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Therapy Dogs in the College Classroom: The Effect of Dogs on Stress, Anxiety, and Spanish L2 Phonological Learning and Performance

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To the Graduate Council:

I am submitting herewith a dissertation written by Elaine Maralee Henry entitled "Therapy Dogs in the College Classroom: The Effect of Dogs on Stress, Anxiety, and Spanish L2 Phonological Learning and Performance." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

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Therapy Dogs in the College Classroom: The Effect of Dogs on Stress, Anxiety, and Spanish L2 Phonological Learning and Performance

A Dissertation Presented for the

Doctor of Philosophy

Degree

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Elaine Maralee Henry

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Dedication

This dissertation is dedicated to my dazzling Wonder.

An elegant and brilliant Bernese Mountain Dog, she is officially known as

Bear-Acres The Wonder of Glory, CGC, CGCA, TDI.

An AKC Group Placing show dog who was nationally ranked as high as #15 Bernese in All Breed Points, Wonder is a star in the ring and in everything she does.

This research was possible because of Wonder's exemplary work as a therapy dog.

Wonder, thank you for making my dreams come true and giving me the honor of loving you every day.

You make those around you better, bring love and joy to everyone you meet, and make every day brighter.

I am so incredibly proud of my Wonder girl.

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Abstract

Anxiety and stress invoked by the second language classroom setting has the ability to cause numerous detrimental physiological changes which impair the learning process. A more natural, “immersion” type atmosphere is often desired when teaching a second language; however, this is not typically possible with college classes. Therefore, the addition of therapy dogs to college second language classes may be a beneficial solution since therapy dogs are frequently cited as having the ability to lower stress and anxiety in many different settings. Stroking and interacting with a dog may reduce many markers of stress, including blood pressure, heart rate, and cortisol levels. Data were collected from 12 University of Tennessee-Knoxville Spanish and psychology students using a within-subjects design. Following baseline testing, participants were taught three Spanish phonemes either with or without a certified therapy dog present. In all three conditions, saliva samples were collected and cortisol assays performed. A group of surveys which included the Foreign Language Classroom Anxiety Scale (FLCAS), anxiety thermometer, Perceived Stress Scale-14 (PSS-14), Self-Esteem Scale (SES), and New General Self-Efficacy Scale (NGSES) were completed during each condition. Phonological proficiency was assessed by audio recordings made of participants reading sentences which contained the previously taught “target” phonemes. Two Spanish experts rated phonological proficiency using a Likert scale. Repeated measures ANOVAs, *t*-tests, and correlational analyses were conducted on all data. During the therapy dog condition, FLCAS and anxiety thermometer scores were significantly lower than in either of the other conditions. PSS-14 scores were significantly lower for both the therapy dog and baseline conditions than for the no dog

condition. Self-esteem and self-efficacy were highest during the therapy dog condition, though significance was not reached for either SES or NGSES results. Cortisol results were not significant but were highest in the no dog condition. Finally, phonological results were not significant. Findings suggest that therapy dogs significantly reduce self-reported second language-specific anxiety, as well as general anxiety and general perceived stress. Further studies are suggested to assess whether therapy dogs may also significantly reduce cortisol levels and possibly improve second language phonological learning when sample sizes are larger.

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Section 1

Literature Review

In an increasingly globalized world, it is easier than ever to travel to another country to live, work, attend school, or vacation. With this increase in individuals who are living in a non-native country comes the challenge of communication. Furthermore, many colleges and universities have foreign language requirements that must be met before students can graduate. An increase in the number of higher education institutions that require L2 proficiency will benefit all involved by producing students who are educated not only in their field of study, but also in how to communicate effectively in a second language. Of particular interest to this study is the significant need for native English speakers to attain proficiency in Spanish.

The most effective way to learn Spanish as an L2 is generally thought to be exposure to it in a naturalistic setting. Learners interacting with the target language in its native country tend to be more motivated and precise (Snow & Hoefnagal-Hohle, 1977). Such learners are also more likely to receive adequate amounts of comprehensible input. However, since it is difficult and often impossible to take students to the language, the language must be brought to them. Teaching an L2 in a traditional classroom setting is less than ideal for many reasons, including limited time for rehearsal, motivation for good grades overshadowing the desire to attain competent communication skills for speaking the L2 in the world beyond the classroom, and students feeling apprehensive about participating in class (Gardner & Lambert, 1965). Academic stress and anxiety may significantly reduce an L2 learner's ability to become proficient in the target language (von Worde, 2003).

