* indicate five sources of validity evidence "that might be used in evaluating the validity of a proposed interpretation of test scores for a particular use" (p. 13). Differential Item Functioning (DIF) analyses provide a richer development of measurements (tests or surveys) and for the improvement of the validity of interpreting the measurement's results. DIF analyses have been used to examine the probabilities of success on specific items of students with the same

estimated ability level from different group affiliations. In the current study, a post hoc DIF analysis was executed by adding an additional interaction parameter to the Many Facet Rasch measurement model. In the case of this study, DIF analysis identifies any potential significant differences in student scores across students' sex-type classification at the same estimated ability level. DIF was used to test the null hypothesis that students of the same ability did not differ significantly based on their sex-type. The *FACETS* computer software (Linacre, 2014) was used for all DIF analyses.

CHAPTER 4

RESULTS

Many-Facet Rasch Model for Self-Talk, Resilience, and Social Environment

Item Response Theory (IRT) allows an investigation of the performance of one item according to the varying respondents. The Rasch Measurement model is in the IRT family of measurement models and employs the assumption of invariance when an appropriate model-data fit exists. Invariant measurement assumes item and respondent independence because the items perform the same regardless of the sample, and the sample will have the same characteristics regardless of the items. The requirements of invariance are defined as (a) the calibration (performance) of items must be independent of the persons (i.e., students) used for measurement, (b) any person must have a higher chance of success on an easy item than a more difficult item, (c) the measurement (performance) of persons must be independent of the set of items used for measuring, (d) a more able person must have a higher chance of success on any single item than a less able person, and (e) the items must measure a single latent variable (i.e., unidimensionality as will be shown in the Wright variable map) (Engelhard & Perkins, 2011).

Table 1 provides the summary statistics of the Many-Facet Rasch model for the respondent and item facets. Tests of chi-square significance answer the substantive question of whether the overall differences between logit locations for each facet (i.e., each respondent and each item) are statistically significant. Results indicated statistically significant differences for the respondents (x^2=3961.9, $p < .01$) and the items (x^2=3396.2, $p < .01$). In the context of

general linear modeling, this is comparable to demonstrating a significant main effect where resiliency, social environment, and items represent independent variables.

Table 1

Summary statistics for the Rasch Measurement Model

	Facets	
	Respondents	**Survey Items**
Measure (Logits)		
Mean	.39	.47
SD	.30	.17
N	315	69
Infit MSE		
Mean	1.06	1.01
SD	.65	.29
Std. Infit MSE		
Mean	-.5	-.2
SD	3.8	3.7
Outfit MSE		
Mean	1.05	1.05
SD	.62	.40
Std. Outfit MSE		
Mean	-.5	-.1
SD	3.7	4.0
Separation Statistics		
Reliability of Separation	.95	.98
Chi-Square	3961.9	3396.2
Degrees of Freedom	314	68

* $p < .01$

Reliability of separation (*Rel*) statistics answer how spread out the facet locations are on the logit scale. For respondents, *Rel* is interpreted similarly to Cronbach's alpha. Whereas Cronbach's alpha is looking at the reliability for replication, the current study is examining how reliably the items separate respondents, or the reliability of the current sample. For the item facet, *Rel* is interpreted as the degree to which each item can be reliably differentiated from the other.

Results indicated moderate to high reliabilities of separation between respondents (*Rel* = 0.95) and items (*Rel* = 0.98). Good model-data fit is demonstrated by reasonable item mean-square (MSE) ranges for infit and outfit (centering on expected values of 1.0 with a range of .02 to 1.3 for self-reported surveys). MSE answers how consistently the patterns of responses have been interpreted and indicated that the self-talk Rating Scale was able to reasonably separate each facet of the underlying latent trait of self-talk within secondary-level instrumental musicians. Acceptable fit is established by MSE ranges between 0.60 and 1.40 (Wright & Linacre, 1994). Values below 0.60 indicate outfit, or too similar patterns, whereas values about 1.40 indicate outfit, or too sporadic patterns to make meaningful inferences. Results indicate that both facets (items and respondents) demonstrated an acceptable range of data-to-model fit.

Item and Construct Calibrations (Research Question 1)

Looking at the three constructs separately, items and constructs were ordered each by the measure, which is in logits, the unit of measure in Rasch measurement (Engelhard, 2013). Each measure for respondents and items is hypothesized to have a location on each latent variable (each construct). Logits transform non-linear proportions into equal units creating a linear scale and represent the marks respondents and items make on the measurement instrument (Ashton, 1972). Fit statistics support the model's interpretation for each construct and must fall between 0.6 and 1.4 with a target value of one to make inferences of meaningful measurement for both respondents and items, suggesting predictive and construct validity respectively (Wright & Linacre, 1994).

The first category of indices based on the Many-Facet Rasch (MFR) model is the logit scale locations. In the context of two facets, these indices provide a method for summarizing student perception as well as item difficulty on a single linear scale that represents the latent

constructs (i.e., self-talk, resilience, and social environment). One important premise of IRT is to verify a conceptual measurement of a person's ability using a vertical axis marked with a scale where both item and respondent facets are observed in terms of their difficulty and ability, respectively. This conceptual "ruler" is used in the same way a physical measurement (i.e., height) is verified by a physical ruler (Engelhard, 2013).

Higher logit scores for respondents (i.e., measure) represent higher levels of agreeability of the criterion described in the item (i.e., self-talk, resilience, and social environment), and lower logit scores represent lower levels of agreeability described in each construct. Item calibrations were anchored at 0.00 logits and the directionality is negative, associating higher and negative scores moving further away from 0.00 with more difficult items. This visual observation of independent item and respondent data can be found in Wright Maps, as well as are demonstrated in calibration tables using the Rasch measurement unit, the logit, as well as the standard error and fit statistics.

Construct item calibrations ranged from 0.49 (resilience, least agreeable) to 0.54 (social environment, most agreeable). Items embedded in each construct were calibrated based on their specific construct (i.e., self-talk items calibrated together).

The measurement calibrations and ordering for the items within each construct are found in Tables 2, 3, and 4. For the self-talk construct, *"I want to redo something I've performed for another person,"* (Q2_1) was the most agreeable with the criterion described in the self-talk construct with an observed average of 2.97, -.44 in logits, with fit indices of .88 and .89, with a standard error of .08. These results are shown visually in Figure 1 with the Wright Map (Wright, 1977), and the measure in logits with the accompanying standard error and fit statistics are found in Table 2.

Table 2

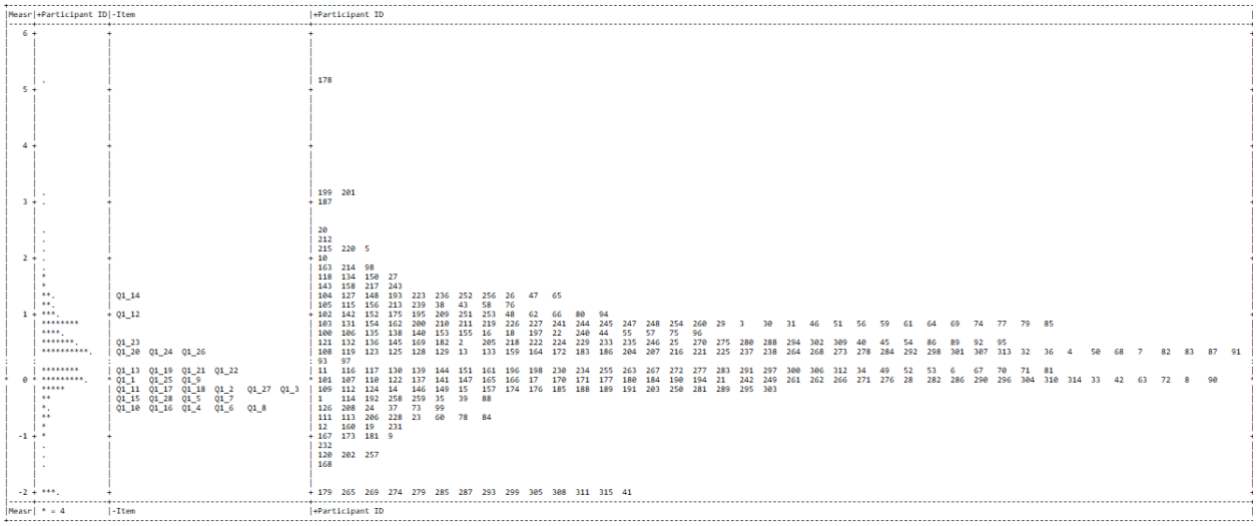
Item calibrations for the self-talk scale

	Item	Average Rating	Measure (in logits)	Standard Error (*SE*)	Infit *MSE*	Outfit *MSE*
Q1_1	In my musical performances, I feel proud.	2.75	.00	.08	.86	.90
Q1_2	In my musical performances, I feel confident.	2.79	-.09	.18	.92	.90
Q1_3	I talk to myself to increase my effort.	2.83	-.17	.08	.97	.97
Q1_4	I talk to myself to stop my negative thinking.	3.01	-.53	.08	.89	.89
Q1_5	I talk to myself to help calm my nerves.	2.92	-.35	.08	.91	.90
Q2_1	I want to redo something I've performed for another person.	2.97	-.44	.08	.88	.89
Q2_2	I wish that I could change aspects of my performance into "better" or different performance attributes	2.92	-.34	.08	.91	.91
Q2_3	In my musical performances, I feel discouraged about my musical ability.	2.96	-.43	.09	1.14	1.11
Q2_4	In my musical performances, I criticize myself.	2.78	-.03	.08	1.08	1.09
Q2_5	In my musical performances, I feel ashamed	3.02	-.56	.08	1.51	1.45
Q3_1	In my musical performances, I imagine how my peers will respond.	2.87	-.25	.08	1.31	1.34
Q3_2	In my musical performances, I imagine my peers' opinions.	2.18	1.00	.07	1.25	1.33
Q3_3	In my musical performances, I imagine how my teachers will respond.	2.63	.23	.08	1.29	1.33
Q3_4	In my musical performances, I imagine my teachers' opinions.	1.99	1.33	.07	1.36	1.51
Q3_5	I review aspects of my performance.	2.91	-.34	.08	.65	.64
Q3_6	In my musical performances, I feel encouraged.	2.96	-.43	.08	1.13	1.09
Q3_7	I talk to myself to enhance my self-confidence.	2.80	-.10	.08	.61	.66
Q3_8	I talk to myself to encourage myself.	2.79	-.09	.08	.76	.78
Q4_1	I need to boost my confidence so that I can perform more difficult music.	2.65	.17	.08	.75	.80
Q4_2	I try to give myself guided direction in musical practice.	2.57	.33	.08	.85	.85
Q4_3	I try to give myself guided direction in musical performance	2.62	.24	.08	.83	.89
Q4_4	I give myself instructions or directions about how I should prepare for my musical performance.	2.65	.19	.08	.58	.57
Q4_5	I have to figure out how I should prepare for my musical performance.	2.50	.45	.07	.83	.84
Q4_6	I tell myself that I "should," "ought to," or "have to" perform at a high level.	2.62	.25	.08	.85	.85
Q4_7	I talk to myself in order to be able to concentrate more fully on the performance.	2.77	.01	.08	1.13	1.14
Q4_8	I talk to myself about the technical elements of the performance.	2.52	.53	.08	.65	.65
Q4_9	I talk to myself to give myself directions.	2.80	-.10	.08	.94	.92