One promising intervention for reducing the stress and anxiety associated with learning an L2 in the classroom setting is animal assisted therapy. Though many types of animals produce excellent results in therapy settings (horses, ponies, dogs, etc.), therapy dogs are the most logical choice for work in educational settings due to their small size, excellent human interaction skills, and ability to be trained to meet the stringent requirements of numerous therapy dog organizations. Therapy dogs lower stress and anxiety, have a relaxing effect, and reduce blood pressure and heart rate (Jalongo, Astorino, & Bomboy, 2004; Taylor, 2012). By introducing therapy dogs into Spanish L2 classrooms, it may be possible to negate the typically anxiety-provoking effects of classroom learning. This possibility will be investigated by exploring the causes of stress and anxiety in an academic setting, identifying the physiological processes by which chronically elevated or high levels of stress impair learning and memory, examining how anxiety specifically affects the L2 learning process, explaining how therapy dogs reduce this anxiety, and, finally, evaluating how therapy dogs may be correlated with increased Spanish L2 phonological learning.

Effect of Stress and Anxiety on Language Learning and Performance

An attempt to create an operational definition of the terms “stress” and “anxiety” must be included in the discussion about the myriad of ways that they both influence language learning and performance. The general cognitive and physiological implications of stress will be delineated in following sections, as will a separate construct known as anxiety and its specific effects on language learning. Additionally, language learning and performance need to be defined individually. Noam Chomsky (1965) refers to language performance as the way individuals actually speak

the language. Therefore, what one learns could be different from how one performs it. Language competence is described as understanding of the language (Chomsky, 1965). Stress and anxiety frequently cause L2 learners to *perform* the language with less accuracy than their *competence* would suggest they should (Chomsky, 1965). It is possible, therefore, that L2 learners know more than they are able to convey since mistakes and slips of the tongue contribute to errors in the actual performance of the target language.

Stress

Stress is frequently mentioned as a component of or contributor to anxiety (Ertekin, Dilmac, & Yazici, 2009). The terms are frequently intermingled but some differences in meaning do exist. *Stress* is a term that is quite familiar yet universally hard to define with any degree of precision (Murray, Baber, & South, 1996). Though a single definition does not serve all disciplines equally well, a psychological and biological perspective may consider stress to be anything that disrupts homeostasis and heightens arousal (Murray, Baber, & South, 1996). The concept of homeostasis is an ancient one that was described by Hippocrates as a state of “harmonious balance” (Johnson, Kamilaris, Chrousos, & Gold, 1992, p. 115). In 1936, Hans Selye created the now famous General Adaptation Syndrome as a model of stress. Following an initial alarm stage, the body fights the stressor during the resistance phase. If the stressor is not removed or resolved, physical failings occur during the third stage of exhaustion (Johnson, Kamiliaris, Chrousos, & Gold, 1992). Physiological resources are depleted and, eventually, tissue damage and organ dysfunction occur during the exhaustion stage, which eventually leads to illness and death. This model clearly shows why

chronic stressors, such as psychological anxiety or worry, are so hazardous. Unlike the acute physical stressors with which the body was initially designed to cope, psychological stressors may remain present for extended periods of time.

Coping is defined as the cognitive and behavioral techniques that a person uses to manage the demands that stress puts on the body (Morin, Rodrigues, & Ivers, 2003). It is essential that an individual employ effective coping strategies to deal with chronic stressors. Conversely, those with poor coping skills are often not able to reduce or remove the stressor and may succumb to the many effects of chronic stress (Morin, Rodrigues, & Ivers, 2003).

Anxiety

Anxiety may be defined as an acquired feeling of fear or stress and, when found in excess, is detrimental to learning (Ertekin, Dilmac, & Yazici, 2009). Unlike stress, which is an innate reaction to any stimulus perceived to be a demand on the body or a threat to well-being (Lazarus & Folkman, 1984), anxiety is acquired. Thus, humans *learn* to feel anxious (Ertekin, Dilmac, & Yazici, 2009). Those who are anxious experience a "subjective feeling of tension, apprehension, nervousness, and worry" (Horwitz, Horwitz, & Cope, 1986). High anxiety individuals show overall heightened arousal and exhibit increased startle responses and skin conductance response rates when compared to low anxiety controls (Dibbets, van den Broek, & Evers, 2015). Increased heart rate, mild nausea, and a lightheaded feeling are also physiological signs of anxiety (Kelly, Rice, Wyatt, Ducking, & Denton, 2015). Activity in the amygdala is greater in those with higher levels of anxiety (Dibbets, van den Broek, & Evers, 2015), suggesting a strong emotional component of anxiety.

Three types of anxiety are found in the literature. First, trait anxiety describes individuals who are likely to exhibit anxiety across all settings (MacIntyre & Gardner, 1991; Spielberger, 1985). Trait anxiety is detrimental to learning in several ways. Trait anxiety not only decreases overall cognition, but also correlates with reduced memory capacity (MacIntyre & Gardner, 1991; Spielberger, 1985). Secondly, proponents of state anxiety feel that anxiety is a combination of trait and situational anxiety (MacIntyre & Gardner, 1991). Therefore, state anxiety could be thought of as two forces coming together to produce elevated anxiety. A person who already shows a tendency to be anxious across all situations (trait anxiety) may become even more anxious in certain situations (situation specific anxiety). Finally, situation specific anxiety refers to anxiety that is confined to a particular context (MacIntyre & Gardner, 1991). For example, individuals who do not exhibit high levels of trait anxiety may still be anxious in one or more particular settings. Public speaking engagements and second language classrooms are contexts where situation specific anxiety may be especially prevalent (MacIntyre & Gardner, 1991).

The anxious-apprehension model asserts that anxious individuals worry about future events and that specific cues elicit their apprehension (Barlow, 2000). Cues may be any stressor, such as L2 classes. These cues lead to a “self-evaluative” focus where individuals think about all the ways in which they are not ready, prepared, or able to deal with the stressor (Barlow, 2000). This focus on lack of preparedness further increases overall arousal and negative feelings, ultimately creating a positive feedback loop where the person finds it difficult to halt the anxiety (Barlow, 2000).

Language and mathematics classes are frequently mentioned as courses that tend to create significant anxiety. Second language courses have been called the “most personal and public of school subjects” (Horwitz, 2000, p. 256), illustrating why performance in language classes has the ability to be tied to deeply to one’s self-esteem. Students with high levels of Foreign Language Anxiety (FLA) are less likely to ever use what they have learned about the L2 in their post-college lives (Dewaele, 2007). Since college L2 classes should aim to create students who can actually communicate effectively outside of the college classroom, this is a significant concern. The requirement of communicating in a foreign language makes L2 classes more likely to elicit stress and anxiety than non-language classes (von Worde, 2003). Anxious students also have less ability to solve math problems and struggle with analytical reasoning (Kelly et al., 2015). Anxiety induced by test-taking reduces working memory capacity (Shi, Gao, & Zhou, 2015). Consequently, persons with the highest anxiety scores exhibit the worst working memory performance when asked to recall lists of letters (Shi, Gao, & Zhou, 2015). Metacognition is also reduced when an individual is experiencing elevated levels of anxiety, leading that person to think less about their own thoughts and reasoning processes (Kelly et al., 2015).

To combat the often-incapacitating levels of anxiety in L2 classrooms, instructors are encouraged to try to reduce classroom stress and anxiety by creating a friendly atmosphere where self-esteem can grow (Noormohamadi, 2009). Likable and appealing pedagogical agents have been found to increase learning, probably because they reduce tension and increase motivation (Domagk, 2010). The current study aims to

introduce therapy dogs as a means of building a learning environment that is relaxed, anxiety-free, and encouraging.