Q4_10	I talk to myself to correct my mistakes.	2.88	-.27	.08	.95	.92

Figure 1

Self-Talk Wright Map



In the resilience construct, *"I use teacher feedback to improve my music practice,"* (Q5_1) was the most agreeable with the criterion described in the resilience construct with an observed average of 3.14, -.99 in logits, with an infit of 1.18 and outfit of 1.16, and a standard error of .08. These results are visually shown in Figure 2 (Wright, 1977), and Table 3 shows the measure for each item in logits as well as the fit statistics and standard error.

Table 3

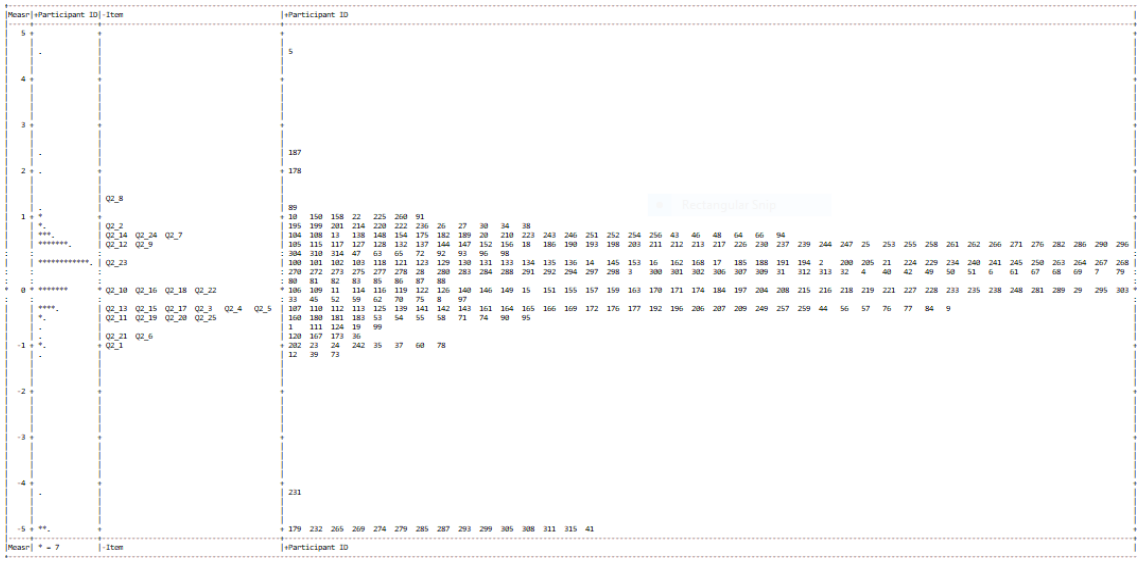
Item calibrations for the resilience scale

	Item	Average Rating	Measure (in logits)	Standard Error (*SE*)	Infit *MSE*	Outfit *MSE*
Q5_1	I use teacher feedback to improve my music practice.	3.14	-.99	.08	1.18	1.16
Q5_2	In difficult musical situations, I would - do my best to stop thinking negatively.	2.01	.88	.07	1.16	1.20
Q5_3	In difficult musical situations, I would blame my music teacher.	2.75	-.24	.07	.81	.79

Q5_4	In a difficult musical situation, I would begin to think my chances of success in music were poor.	2.67	-.12	.07	1.35	1.34
Q5_5	I would try to think of new solutions to help myself in a difficult musical situation.	2.66	-.10	.07	.86	.86
Q5_6	I would use my past musical successes to help motivate myself.	3.01	-.73	.08	.85	.80
Q5_7	When faced with difficult musical passages, I would think my chances of continuing in music were poor.	2.17	.64	.07	1.46	1.54
Q5_8	When faced with difficult musical passages, I would seek help from my music teacher.	1.73	1.34	.07	1.76	2.15
Q5_9	When faced with difficult musical passages, I would stop myself from panicking.	2.30	.45	.07	1.00	1.06
Q5_10	I would try different ways to practice difficult musical passages.	2.60	.00	.07	.93	.95
Q5_11	I set my own goals for musical achievement.	2.78	-.30	.07	.81	.80
Q5_12	I seek encouragement from my family.	2.37	.35	.07	1.08	1.08
Q5_13	I seek encouragement from my friends.	2.69	-.15	.07	1.06	1.08
Q5_14	I seek encouragement from my teachers.	2.19	.61	.07	1.10	1.13
Q5_15	I try to think about my strengths more than my weaknesses to help me practice better.	2.70	-.17	.07	.71	.73
Q5_16	Depending on my performance quality, I set rewards for myself.	2.61	-.03	.07	.83	.83
Q5_17	Depending on my performance quality, I set punishments for myself.	2.76	-.26	.07	.95	.96
Q6_1	In difficult musical situations, I would give up.	2.63	-.05	.07	.81	.83
Q6_2	In difficult musical situations, I would use the situation to motivate myself.	2.81	-.36	.07	.99	1.10
Q6_3	In difficult musical situations, I would probably get annoyed.	2.88	-.48	.08	.99	1.02
Q6_4	In difficult musical situations, I would work harder	3.00	-.70	.08	.98	.93
Q6_5	In difficult musical situations, I would get depressed.	2.56	.06	.07	.66	.68
Q6_6	I would see a difficult musical situation as temporary.	2.48	.15	.07	.63	.63
Q6_7	When struggling with musical passages, I would be very disappointed in my musical abilities.	2.12	.68	.07	.97	.97
Q6_8	I look forward to showing that I can improve my performance.	2.89	-.49	.08	1.13	1.13

Figure 2

Resilience Wright Map



Lastly, for the social environment construct, *"My music teacher points out those students who get poor grades as an example to us all,"* (Q7_2) was the most agreeable with the criterion described in the social environment construct with an observed average of 3.10, -.61 in logits, with an infit of .83 and outfit of .82. Figure 3, the Wright Map for the social environment construct visually represents how both item and participant facets responded (Wright, 1977), where Table 4 shows the results for the measure in logits with standard error and fit statistics.

Table 4

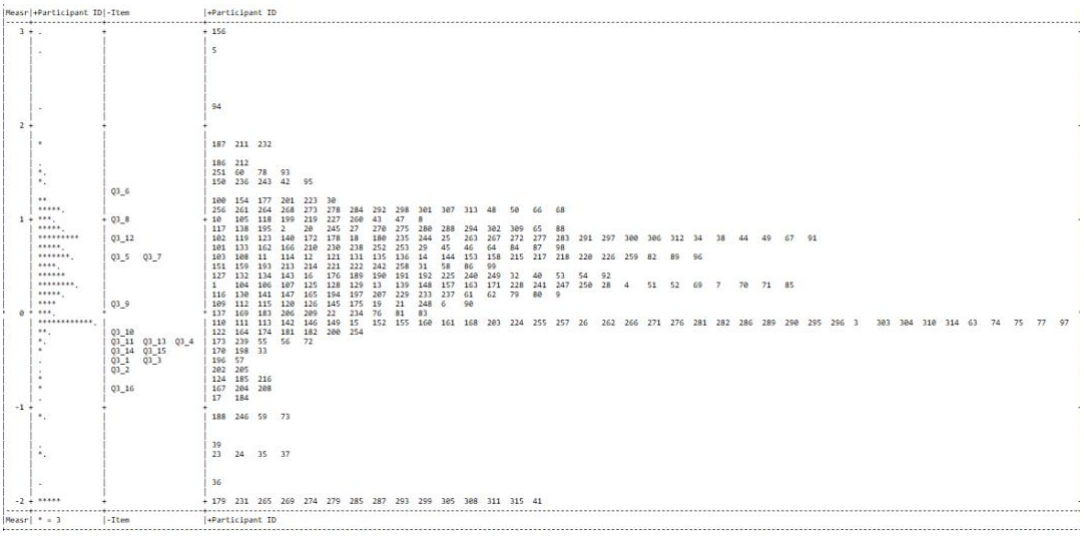
Item calibrations for the social environment scale

	Item	Average Score	Measure (in logits)	Standard Error (*SE*)	Infit *MSE*	Outfit *MSE*
Q7_1	My music teacher points out those students who get good grades as an example to us all.	3.05	-.52	.08	.89	.86
Q7_2	My music teacher points out those students who get poor grades as an example to us all.	3.10	-.61	.08	.83	.82
Q7_3	My music teacher lets us know who the best music performers are.	3.03	-.49	.08	.97	.97

Q7_4	My music teacher tells us how we compare to other students.	2.93	-.32	.07	.96	.95
Q7_5	My music teacher encourages us to share ideas with one another in class.	2.32	.60	.07	.95	.93
Q7_6	My music teacher lets us ask other students when we need help with our part in the music.	1.84	1.31	.07	1.46	1.88
Q7_7	My music teacher encourages us to get to know all the other students in music class.	2.30	.62	.07	1.46	1.50
Q7_8	My music teacher wants us to respect each other's performances in class.	2.05	.99	.07	1.33	1.48
Q7_9	My music teacher makes sure that students do not make fun of other students' performances in class.	2.68	.08	.07	.63	.63
Q7_10	My music teacher makes sure that students don't say anything negative about each other in class.	2.88	-.23	.07	.56	.55
Q8_1	My music teacher wants us to understand our music, not just memorize it.	2.93	-.32	.07	.79	.78
Q8_2	My music teacher really wants us to enjoy learning new musical concepts.	2.15	.84	.07	1.12	1.56
Q8_3	My music teacher recognizes us for trying hard.	2.95	-.34	.07	.91	.88
Q8_4	My music teacher gives us time to understand new musical concepts.	2.97	-.38	.07	1.14	1.11
Q8_5	In our music class, we are always supposed to be quiet.	3.00	-.44	.07	1.14	1.40
Q8_6	My music teacher wants all students to feel respected.	3.18	-.78	.08	.88	.82

Figure 3

Social Environment Wright Map



Domain Ordering and Fit

The eight domains embedded in the three constructs were examined on an agreeability anchor and are shown in Tables 6, 7, and 8. Each measure is shown from the hardest domain for respondents to agree with to the easiest domain for respondents to agree with. For self-talk, motivational self-statements were the most difficult to agree with, with an average of 2.83, a measure of .00 logits and fit indices of .99 and .99. For resilience, self-efficacy was perceived as most difficult to agree with, with an average of 2.59, .00 logits, and fit indices of 1.00 and 1.09. Lastly, for Social Environment, setting mastery goals was perceived most difficult to agree with, with an average of 2.91, .00 logits, and fit indices of 1.00 and 1.10.

Table 5

Calibrations of self-talk domains

	Observed Average	**Measure (in logits)**	**Standard Error (*SE*)**	**Infit *MSE***	**Std. Infit**	**Outfit *MSE***	**Std. Outfit**
Domain							
Motivational	2.83	.00	.09	.99	-.5	.99	-.4
Positive	2.77	.00	.08	1.00	-.2	.99	-.3
Instructional	2.77	.00	.09	1.00	-.3	1.00	-.4
Negative	2.49	-1.20	.10	1.11	1.3	1.19	2.1

Note. Domains are listed in measure order from the hardest survey items for respondents to agree with to the easiest items for respondents to agree with.

Table 6

Calibrations of resilience domains

	Observed Average	**Measure (in logits)**	**Standard Error (*SE*)**	**Infit *MSE***	**Std. Infit**	**Outfit *MSE***	**Std. Outfit**
Domain							
Self-Efficacy	2.59	.00	.08	1.00	-.3	1.09	.0
Tenacity	2.56	.00	.07	1.00	-.1	.99	-.1

Note. Domains are listed in measure order from the hardest survey items for respondents to agree with to the easiest items for respondents to agree with.

Table 7

Calibrations of social environment domains

Domain	Observed Average	Measure (in logits)	Standard Error (*SE*)	Infit *MSE*	Std. Infit	Outfit *MSE*	Std. Outfit
Mastery Goals	2.91	.00	.08	1.00	-.3	1.10	-.5
Social Assessment	2.59	.00	.07	1.00	-.3	1.06	.3

Note. Domains are listed in measure order from the hardest survey items for respondents to agree with to the easiest items for respondents to agree with.

Correlations Coefficients

To answer the second research question and examine the relationship between self-talk, resilience, and social environment, a Pearson's correlation coefficient (*r)* was used. The three constructs have strong positive correlations and have a range between 0.64 and 0.84 with a corresponding p-value of less than 0.01. Table 9 shows the relationship between the three constructs, where the Pearson correlation coefficient between self-talk and resilience is 0.72, and the Pearson correlation coefficient between resilience and social environment is 0.84. The Pearson correlation coefficient between resilience and social environment is 0.84.

Table 8

Correlations matrix: Constructs

	Self-Talk	Resilience	Social Environment
Self-Talk	1.00	0.72	0.64
Resilience	0.72	1.00	0.84
Social Environment	0.64	0.84	1.00

* $p < .01$

Figure 4

Correlogram reporting Pearson's r and confidence intervals

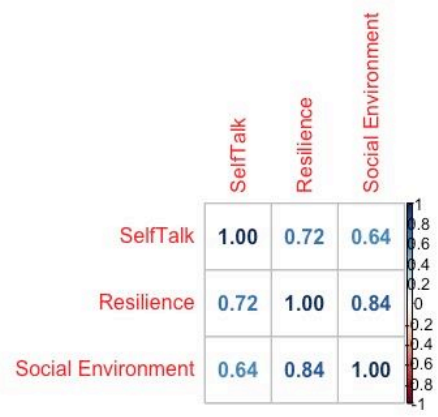


Figure 4 shows the relationship between the three constructs in a correlogram matrix reporting each construct's confidence interval. As indicated numerically, resilience and social environment have a strong positive relationship $r(315) = 0.84$, $p < .01$, 95% CI [0.8, 0.87]. resilience and self-talk have a strong positive relationship $r(315) = 0.72$, $p < .01$, 95% CI [0.7, 0.77]. Self-talk and social environment also have a strong positive relationship $r(315) = 0.64$, $p < .01$, 95% CI [0.6, 0.7].

The eight domains are in the range of -0.12 and 0.84 with a corresponding p-value of less than 0.01, as shown in Table 10. Seven of the eight domains have strong positive correlations and have a range between 0.35 and 0.84. Negative self-talk is the only domain with a strong negative correlation between -0.12 and -0.60.

Table 9

Correlations matrix: Domains

	Positive	Negative	Motivational	Instructional	Self-Efficacy	Tenacity	Social Assessment	Mastery Goals
Positive	1.00	-0.12	0.64	0.59	0.50	0.35	0.36	0.41
Negative	-0.12	1.00	-0.42	-0.54	-0.45	-0.60	-0.47	-0.37
Motivational	0.64	-0.42	1.00	0.69	0.56	0.54	0.50	0.51
Instructional	0.59	-0.54	0.69	1.00	0.71	0.69	0.64	0.61
Self-Efficacy	0.50	-0.45	0.56	0.71	1.00	0.84	0.78	0.73
Tenacity	0.35	-0.60	0.54	0.69	0.84	1.00	0.74	0.63
Social Assessment	0.36	-0.47	0.50	0.64	0.78	0.74	1.00	0.81
Mastery Goals	0.41	-0.37	0.51	0.61	0.73	0.63	0.81	1.00

* $p < .01$

Figures 5 and 6 show the relationship between the eight domains in a correlogram matrix. The darker shades of blue indicate a stronger positive relationship, whereas shades of orange indicate negative relationships between domains. As indicated numerically, tenacity and self-efficacy have the strongest positive relationship $r(315) = 0.84$, $p < .01$, 95% CI [0.8, 0.87]. Negative self-talk has the strongest negative relationship with tenacity $r(315) = -0.60$, $p < .01$, 95% CI [-0.66, -0.52].

Figure 5

Correlogram matrix across domains using the confidence interval

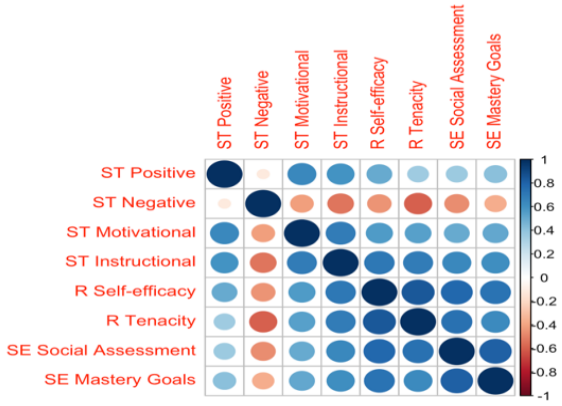
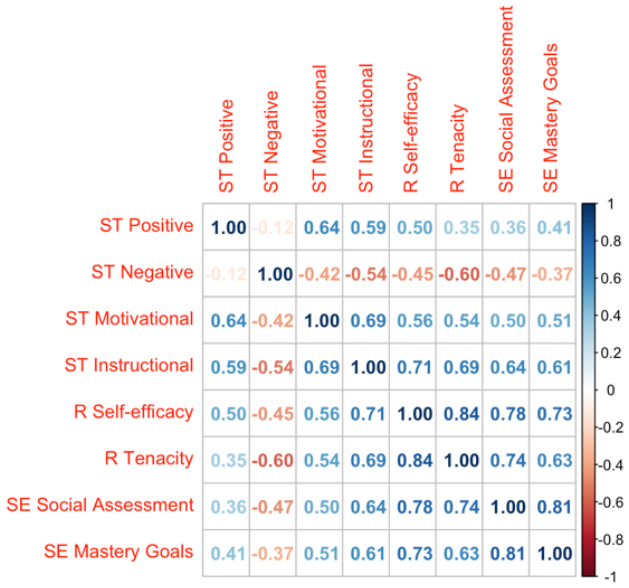


Figure 6

Correlogram reporting Pearson's r and confidence intervals



Multiple Linear Regression

The focus of this study was to examine the effect of each of the continuous predictor variables (i.e., resilience and social environment) on the response variable (i.e., self-talk) at different levels of another predictor variable, a categorical variable (i.e., sex-type) (Wesolowski, 2022). Examining both the continuous and categorical variables as predictor variables, the use of two separate linear regression models separately examined the interactions between sex-type and resilience, as well as sex-type and Social Environment, respectively.

Model Assumptions

Before building a linear model, all model assumptions must be met. Multicollinearity is an applicable assumption for models consisting of multiple predictor variables (Wesolowski,

2022). The current study has two predictor variables for one response variable. If there is an occurrence of high intercorrelation between resilience and social environment, and their values can be predicted between each other, the influence of either individual predictor variable undermines explaining the variance of self-talk. If there is multicollinearity between resilience and social environment, it would be difficult to make meaningful interpretations of the model coefficients and identify statistical significance of the variance of resilience and social environment on self-talk.