In subsequent sections, the physiology of stress and its effects on the body and on general cognition will be explored. Social and motivational factors that affect second language (L2) learning will be discussed. Finally, differences between implicit and explicit L2 learning processes will be explored.

Physiology of Stress

Stress may be defined as any instance when homeostasis is disturbed (Reeder & Kramer, 2005). Subsequent changes in cognition or motivation frequently occur (Greenberg, Carr, & Summers, 2002). It is a physiological state in which the body's sympathetic nervous system (SNS) dominates its parasympathetic nervous system (PNS). During normal, day-to-day life, the PNS maintains control and works to keep the body at homeostasis. The introduction of a physical or psychological stressor disrupts this equilibrium and activates the SNS, also known as the "fight or flight" response. Physical stressors include things like extreme temperatures, high intensity exercise, and threatening presences such as wild animals and intruders. The SNS was originally designed to deal with this type of acute stressor. Once the stressor was gone, the person's PNS would regain control and return the body to homeostasis (Reeder & Kramer, 2005). Today, however, psychological stressors such as fear, anger, frustration, and anxiety are becoming increasingly prevalent. Such emotional stressors may remain present for extended periods of time, causing deleterious chronic stress (Sapolsky, 2004). While the overall goal of the stress response is always to deal with the stressor and then return the body to homeostasis, what triggers the stress response

varies from individual to individual (Lazarus & Folkman, 1984). Once the stress response is activated, however, the cascade of events is uniform across individuals and, for the most part, even different species.

The central nervous system (CNS) activates both the SNS and hypothalamic-pituitary-adrenal (HPA) axis during a crisis (Charmandari, Tsigos, & Chrousos, 2005). The SNS has a response that is almost immediate. The paraventricular nucleus of the hypothalamus innervates the spinal cord and causes the adrenal medulla to secrete epinephrine and the peripheral nerves to release norepinephrine (Reeder & Kramer, 2005). Epinephrine and norepinephrine are excitatory neurotransmitters that cause increased heart rate and respiration, glycogenolysis (the release of glucose from tissues), and lipoloysis (fat breakdown) (Reeder & Kramer, 2005). SNS arousal is also associated with elevated blood pressure, dilated pupils, sweating, and increased blood flow to the heart (Zoladz & Diamond, 2009).The goal of such physiological activities is to prepare the body to either fight or flee from the stressor. By delaying normal functions such as digestion, the body is investing all of its resources into tasks that will assist the individual in escaping or fighting. SNS activation can be measured by heart rate and temperature variability. Once the stressor is no longer a threat, the PNS down regulates the SNS and restores balance (Reeder & Kramer, 2005).

The HPA axis, though slower than the SNS, produces longer lasting effects. HPA activation begins when the paraventricular nucleus triggers the pituitary gland to produce corticotrophin-releasing hormone (CRH) which, in turn, leads to release of adrenocorticotropic hormone (ACTH) from the anterior pituitary (Reeder & Kramer, 2005). ACTH works on the adrenal cortex, causing it to produce glucocorticoids such as

cortisol in humans. Thus, by measuring cortisol, the end product of HPA axis activation can be ascertained. Elevated cortisol levels are correlated with high stress levels (Charmandari, Tsigos, & Chrousos, 2005). Even in the absence of a stressor, cortisol displays a circadian rhythm and peaks in the morning, just before the time of awakening (Reeder & Kramer, 2005). This allows the individual to prepare for whatever stressors may be encountered upon beginning the day.

To return to homeostasis, a negative feedback loop causes down-regulation of the HPA axis when cortisol levels are elevated. ACTH also maintains a negative feedback loop which reduces production of CRH.

Effect of Stress on General Learning and Cognition

Elevated cortisol, often caused by a persistent psychological stressor, can lead to numerous detrimental changes in the brain and throughout the body. Prolonged high cortisol is associated with increased cell death, insulin resistance, and, eventually, immune system collapse (Lambert & Kinsley, 2011; Reeder & Kramer, 2005). Acute psychological stress creates an increase in systemic inflammation as measured by saliva (Slavish, Graham-Engeland, Smyth, & Engeland, 2015). The HPA and sympathetic nervous system are thought to enhance inflammation levels throughout the body when an acute stressor is present (Slavish, Graham-Engeland, Smyth, & Engeland, 2015). Protein decomposition, hippocampal dendritic damage, and reduced hippocampal long-term potentiation (LTP) are also effects of chronically elevated cortisol (Zoladz & Diamond, 2009). LTP is the process through which long-term memories are encoded and stored. For this reason, memory and learning may be adversely affected by extended periods of increased cortisol (Yehuda, Rabinovitz,

Carasso, & Mostofsky, 2000). Chronic stress also frequently causes depressive-type symptoms and a state of hyper anxiety (Pinto et al., 2014).