To examine and understand how the variability in self-talk is affected by resilience and social environment, a correlation matrix was conducted. If resilience and social environment have a zero-order correlation value of above 0.80, the assumption of potential multicollinearity could cause concern. Table 10 shows the predictor variable correlation matrix of resilience and social environment. Here results indicate that resilience and social environment have a correlation value of 0.84, which could potentially be problematic. Therefore, the partial correlations between the predictor variables were examined.

Table 10

Predictor correlation matrix of resilience and social environment on self-talk

	Self-Talk	**Resilience**	**Social Environment**
Self-Talk	1.00	0.74	0.66
Resilience	0.74	1.00	0.84
Social Environment	0.66	0.84	1.00

The partial correlations are unlike the zero-order correlations because they control for the effect of each predictor variable on the correlation between each variable. Table 11 shows the partial correlations between resilience and social environment and are less than the zero-order correlations, which indicates an overriding effect and no substantial correlations with resilience and social environment having a correlation value of 0.70.

Table 11

Partial correlation matrix of resilience and social environment on self-talk

	Self-Talk	**Resilience**	**Social Environment**
Self-Talk	1.00	0.45	0.11
Resilience	0.45	1.00	0.70
Social Environment	0.11	0.70	1.00

Next, the variance inflation factors (*VIF*) were examined, which assesses the inflation of the variances due to the collinearities that exist between resilience and social environment. *VIF* includes tolerance, which a percent of variance of one predictor variable that cannot be accounted for by the other predictor variable. Table 12 shows the tolerance and *VIF* values of resilience and social environment. Because the *VIF* value is not close to 1, this indicates that there is inflation for correlation among the predictor variables in the model, suggesting that it does not adequately meet the assumption of no multicollinearity.

Table 12

VIF and tolerance of resilience and social environment

	Tolerance	***VIF***
Resilience	0.2940514	3.40
Social Environment	0.2940514	3.40

To examine the variance across the combinations of predictor variables, eigenvalues for each linear combination of predictor variables was conducted. The condition index for each of

the three combinations were well below 30, which suggests that the model in the current study adequately meets the assumption of no multicollinearity. Combination one had a condition index of 1.00, combination two's index was 1.33, and combination three's index was 3.43.

Lastly, the statistical test series Farrar-Glauber was conducted to examine the overall multicollinearity diagnostics. The chi-square test is statistically significant ($p < 0.01$), suggesting there is multicollinearity in the data. Because the Farrar-Glauber chi-square results detected multicollinearity, examining which variable is problematic was of interest. Conducting a Pearson's method of correlation, results suggest a statistically significant *t*-statistic between self-talk and resilience, $t = 8.32$ and resilience and social environment, $t = 16.24$. These interactions caused the Farrar-Glauber test to detect multicollinearity.

The assumption of homogeneity of variances is an assumption made for models with a categorical predictor variable, in the case of this study, the categorical predictor variable is sex-type with two levels, female and male. Looking at each construct separately, self-talk, resilience, and social environment met the assumption of homogeneity of variance ($p < 0.01$) among the two levels of sex-type. This assumption assumes that both the male and female levels have similar variance.

Interaction Model I

The first interaction model was between resilience and sex-type. Statistically, significant F tests suggest that the combination of the three predictor variables in addition to the interaction explains the variability in self-talk with statistical significance. Because there is a statistically significant interaction, that's where our focus is. All the main effects for social environment, resilience, and sex-type are statistically significant and have a statistically significant interaction effect between resilience and sex-type. Shown in Tables 8 and 9 is a larger effect of resilience for

males than for females, they are both positive and the average simple effect for the male level was 1.02 and the average simple effect for female is .411.

Taking a close look at resilience first, the R2 value of 0.5946 suggests that approximately 59% of the variation in self-talk can be explained by resilience conditioned on sex-type. The adjusted R2 value of 0.5828 suggests that approximately 58% of the variation in self-talk can be explained by resilience conditioned on sex-type after adjusting the number of parameters in the model and sample size. $F(4, 138) = 50.59$, $p < .01$ indicates that the model is statistically significant, suggesting that the model better explains the variability in resilience than simply using a model based on the interpretation of the mean of resilience. On average, the observed resilience scores are approximately .52 units away from the fitted, y-hat values of resilience.

Table 13

Self-Talk as a function of social environment as moderated by sex-type

Effect	Estimate	*SE*	95% CI		*p*
			LL	*UL*	
Fixed effects					
Intercept	.337	.058	.22	.45	<.01
Social Environment	.336	.047	.24	.43	<.01
Sex-Type Male	-.088	.082	-.25	.07	<.01
Resilience: Sex-Type Trends	.189	.062	.07	.31	<.01
Sex-Type Male	.525	.040	.446	.604	<.0001
Sex-Type Female	.336	.048	.243	.430	<.0001

Note. Number of observations = 280, total $N = 315$. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

The Social Environment ($t = 1.70$, $p < .01$) and Resilience ($t = 5.67$, $p < .01$) predictor variables are both statistically significant, which suggests the slope for each of the variables

social environment and resilience are statistically different from 0. Examining the additional model coefficient, the interaction, i.e., sex-type of resilience, suggests that the interaction effect is statistically significant ($t = 6.04$, $p < .01$), which suggests that the simple slope of resilience on self-talk varies based on the condition of sex-type.

Because there's an interaction between resilience and sex-type, a Type-II ANOVA was used to plot the simple effects and interaction effects, as well as test the simple effects. Based on the plot, as self-talk and resilience increase, the male and female levels vary and construct a different pattern, which suggests differences in resilience on the condition of male or female. Table 14 represents that statistically significant F test for resilience and its effect on self-talk as conditioned by sex-type. Figure 7 shows how males and females perceive their resilience and its impact on their self-talk.

Next, the simple effect, or the estimated marginal mean for the male level is 1.02 with a 95% confidence interval of [.80, 1.25]. For the female level, the simple effect is 0.41 with a 95% confidence interval of [.27, .55]. Both slopes for male and female are positive, and as indicated in the simple effects plot as resilience increases, so does self-talk for both males and females. When examining the statistical significance of the differences in the simple effects pertaining to resilience and sex-type, results suggest there is a statistical difference between female and male ($t = -4.74$, $p < .01$).

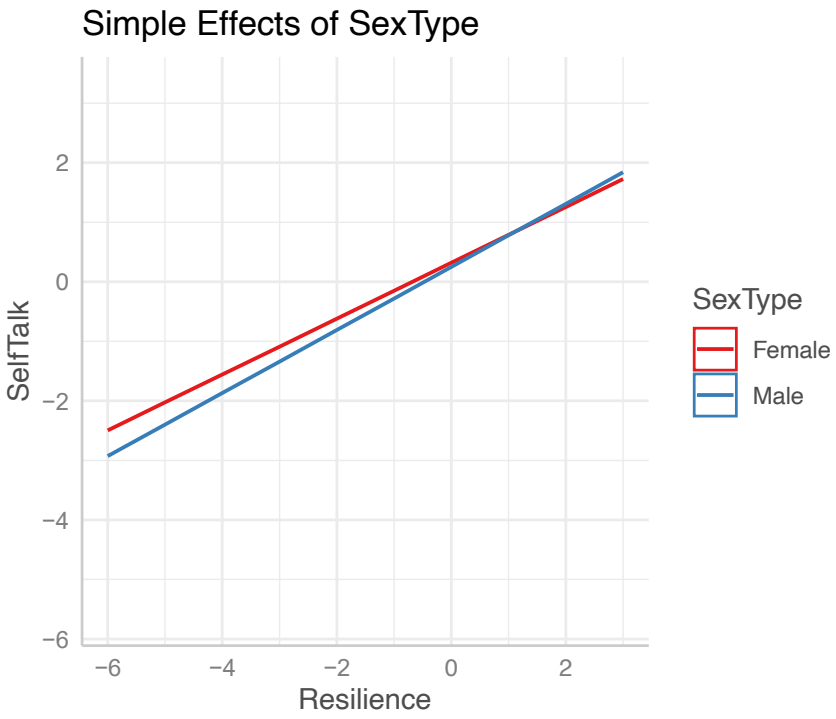
Table 14

Resilience: Type-II ANOVA

	Df	**Sum Sq**	**F value**	**Pr(>F)**
Social Environment	1	.779	2.88	.092
Resilience	1	21.03	77.64	.001
Sex-Type	1	.228	.840	.361
Resilience: Sex-Type	1	6.09	22.49	.001
Residuals	138	37.38		

Figure 7

Simple effects of sex-type



Interaction Model II

The second model examined the interaction between social environment and sex-type. The F tests suggest that there is a statistically main effect of resilience and social environment and sex-type. There is a statistically significant interaction between social environment and sex-type. Tables 10 and 11 show that there is a statistically significant main effect of resilience and social environment and sex-type, as well as the statistically significant interaction between social environment and sex-type.

Looking at social environment, the R2 value of 0.5549 suggests that approximately 55% of the variation in self-talk can be explained by social environment conditioned on sex-type. The adjusted R2 value of 0.542 suggests that approximately 54% of the variation in self-talk can be

explained by social environment conditioned on sex-type after adjusting the number of parameters in the model and sample size. $F(4, 138) = 43.02$, $p < .01$ indicates that the model is statistically significant, suggesting that the model explains the variability in social environment. On average, the observed social environment scores are approximately .55 units away from the fitted, y-hat values of social environment.

The resilience ($t = 8.88$, $p < .01$) and social environment ($t = -1.03$, $p < .01$) predictor variables are both statistically significant, which suggests the slope for each of the variables social environment and resilience are statistically different than 0. Examining the additional model coefficient, the interaction, i.e., sex-type of social environment, suggests that the interaction effect is statistically significant ($t = 2.86$, $p < .01$), which suggests that the simple slope of social environment on self-talk varies based on the condition of sex-type.

Table 15

Self-Talk as a function of resilience as moderated by sex-type

Effect	Estimate	*SE*	95% CI		*p*
			LL	*UL*	
Fixed effects					
Intercept	.319	.053	.22	.42	<.01
Resilience	.469	.071	.37	.57	<.01
Sex-Type Male	.078	.091	-.22	.08	.39
Social Environment: Sex-Type Trends	.387	.135	-.06	.18	<.001
Sex-Type Female	.469	.049	.373	.565	<.001
Sex-Type Male	.530	.035	.461	.599	<.001

Note. Number of observations = 280, total $N = 315$. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

Due to an interaction between social environment and sex-type, a Type-II ANOVA was used to plot the simple effects and interaction effects, as well as test the simple effects. Based on this plot, as self-talk and social environment increase, the male and female levels vary and construct a different pattern, which suggests differences in social environment on the condition of sex-type.

The simple effect, or the estimated marginal mean for the male level is .31 with a 95% confidence interval of [.07, .55]. For the female level, the simple effect is -0.08 with a 95% confidence interval of [-.23, .07]. Figure 5 shows the slope for both male and female are positive. As indicated in the simple effects plot for males, as social environment increases, so does self-talk. For females, as social environment increases, self-talk increases, but at a lower level than for males. When examining the statistical significance of the differences in the simple effects pertaining to social environment and sex-type, results suggest there is a statistical difference between the female level and the male level (t = -2.86, p < .01).

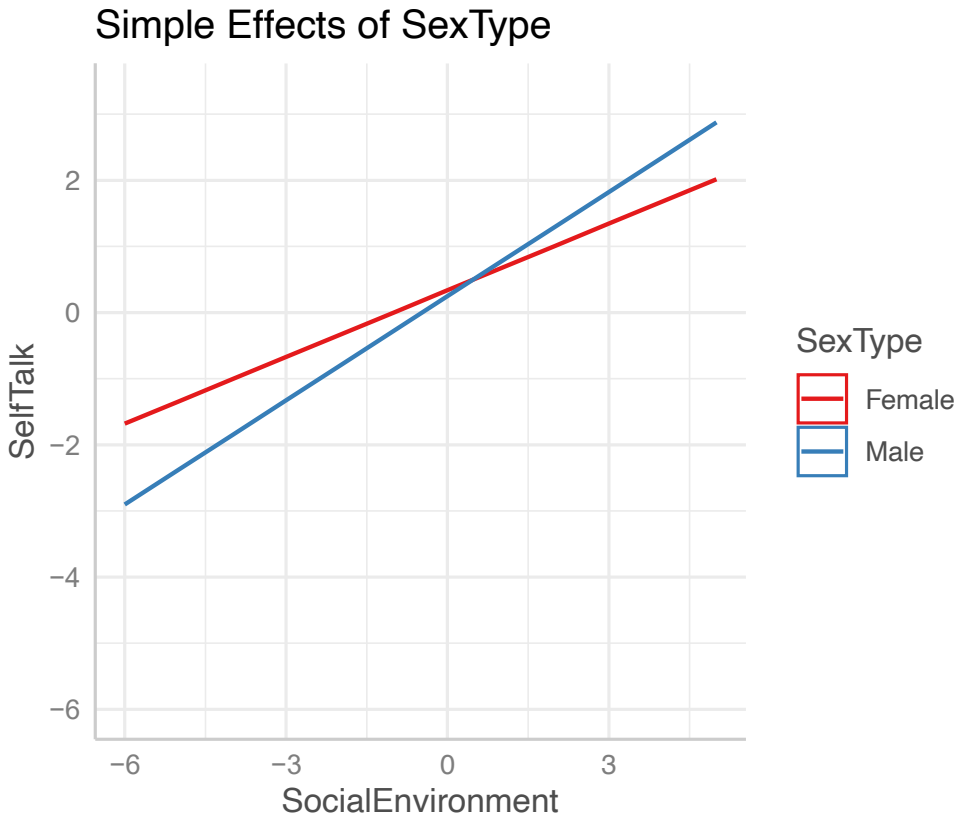
Table 16

Social Environment: Type-II ANOVA

	Df	**Sum Sq**	**F value**	**Pr(>F)**
Resilience	1	23.44	78.85	.001
Social Environment	1	.032	.108	.743
Sex-Type	1	.228	.766	.383
Social Environment: Sex-Type	1	2.44	8.20	.01
Residuals	138	41.03		

Figure 8

Simple effects of sex-type



Results suggest there is a larger trending effect of resilience for males (.309) than females (-.078), as well as social environment for males (.525) than for females (.336). The results of this study suggest that secondary-level instrumental music male students are more likely to have more positive self-talk based on their personal resilience and perception of the music classroom environment than their female peers. Previous research suggests that self-talk, covert or overt, is associated with greater emotional or behavioral problems (Brinthaupt et al., 2009). Though the current study does not investigate what underlying factors contribute to self-talk in secondary-level instrumental music students, the results of this study suggest that males and females

interact with their internal dialogue differently in their music practice and performance behaviors.

Fairness and Differential Item Functioning

To determine whether measurement equivalence (i.e., fairness) for all items exists (research question 1) when used to measure subgroups of students based on their identified sex-type (research question 3), a DIF omnibus analysis was conducted. The DIF analysis was conducted by crossing the item and sex-type classification facets to test the null hypothesis that the overall set of interaction terms between the item facet and sex-type classification facet do not significantly differ from zero. The analysis indicated an overall statistically significant item performance based on sex-type classification ($\chi^2_{(279)} = 3438.8$, $p < .01$), indicating the null hypothesis can be rejected. These results suggest measurement equivalence for all items does not exist when used to measure students based on their sex-type.

Differential Item Functioning Interactions

To answer the fourth research question and find out if any patterns of DIF effects exist for items when used to measure subgroups of students based on their sex-type, a post hoc pairwise interaction analysis between all items ($n = 69$) and sex-type classifications ($n = 2$) was conducted. All 138 possible interaction terms were found to be statistically significant ($|Z| \geq 2.00$). Item 20 (*I talk to myself in order to be able to concentrate more fully on the performance*), was found to have the highest level of bias among females (0.22 logits) and the least level of bias among males (-0.22 logits). Positive values indicate the item was systematically less difficult for females to respond to than females. Item 42 (*When faced with difficult musical passages, I would think my chances of continuing in music were poor*), was found to have the highest level of bias

among males (0.16 logits) and the least level of bias among females (-0.14 logits). Negative values indicate the item was systematically more difficult for females to respond to than males.

The bias index values (Bias) indicate the size of the DIF effect in logit units. The expected value of bias indices is 0.00 logits, which indicates there was no differential item behavior exhibited. Positive values indicate the item was systematically less difficult for the identified sex-type classification than expected, whereas negative values indicate the item was systematically more difficult for the identified sex-type classification than expected. The standard error (*SE*) represents the standard model error of the bias estimate. Any value above 2.00 or below -2.00 indicates a significant interaction effect. Note that all 138 possible interaction terms were significant ($|Z| \geq 2.00$).

Figure 9 shows the interaction bias among the 69 survey items among females (1, blue) and males (2, orange). The infit mean square (Infit MSQ) indicates how much misfit to the model remains after accounting for the bias, which is expected to be less than 1.00. For item 20, the female Infit MSQ is 0.9, and the male Infit MSQ is 0.8. This is interpreted as this item having no further unknown causes of misfit beyond the identified DIF effect for item 20 between males and females. For item 42, the male Infit MSQ is 1.3, and the female Infit MSQ is 1.1. These results are interpreted that this item as having further unknown causes of misfit beyond the identified DIF effect.

Table 17

Summary of differential item functioning statistics

Item	Infit MSQ	Outfit MSQ	Total observed	Total expected	Stand. Mean Residual (obs-exp)	Bias logit	*SE*	*Z*
1	.80	.80	412	397.77	.10	.18	.11	1.57
2	.90	.90	377	372.52	.03	.06	.12	.51

3	.80	.80	382	378.60	.03	.05	.12	.39
4	1.0	.90	441	435.78	.04	.08	.12	.63
5	.90	.90	431	423.91	.05	.09	.12	.80
6	.90	.90	431	427.83	.02	.05	.13	.40
7	1.0	1.0	425	423.91	.01	.01	.12	.13
8	1.8	2.1	401	395.13	.04	.09	.12	.71
9	1.8	2.1	382	372.11	.07	.15	.12	1.21
10	1.8	1.9	404	402.74	.01	.02	.13	.16
11	.90	.90	425	419.49	.04	.06	.11	.57
12	1.2	1.2	304	292.73	.08	.14	.11	1.27
13	1.0	1.0	352	349.81	.02	.02	.10	.22
14	1.1	1.1	271	269.51	.01	.02	.11	.16
15	.70	.70	419	416.74	.02	.04	.13	.30
16	2.0	1.9	402	398.33	.03	.08	.15	.53
17	.80	.70	412	406.24	.04	.10	.13	.74
18	.90	.90	377	372.49	.03	.07	.13	.57
19	.80	.80	399	384.84	.10	.18	.12	1.61
20	.90	.90	396	377.05	.13	.22	.11	2.02
21	.80	.80	354	350.63	.02	.04	.11	.38
22	.70	.70	388	386.37	.01	.02	.12	.20
23	.80	.80	366	364.32	.01	.02	.10	.18
24	.60	.60	391	381.15	.07	.11	.11	1.04
25	.60	.60	407	403.10	.03	.05	.11	.43
26	.90	.80	338	334.82	.02	.04	.11	.35
27	.90	.80	370	370.54	.00	-.01	.11	-.06
28	.90	.80	384	381.17	.02	.04	.12	.32
29	.90	.90	454	451.90	.01	.02	.11	.23
30	1.4	1.4	278	270.12	.06	.09	.11	.86
31	1.0	.90	373	365.14	.06	.11	.12	.94
32	1.2	1.2	362	357.90	.03	.04	.10	.41
33	.90	.90	395	386.19	.06	.10	.11	.94
34	.80	.80	441	433.00	.06	.11	.12	.93
35	1.4	1.4	297	286.38	.08	.10	.10	1.05
36	1.6	2.0	242	229.53	.09	.12	.10	1.27
37	1.2	1.2	309	305.57	.03	.04	.11	.38
38	1.0	1.0	353	352.09	.01	.01	.11	.10
39	1.0	1.0	370	368.30	.01	.02	.11	.19
40	.90	.90	330	319.08	.08	.11	.10	1.11
41	.80	.80	393	393.59	.00	-.01	.10	-.06
42	1.3	1.3	309	294.21	.11	.16	.10	1.54
43	.80	.80	366	363.94	.02	.03	.12	.25
44	.90	.90	352	349.10	.02	.04	.12	.34
45	.80	.80	367	367.17	.00	.00	.11	-.02
46	.80	.80	393	382.53	.07	.13	.11	1.16
47	.90	.90	418	410.31	.05	.08	.10	.76
48	.80	.80	426	417.40	.06	.09	.10	-.26