Continual exposure to the glucocorticoid due to chronic stress decreases neurogenesis in the hippocampus, possibly by reducing levels of brain-derived neurotrophic factor (BDNF) produced in that area (Nelson, 2011). The mechanism through which BDNF production is decreased by chronic stress may be associated with elevated inflammation in the hippocampus. Inflammatory cytokines increase the storage of iron in the hippocampus and decrease the level of iron in the blood and cerebrospinal fluid (CSF) (Sara, Arezo, Fatemeh, Mansoureh, Mohammad, & Mahmood, 2015). This process decreases BDNF production and may reduce neurogenesis and the ability of the hippocampus to function properly (Sara et al., 2015).

Stress leads to additional structural changes such as shrinkage of hippocampal dendrites and damage to pyramidal neurons (Yehuda et al., 2000). Rats show decreased spatial and navigational ability in the Morris Water Maze when cortisol is high (Yehuda et al., 2000). This can presumably be explained by damage to the hippocampus. In as little as one week, chronic stress can cause changes in the medial prefrontal cortex (mPFC). mPFC dendrite length and number of dendritic branches are both adversely affected by seven days of chronic stress (Mika et al., 2012). Hippocampal damage caused by elevated cortisol, meanwhile, may take up to three weeks to occur (Mika et al., 2012). Long-term potentiation, the mechanism through which long term memories are created, may be impaired for up to two days following a stress-inducing experiment (Zoladz & Diamond, 2009). Any diminished capacity of the hippocampus is especially detrimental because of its function in memory storage.

Complicated and cognitively demanding tasks are particularly vulnerable to the effects of chronic stress (Derakshan & Eysenck, 2009).

Areas of the hippocampus may be differentially affected by chronic stress. Subsequently, stress has the ability to decrease some functions while increasing others. The dorsal hippocampus is primarily responsible for memory and cognition, while the ventral hippocampus assists with emotional information (Pinto et al., 2014). The dorsal hippocampus is heavily involved with the process of LTP. Chronic stress leads to decreases in volume of the dorsal hippocampus, which may partially explain the detrimental effect that stress has on cognition and long-term memory creation (Pinto et al., 2014). Stress increases ventral hippocampal volume, elucidating the connection between stress and highly emotional learning (Pinto et al., 2014).

Beyond the reduced ability to form memories when stress is chronically elevated, reinforcement-moderated learning may also be impaired. For those who view learning as an intrinsically rewarding behavior due to a sense of accomplishment or those who see good grades as an external motivator, stress may reduce their feelings of reward by inhibiting the pleasure center in the brain (Bogdan, Perlis, Fagerness, & Pizzagalli, 2010). Cortisol also decreases prefrontal executive functioning, leading to a reduction in high-level cognitive abilities (Radenbach et al., 2015). Additionally, goal-oriented actions (such as learning) may be adversely affected by chronic stress (Radenbach et al., 2015). Chronically stressed rats exhibit fewer goal-oriented behaviors and more random or habitual activities (Radenbach et al., 2015).

Mild, short-term stress may instead be beneficial for some types of learning (Sapolsky, 2004). From an evolutionary perspective, this makes sense because a brief

stressor may increase memory of an event which should be avoided in the future. Timing of the stressor may also be important in deciding whether it is helpful or detrimental to learning. Some research shows that a mild stressor *after* learning may be beneficial but that chronic stress preceding the learning task hinders learning (Zoladz, Kalchick, Hoffman, Aufdenkampe, Burke, Woelke, Pisansky, & Talbot, 2014). Excess acute stress and chronic stress, however, both impair prefrontal cortex functioning (Greenberg, Carr, & Summers, 2002).