49	.80	.70	437	435.03	.01	.02	.11	.21
50	.90	.90	370	369.88	.00	.00	.12	.01
51	1.2	1.2	368	361.14	.05	.06	.09	.64
52	1.5	1.4	304	302.42	.01	.01	.10	.15
53	.90	.90	436	422.70	.09	.16	.11	1.42
54	1.0	.90	406	405.37	.00	.01	.11	.07
55	.90	.90	457	448.66	.06	.10	.11	.89
56	.90	.80	444	438.70	.04	.05	.10	.52
57	1.0	1.0	386	384.17	.01	.02	.10	.19
58	1.1	1.0	306	306.19	.00	.00	.11	-.02
59	1.3	1.4	256	250.03	.04	.06	.10	.61
60	1.2	1.2	319	307.45	.08	.11	.10	1.14
61	1.2	1.2	283	277.16	.04	.06	.10	.61
62	.90	.90	401	393.67	.05	.08	.11	.78
63	.90	.80	386	385.49	.00	.01	.12	.06
64	.90	.90	442	430.86	.08	.12	.11	1.15
65	1.3	1.3	289	288.39	.00	.01	.11	.07
66	.90	.80	391	389.09	.01	.02	.10	.19
67	.90	.90	395	391.04	.03	.04	.10	.38
68	1.0	1.1	401	397.06	.03	.04	.10	.37
69	1.0	.90	428	422.13	.04	.07	.11	.62

To identify the size of DIF effects for items used to measure subgroups of students based on their sex-type classification, bias index values were examined to make substantive interpretations of their effect. Bias indices where $|\text{DIF}| /= 0.64$ logits are considered to represent a moderate to large effect, bias indices between 0.43 and 0.64 are considered to represent a slight moderate effect, and bias indices below 0.43 logits are considered to represent no significant effect. Effect size represented by $|\text{DIF}| >/= 0.43$ are highly important to considerations of fairness of assessment outcomes (Zwick, Thayer, & Lewis, 1999). As indicated in Figure 7, no items crossed the threshold of 0.43 logits, suggesting that there are no significant pairwise interactions between items and sex-type by DIF effect size. These results indicate no issue of fairness on survey items based on sex-type.

Figure 6 and Table 18 show the statistically significant interactions among items between the two sex-type levels, male and female. Item 20 (*I talk to myself in order to be able to concentrate more fully on the performance*, aligned in the motivational self-talk domain), was a statistically lower response for females than for males. Item 42 (*When faced with difficult musical passages, I would stop myself from panicking*, aligned in the tenacity resilience domain), was a statistically higher response for females than for males. Item 53 (*My music teacher really wants us to enjoy learning new musical concepts*, aligned with the mastery goals social environment domain), was a statistically higher response for males than for females.

Figure 9

DIF interaction between sex-type and items

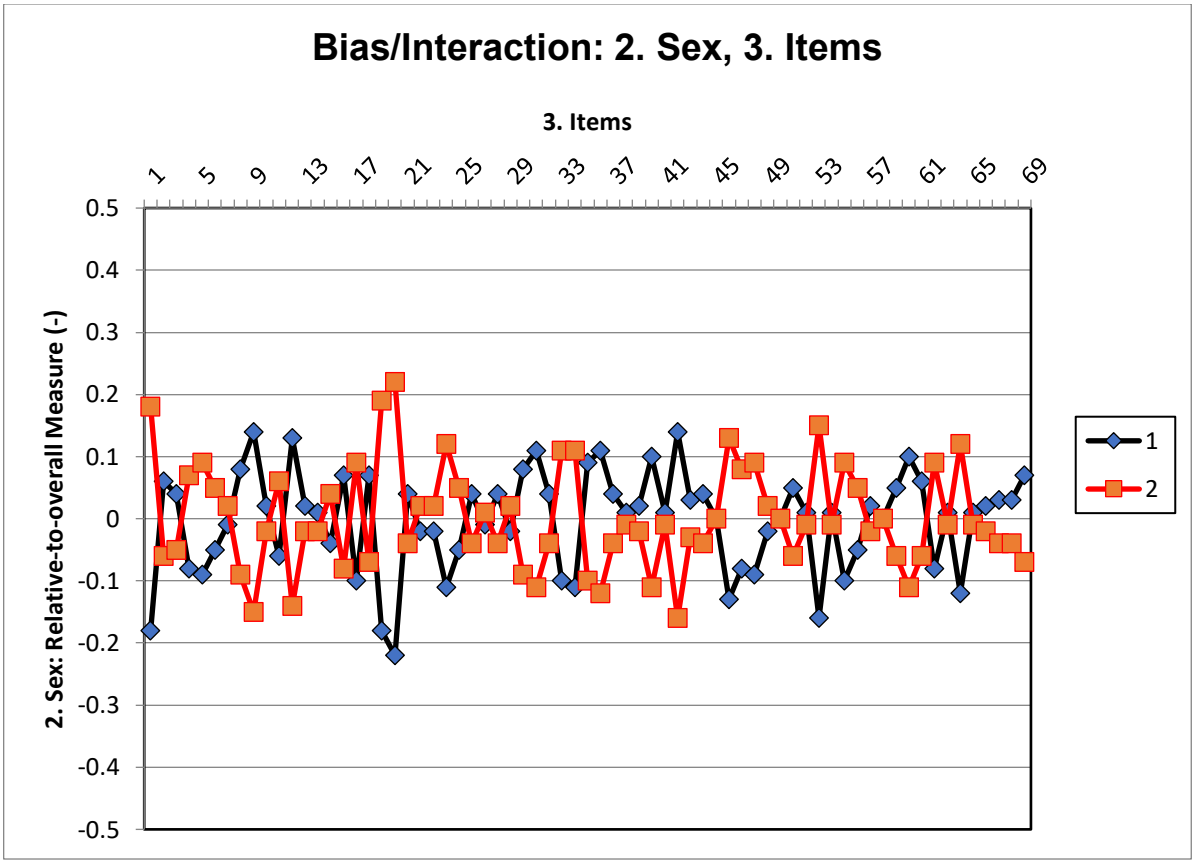


Table 18

Statistically significant DIF interactions by sex-type

Item	Sex-Type	Target Measure	Obs-Exp Average	*SE*	Target Contrast	Joint *SE*	*t*
42	Female	.73	-.10	.10	.30	.14	2.12
	Male	.42	.11	.10			
9	Female	-.52	-.07	.12	.28	.17	1.67
	Male	-.80	.07	.12			
12	Female	.70	-.08	.11	.27	.16	1.75
	Male	.43	.08	.11			
36	Female	1.07	-.09	.10	.24	.14	1.72
	Male	.83	.09	.10			
31	Female	-.06	-.09	.12	.22	.17	1.31
	Male	-.28	.09	.12			
40	Female	.42	-.08	.10	.21	.14	1.53
	Male	.21	.08	.10			
60	Female	.49	-.08	.09	.21	.14	1.56
	Male	.28	.08	.10			
35	Female	.65	-.07	.09	.20	.14	1.44
	Male	.45	.08	.10			
30	Female	.74	-.06	.10	.18	.15	1.18
	Male	.56	.06	.11			
8	Female	-.86	-.04	.12	.17	.17	.98
	Male	-1.03	.04	.12			
16	Female	-1.00	-.02	.12	.15	.20	.72
	Male	-1.15	.03	.12			
18	Female	-.24	-.03	.12	.14	.18	.80
	Male	-.38	.03	.13			
69	Female	.94	-.04	.12	.13	.15	.89
	Male	.81	.04	.13			
61	Female	.64	-.04	.10	.12	.14	.83
	Male	.52	.04	.10			
2	Female	-.24	-.03	.11	.11	.16	.72
	Male	-.36	.03	.12			
59	Female	.87	-.04	.10	.11	.14	.82
	Male	.76	.04	.10			
51	Female	.31	-.05	.09	.11	.13	.88
	Male	.20	.05	.09			
3	Female	-.27	-.02	.11	.09	.16	.55
	Male	-.36	.03	.12			
21	Female	.06	-.02	.11	.08	.16	.53
	Male	-.02	.02	.11			
37	Female	.44	-.02	.11	.08	.15	.53
	Male	.36	.03	.11			

44	Female	.28	-.02	.11	.08	.17	.48
	Male	.20	.02	.11			
32	Female	.08	-.03	.10	.08	.14	.57
	Male	.00	.03	.10			
26	Female	.17	-.02	.11	.07	.15	.48
	Male	.09	.02	.11			
28	Female	-.22	-.02	.11	.07	.16	.45
	Male	-.29	.02	.12			
67	Female	-.25	-.03	.09	.07	.13	.53
	Male	-.32	.03	.10			
68	Female	1.08	-.03	.09	.07	.13	.52
	Male	1.01	.03	.10			
43	Female	-.04	-.01	.12	.06	.17	.34
	Male	-.10	.02	.12			
13	Female	.12	-.02	.10	.04	.14	.31
	Male	.08	.02	.10			
39	Female	-.05	-.01	.11	.04	.16	.26
	Male	-.09	.01	.11			
10	Female	-.96	-.01	.13	.04	.18	.22
	Male	-1.00	.01	.13			
57	Female	-.24	-.01	.10	.04	.14	.26
	Male	-.28	.01	.10			
66	Female	-.26	-.01	.10	.04	.14	.26
	Male	-.29	.01	.10			
14	Female	.78	-.01	.10	.03	.15	.22
	Male	.75	.01	.11			
52	Female	.72	-.01	.09	.03	.13	.21
	Male	.70	.01	.10			
38	Female	.04	-.01	.11	.02	.16	.14
	Male	.02	.01	.11			
65	Female	.52	.00	.11	.01	.16	.10
	Male	.51	.00	.11			
54	Female	.79	.00	.11	.01	.15	.10
	Male	.78	.00	.11			
63	Female	-.32	.00	.12	.01	.17	.08
	Male	-.34	.00	.12			
41	Female	-.02	.00	.10	.01	.15	.09
	Male	-.03	.00	.11			
50	Female	.16	.00	.12	.00	.17	-.02
	Male	.17	.00	.12			
45	Female	-.05	.00	.11	.00	.15	-.03
	Male	-.04	.00	.11			
58	Female	.50	.00	.10	.00	.15	-.03
	Male	.50	.00	.11			
27	Female	-.20	.00	.11	-.01	.16	-.09
	Male	.50	.00	.11			

7	Female	-.50	.01	.12	-.03	.17	-.18
	Male	-.47	-.01	.12			
23	Female	.16	.01	.10	-.04	.15	-.25
	Male	.19	-.01	.11			
49	Female	-.43	.01	.11	-.04	.15	-.29
	Male	-.39	-.01	.11			
22	Female	.00	.01	.12	-.05	.17	-.28
	Male	.05	-.01	.12			
29	Female	-.66	.01	.11	-.05	.15	-.32
	Male	-.61	-.02	.11			
15	Female	-.47	.02	.13	-.08	.19	-.42
	Male	-.39	-.02	.13			
25	Female	-.13	.03	.11	-.10	.16	-.61
	Male	-.03	-.03	.11			
56	Female	-.44	.04	.10	-.10	.14	-.73
	Male	-.34	-.04	.10			
6	Female	-.83	.02	.13	-.10	.18	-.57
	Male	-.72	-.02	.13			
11	Female	-.42	.04	.11	-.12	.15	-.82
	Male	-.29	-.04	.11			
4	Female	-.50	.04	.12	-.15	.17	-.89
	Male	-.34	-.04	.12			
47	Female	-.27	.04	.10	-.16	.14	-1.09
	Male	-.12	-.04	.10			
62	Female	-.17	.05	.11	-.17	.15	-1.12
	Male	.00	-.05	.11			
48	Female	-.35	.06	.10	-.17	.15	-1.25
	Male	-.17	-.06	.10			
5	Female	-.50	.05	.12	-.19	.16	-1.15
	Male	-.32	-.05	.11			
55	Female	-.60	.06	.11	-.19	.15	-1.26
	Male	-.41	-.06	.10			
17	Female	-.32	.04	.13	-.19	.18	-1.05
	Male	-.13	-.04	.13			
33	Female	-.14	.06	.11	-.21	.15	-1.35
	Male	.07	-.06	.11			
34	Female	-.64	.06	.12	-.22	.17	-1.33
	Male	-.42	-.06	.12			
24	Female	-.06	.07	.11	-.23	.15	-1.50
	Male	.17	-.07	.11			
64	Female	-.53	.08	.11	-.24	.15	-1.63
	Male	-.29	-.08	.10			
46	Female	-.04	.07	.11	-.26	.16	-1.65
	Male	.22	-.08	.11			
53	Female	.83	.09	.11	-.31	.15	-2.02
	Male	1.13	-.10	.10			

1	Female	-.37	.10	.11	-.36	.16	-2.26
	Male	-.01	-.10	.11			
19	Female	-.29	.10	.12	-.38	.16	-2.31
	Male	.09	-.10	.12			
20	Female	-.09	.13	.11	-.45	.15	-2.89
	Male	.36	-.14	.11			

CHAPTER 5

CONCLUSION AND DISCUSSION

The purpose of this study was to examine students' perceptions of self-talk, resilience, and social environment in the context of secondary-level instrumental music performance classrooms. In answer to research question one (*What are the psychometric qualities (i.e., validity, reliability, and fairness) of the self-talk, resiliency, and social learning environment scales proposed in this study?*), results suggest that the *Self-Talk, Resilience, and Social Environment in Music Rating Scale* is valid, reliable, and fair. The significant and high reliability of the separation statistics for the items, constructs, and domains provide empirical support for the strong construct and predictive validity of the measure. The significant and high reliability of separation for the respondents provides empirical support for the respondents' shared understanding of each of the three constructs' operational definitions (Wright & Linacre, 1992). Results suggest a clear and reliable ordering and fit of each domain embedded within each construct. The ordering of domains from least agreeability to most agreeability is: (a) negative self-talk, (b) tenacity, (c) self-efficacy, (d) social assessment, (e) instructional self-statements, (f) positive self-talk, (g) motivational self-statements, and (h) mastery goals. The scale also demonstrates fairness among males and females for each item.

To answer research question two (*What is the relationship between the constructs of self-talk, resiliency, and social environment in the context of secondary-level music teaching and learning based on sex-type?*), results suggest the three constructs have strong positive relationships with one another. Results suggest that seven of the eight domains have strong

positive relationships with one another, and that negative self-talk has a strong negative relationship with each of the seven domains. Negative self-talk relates the least to respondents' perception of their personal tenacity.

Results suggest that resilience and social environment have a stronger relationship than social environment and self-talk or resilience and self-talk, however, both social environment and resilience have a strong positive relationship with self-talk. These results indicate that secondary-level instrumental music students perceive their personal abilities to maneuver through challenging circumstances and their surrounding environment to be affected by one another, as well as affecting how they talk to themselves.

An omnibus test of DIF was used to test the null hypothesis that the overall set of interaction terms between all items and both levels of sex-type do not differ significantly from zero. An overall statistically significant interaction between item and sex-type facets ($\chi^2(279) = 3438.8$, $p < .01$) was found, indicating that measurement equivalence did not exist for all items when used to measure subgroups of students based on their sex-type classification, so the null hypothesis was rejected.

In answer to research question three (*What interaction effects exist between resiliency, social environment, and sex-type and how do they explain variability in self-talk?*), a linear model was built to check for assumptions. Multicollinearity was detected, indicating that the constructs resilience and social environment are highly intercorrelated. Each construct, self-talk, resilience, and social environment met the assumption of homogeneity of variance ($p < 0.01$) among both levels of sex-type, female and male. This assumes that both male and female have similar variance.

The interaction effects results suggest a statistically significant interaction effect with strong main effects for the social environment, resilience, and sex-type, which explains the variability in self-talk between males and females. Self-talk increases in both females and males as their perceptions of resilience and social environment increase, but both increase for males more than females.

In answer to research question four (*What size of Differential Item Functioning (DIF) effect exist for items when used to measure subgroups of students based on their sex-type?*), results suggest that there are no significant pairwise interactions between items and sex-type by DIF effect size and indicate no issue of fairness on survey items based on sex-type. These results indicate that while males and females perceive their personal self-talk, resilience, and social environment in music classrooms differently, the items on the *Self-Talk, Resilience, and Social Environment in Music Rating Scale* are fair for both males and females to respond to.

The results of this study suggest that each of the three constructs and embedded eight domains adequately describes the perception of self-talk among secondary-level instrumental music students. Resilience and social environment are highly correlated, which could cause concern in the model diagnostics, however, both males and females indicated similar variance among the constructs. This indicates that the survey items are fair for both males and females, though males and females responded differently. While the effects of students' demographics, beyond sex-type, are unknown in this study, there is evidence suggesting that student self-talk and student well-being in music classrooms need to be addressed and can be assessed using the *Self-Talk, Resilience, and Social Environment in Music Rating Scale*. These findings corroborate previous research in psychological athletic research that self-talk does impact practice and performance behaviors.

The results of this study suggest that males and females perceive their personal resilience and surrounding social environment and how each affects their self-talk differently. These findings support research related to performance anxiety and how it varies based on sex-type in practice and performance situations among musicians and athletes (Armbrecht, 2011). In the current study, males perceive their personal resilience and social environment to enhance their positive self-talk more than females. This finding is supported by previous work on self-reported anxiety levels among musicians who have performed for evaluation. Researchers have found that females who were evaluated to have better instrumental music performances, also had higher self-reported anxiety than males (LeBlanc et al., 1997). Music performance anxiety among collegiate-level students and professional musicians also suggests that females experience a higher prevalence of anxiety than males and with more frequency (Barber et al., 2013). These findings suggest a difference in how male and female instrumental musicians respond to their practice and performance settings (Osborne & Franklin, 2002), their surrounding social environment, and how their peers, colleagues, and teachers or directors impact their self-talk in music practice and performance behaviors.

The results from this study suggest that as negative self-talk increases among secondary-level instrumental music students, the drive and determination (i.e., tenacity) to believe in their abilities (i.e., self-efficacy) decreases. Results also suggest that as self-efficacy increases, so does motivational and instructional self-talk. These results are corroborated by research examining the development of self-concept (Cooley, 1902; Festinger, 1954; Bandura, 1977; Purkey, 2000; Chohan, 2010). Findings from previous research suggest that how a person interprets their intrapersonal communication guides their understanding of who they are, what their belief system is, and how they think about their abilities in any given task.

Findings from the current study suggest that tenacity and self-efficacy are strongly and positively correlated to social assessment (i.e., an individual's perceived abilities compared to others in their immediate surroundings). Participants responded to items such as, *My music teacher tells us how we compare to other students*, which males agreed with more than females. This points to an assumption as to why males perceive their social environment positively affecting their self-talk in music classrooms. Music teachers were not included in this study, however, how students perceive their interactions with and feedback from their music teachers is assumed to affect how they speak to themselves in their music practice and performance. This finding has been seen in previous studies examining athletes and their relationship with their coaches (Brinthaupt et al., 2009; Hatzigeorgiadis et al., 2014).

When asking students in various developmental stages in secondary-level education (grades 6-12) how they talk to themselves, research suggests that their inner voice is often not based in their own voice (Cheal, 2014), but that of the significant individuals in their lives. Flanagan and Symonds (2012) suggest that females' self-talk is largely influenced by their teachers or coaches, whereas males' self-talk is more influenced by their parents, guardian figures, and families. This finding alongside the findings of the current study could be interpreted that females internalize the feedback from their music teachers as negatively impacting their self-talk and how they believe in their abilities in their music classrooms.