Second Language (L2) Learning Anxiety

Anxiety about learning a language is "a complex psychological construct" (Young, 1992, p. 157) that has been studied from many perspectives. Foreign language anxiety is described as a "specific anxiety reaction" that occurs when learning an L2 (Horwitz, Horwitz, & Cope, 1986). Importantly, foreign language anxiety is frequently present even in individuals who are not otherwise anxious (Horwitz, Horwitz, & Cope, 1986). It is apparent that high levels of anxiety are detrimental to language learning. For example, using classroom teaching methodologies designed to reduce anxiety improves both student motivation and overall communication skills (Young, 1991). Students with high levels of anxiety display an overall reduction in second language (L2) performance (Cheng, Horwitz, & Schallert, 1999) and anxiety decreases L2 "acquisition, retention, and production" (MacIntyre & Gardner, 1991, p. 86). Those with the lowest levels of anxiety acquire the L2 more quickly and efficiently (Krashen, 1981). Specifically, anxiety hinders the ability to discriminate phonemes and comprehend semantics in the L2 (Horwitz, Horwitz, & Cope, 1986). Elevated anxiety also decreases the ability to focus and leads to reduced L2 reading comprehension (Sellers, 2000). Comprehension of

input and retrieval of information from the long term memory are decreased if anxiety levels are high (von Worde, 2003). As previously mentioned, anxiety associated with learning an L2 differs significantly from other types of anxiety and is very specific to the task of learning to communicate in a non-native language (Kao & Craigie, 2013). Even those who learn easily in other academic settings often experience anxiety and may struggle when learning an L2 (Horwitz, Horwitz, & Cope, 1986).

To provide a thorough background about factors affecting L2 anxiety and L2 learning in general, numerous related topics will subsequently be discussed. Stages of anxiety will be defined, the affective filter hypothesis will be explored for the purpose of determining how anxiety may reduce comprehensible input and overall L2 learning, and motivational and social aspects which influence the L2 learning process will be discussed. Concepts such as implicit versus explicit learning and the Universal Grammar hypothesis will be covered to provide input about the challenge that college age learners, such as those in the current study, may face when learning an L2. Similarly, findings regarding structural brain differences based on age of L2 learning as well as how children (i.e. younger L2 learners) may process the L2 differently will be explored. Finally, specific areas of L2 learning such as semantics and phonology will be discussed for the purpose of providing information about why certain aspects are more difficult than others to learn at a later age.

Anxiety incurred during the process of learning an L2 may be broken down into three distinct stages: input anxiety, processing anxiety, and output anxiety (Bailey, Onwuegbuzie, & Daley, 2000). Input anxiety is the apprehension felt when a student is learning new material in the target L2. Anxiety at this stage of language learning results

in a decreased ability to encode the material because attention is diverted from the task at hand (Bailey, Onwuegbuzie, & Daley, 2000). High anxiety students reread material more frequently and ask the instructor for more words to be repeated during the input stage than do their less anxious counterparts (Bailey, Onwuegbuzie, & Daley, 2000). Processing anxiety is triggered when a student uses cognition to process the newly learned material (Bailey, Onwuegbuzie, & Daley, 2000). Factors such as complexity of the task and organization of the material may affect anxiety at this stage (Bailey, Onwuegbuzie, & Daley, 2000). Memory and overall learning of the material suffers when a student displays high levels of processing anxiety. Finally, output anxiety describes concern felt when using the newly learned material, such as when reading or speaking in the L2 (Bailey, Onwuegbuzie, & Daley, 2000). Certain demographics of learners appear to be a higher risk of anxiety related to these three learning stages, including those who are older L2 learners, those who view themselves as academically talented, those who have never taken a foreign language course or visited another country before, and those who have low self-esteem (Bailey, Onwuegbuzie, & Daley, 2000). Taking steps to reduce anxiety during input, processing, and output may be beneficial since some students experience detrimental levels of anxiety during one or all of the stages.