The importance of this study and its implications on music education in the future is that the *Self-Talk, Resilience, and Social Environment in Music Rating Scale* observes student musicians' beliefs about their self-talk and makes meaningful inferences about how their self-talk impacts their beliefs in their musical abilities. Music educators do not have the ability to read the minds of their students but having information about their students talk to themselves in

their classrooms might influence teacher feedback, and teacher modeling behaviors of positive self-talk. Pre-service educator programs impart the importance of teacher modeling as well as teacher feedback. This study provides a glimpse into how students feel about their music teachers' feedback. Music teachers demonstrating positive self-talk to themselves, even in challenging situations, might influence music students to talk with a more positive, motivational, or instructional tone while practicing or performing on their instrument.

How music students talk to themselves is an important of inquiry because negative self-talk can lead to the fear of failure, disengagement, and lack of confidence in their personal abilities (Martin, 2013). Positive self-talk can lead to practice and performance success, development of self-efficacy, development of a positive self-concept, and self-regulation (Bandura, 1997; Dagrou & Gauvin, 1992; Perkos et al., 2002; Vygotsky, 1987). Each of these elements relating to positive or negative self-talk might not only impact music students' enjoyment of their music-making experiences and might be responsible for creating music performance anxiety among music students. This might also negatively impact their decision of whether or not to continue making music while in school and beyond.

Music performance anxiety is a broad concept that has been examined in several age groups, specifically in pre-professional and professional musicians (Craske & Craig, 1984; Lang, 1993; Osborne et al., 2014). While specific and independent underlying factors of music performance anxiety have been examined, such as fear of failure, fear of performance, and cognitive, physiological, and behavioral components of performing musicians (Allan, 2016; Clark et al., 2014; Weiss, 2008), the quality and content of the internal dialogue musicians' have in music practice and performance have not yet been measured, specifically among developing instrumental music students.

Music performance anxiety research has examined self-talk as an intervention strategy for overcoming the fear of performance (Allan, 2016; Clark et al., 2014; Weiss, 2008), yet has not yet considered how music students talked to themselves prior to the intervention. Motivational self-statements such as, *I talk to myself to encourage myself*, or *In my musical performances I feel encouraged*, could be used in several ways such as saying *I can do this* to get through a performance in adverse and anxiety-fueled experiences such as performing for peers or teachers. However, it is likely that music students talked to themselves about their musical performance and musical abilities prior to using an intervention utilizing self-talk. When music students talk to themselves, whose voice are they hearing? Are they hearing their own voice, their teacher's voice, their families' or friends' voices? It is important moving forward with this research to take into account how music students talk to themselves, how they came to use the self-statements they are using, and how they can use positive, motivational, or instructional self-statements to positively affect their music practice and performance.

The results of this study provide music educators a valid, reliable, and fair way to measure the perceptions of self-talk among secondary-level instrumental music students, as well as suggest a richer understanding of how males and females perceive their musical abilities and music classrooms independently. Because there are underlying psychological, and personality traits, student and teacher behaviors, and social interactions embedded in secondary-level instrumental music classrooms that have not yet been examined, future research needs to account for how students perceive themselves and the world around them differently.

Student grade levels were collected but were not analyzed in relationship to sex-type or perception of self-talk, resilience, and social environment. The current study streamlined sex-type classifications (*female, male, do not wish to share*) and did not examine the relationship

between student grade level, sex-type, and perceptions of their internal dialogue. It is of interest to investigate further how grade level plays a role in how music students responded to the *Self-Talk, Resilience, and Social Environment in Music Rating Scale.* Students in sixth grade probably interpreted the items on the survey differently than twelfth-grade students due to developmental changes and school-music experiences. Self-talk impacts secondary-level instrumental music students, regardless of sex-type classification. Interestingly, the results demonstrated adequate data-to-model fit as evidenced by acceptable fit statistics of the Many Facet Rasch measurement model. However, post hoc DIF analyses indicated several DIF effects. The broad-based considerations and sex-type-by-item interactions are speculative. Follow-up phenomenological investigations into pedagogical influences, social interactions among students and teachers, as well as student performance and practice behaviors would be a step in the right direction for explaining these results in a more meaningful way.

Future research should include case studies or follow-up interviews with music students and teachers, as well as collecting other demographics and school attributes such as socioeconomic status, and race and ethnicity, student primary language, student/teacher relationships, among other various factors that could provide a deeper understanding of how students talk to themselves and how that internal dialogue impacts their music-making experience. How students relate to the world around them is deeply associated with their surroundings and upbringings (hooks, 2010), and how they develop their critical thinking skills, which might influence their belief in their abilities, how they compare to others in their music classes, interpret their teacher feedback, and talk to themselves.

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APPENDIX A

The Self-Talk, Resilience, and Social Environment in Music Rating Scale
Molly Blair, 2021

Self-Talk – 28 items
Resilience – 25 items
Social Environment – 16 items

Participants respond to a 4-point Likert-scale:
1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree

Self-Talk

1. I want to redo something I've performed for another person. D2
2. In my musical performances, I imagine - how my peers will respond. D3
3. In my musical performances, I imagine - my peers' opinions. D3
4. In my musical performances, I imagine - how my teachers will respond. D3
5. In my musical performances, I imagine - my teachers' opinions. D3
6. I review aspects of my performance. D3
7. I wish that I could change aspects of my performance into "better" or different performance attributes. D2
8. In my musical performances, I feel – Proud D1
9. In my musical performances, I feel – Confident D1
10. In my musical performances, I feel – Encouraged D3
11. I need to boost my confidence so that I can perform more difficult music. D4
12. In my musical performances, I - feel discouraged about my musical ability. D2
13. In my musical performances, I - criticize myself. D2
14. In my musical performances, I - feel ashamed. D2
15. I try to give myself guided direction - in musical practice. D4
16. I try to give myself guided direction - in musical performance. D4
17. I give myself instructions or directions about how I should prepare for my musical performance. D4
18. I have to figure out how I should prepare for my musical performance. D4
19. I tell myself that I "should," "ought to," or "have to" perform at a high level. D4
20. I talk to myself in order to be able to concentrate more fully on the performance. D4
21. I talk to myself about the technical elements of the performance. D4
22. I talk to myself to - give myself directions. D4
23. I talk to myself to - enhance my self-confidence. D3
24. I talk to myself to - encourage myself. D3
25. I talk to myself to - increase my effort. D1
26. I talk to myself to - stop my negative thinking. D1
27. I talk to myself to - help calm my nerves. D1
28. I talk to myself to - correct my mistakes. D4

Resilience

1. I use teacher feedback to improve my music practice. D5
2. In difficult musical situations, I would - give up. D6
3. In difficult musical situations, I would - use the situation to motivate myself. D6
4. In difficult musical situations, I would - probably get annoyed. D6
5. In difficult musical situations, I would - do my best to stop thinking negatively. D5
6. In difficult musical situations, I would - work harder. D6
7. In difficult musical situations, I would - get depressed. D6
8. In difficult musical situations, I would - blame my music teacher. D5
9. In a difficult musical situation, I would begin to think my chances of success in music were poor. D5
10. I would see a difficult musical situation as temporary. D6
11. I would try to think of new solutions to help myself in a difficult musical situation. D5
12. When struggling with musical passages, I would be very disappointed in my musical abilities. D6
13. I would use my past musical successes to help motivate myself. D5
14. When faced with difficult musical passages, I would - think my chances of continuing in music were poor. D5
15. When faced with difficult musical passages, I would - seek help from my music teacher. D5
16. When faced with difficult musical passages, I would - stop myself from panicking. D5
17. I would try different ways to practice difficult musical passages. D5
18. I set my own goals for musical achievement. D5
19. I seek encouragement from my - family. D5
20. I seek encouragement from my - friends. D5
21. I seek encouragement from my - teachers. D5
22. I try to think about my strengths more than my weaknesses to help me practice better. D5
23. Depending on my performance quality, I set _____ for myself. – rewards D5
24. Depending on my performance quality, I set _____ for myself. – punishments D5
25. I look forward to showing that I can improve my performance. D6

Social Environment

1. My music teacher wants us to understand our music, not just memorize it. D8
2. My music teacher really wants us to enjoy learning new musical concepts. D8
3. My music teacher recognizes us for trying hard. D8
4. My music teacher gives us time to understand new musical concepts. D8
5. My music teacher points out those students who get good grades as an example to us all. D7
6. My music teacher points out those students who get poor grades as an example to us all. D7
7. My music teacher lets us know who the best music performers are. D7
8. My music teacher tells us how we compare to other students. D7
9. My music teacher encourages us to share ideas with one another in class. D7
10. My music teacher lets us ask other students when we need help with our part in the music. D7
11. My music teacher encourages us to get to know all the other students in music class. D7

12. In our music class, we are always supposed to be quiet. D8
13. My music teacher wants us to respect each other's performances in class. D7
14. My music teacher makes sure that students do not make fun of other students' performances in class. D7
15. My music teacher makes sure that students don't say anything negative about each other in class. D7
16. My music teacher wants all students to feel respected. D8

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Human Research Protection Program

EXEMPT DETERMINATION

November 30, 2022

Dear Brian Wesolowski:

On 11/30/2022, the Human Subjects Office reviewed the following submission:

Title of Study:	Toward Healthy Internal Dialogues: Examining Secondary-Level Music Students' Perceptions of Self-Talk, Resilience, and Social Environment
Investigator:	Brian Wesolowski
Co-Investigator:	Molly Blair
IRB ID:	PROJECT00004668
Funding:	None
Review Category:	FLEX Exempt 7

We have determined that the proposed research is Exempt. The research activities may begin 11/30/2022.

Since this study was determined to be exempt, please be aware that not all future modifications will require review by the IRB. For more information please see Appendix C of the Exempt Research Policy (https://research.uga.edu/docs/policies/compliance/hso/IRB-Exempt-Review.pdf). As noted in Section C.2., you can simply notify us of modifications that will not require review via the "Add Public Comment" activity.

A progress report will be requested prior to 11/30/2027. Before or within 30 days of the progress report due date, please submit a progress report or study closure request. Submit a progress report by navigating to the active study and selecting Progress Report. The study may be closed by selecting Create Version and choosing Close Study as the submission purpose.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103).

Sincerely,

Maricia Dilan, IRB Professional
Human Subjects Office, University of Georgia