As many as one-third of American college students enrolled in an L2 class have moderate or severe anxiety about the course (Horwitz, 2000). Specific reasons why L2 classes invoke high levels of anxiety in some students include variables such as communication apprehension, test anxiety, and fear of evaluation (Horwitz, Horwitz, & Cope, 1986). The aspect of L2 learning that consistently evokes the highest levels of

anxiety is speaking (Brantmeier, 2005). Conversely, listening to the L2 is associated with significantly lower anxiety levels (Brantmeier, 2005). Learning to master non-native phonemes and syntax is also a frequent cause of anxiety (Saito, Garza, & Horwitz, 1999). Communication apprehension refers to the anxiety that some students feel when speaking the L2 in front of others (Gregersen & Horwitz, 2002). Adults, in particular, often find it difficult to transition from being a competent communicator in their native language to being an awkward beginner in the L2 (Horwitz, Horwitz, & Cope, 1986). No longer able to speak or write fluently, they are reduced to communicating on a far simpler level than they have been accustomed and this is often threatening to self-esteem. Personality traits such as perfectionism may also affect communication apprehension (Gregersen & Horwitz, 2002). Students who hold themselves to extremely high standards want to be able to communicate without mistakes and may not wish to speak at all since their skills are not at the level they consider acceptable (Gregersen & Horwitz, 2002). Even small errors may cause such students extreme anxiety and even emotional reactions to their perceived failure (Gregersen & Horwitz, 2002).

Test anxiety may cause a student to worry excessively over grades. Test anxiety peaks when “a situation is threatening or difficult” (Young, 1986, p. 443), such as during an L2 exam. This is an aspect of L2 learning that can be a significant factor in the classroom setting since immersion programs or L2 learning in naturalistic settings are not feasible or possible for many students. In fact, language anxiety in general could be partially attributable to the artificial setting and learning methodologies found in the classroom (Young, 1991). Research suggests that, while overall L2 proficiency may affect test scores more than anxiety levels during a practice L2 oral exam, anxiety may

play a more detrimental role during actual tests since the conditions are more intimidating (Young, 1986).

Fear of being negatively perceived by others causes high anxiety learners to be less willing to speak difficult phrases in class than their less-anxious colleagues (Horwitz, Horwitz, & Cope, 1986). As previously mentioned, speaking in class may be the most anxiety-provoking aspect of learning an L2 in the college setting (Horwitz, Horwitz, & Cope, 1986). However, willingness to communicate is a critical aspect of L2 learning success. It is obvious that students cannot learn and improve if they are not willing to attempt to communicate. Making mistakes is a natural part of any learning process but fear of making these mistakes, especially when speaking aloud, may hinder many L2 learners. High L2 anxiety levels are negatively correlated with willingness to communicate (Rastegar & Karami, 2015). Since improvement cannot occur if L2 learners are not attempting to communicate, this is an important finding. Furthermore, L2 learners who are less willing to communicate have significantly less overall success learning the L2 (Rastegar & Karami, 2015).

The affective filter hypothesis asserts that affective variables such as high anxiety and low motivation or self-esteem adversely affect the L2 learning process (Krashen, 1981). A type of “psychological obstacle,” the affective filter reduces the amount of comprehensible input that is processed efficiently (Ni, 2012). The “input +1” hypothesis posits that the most successful L2 learning occurs when the material taught is one level above the current level of comprehensible input of the learner (Krashen, 1981). This allows for the material to be comprehensible yet challenging enough to elicit improvement. Vygotsky’s Zone of Proximal Development theory also suggests that,

when an L2 learner is attempting to develop increased levels of proficiency, “support” from a more advanced L2 speaker is invaluable (van Compernolle & Zhang, 2014). This assistance from an expert speaker often allows the L2 learner to communicate at a level above what would have been possible when interacting only with speakers of their own proficiency level (van Compernolle & Zhang, 2014).

The affective filter, however, may be regarded as a “mediator” between the comprehensible input the student receives in the classroom and his or her ability to successfully process and apply the L2 (Henter, 2014). A compromised L2 learner who displays high anxiety or low motivation will have more difficulty with the target language because a “mental block” prevents them from achieving full processing of the material presented (Krashen, 1981). Even if students appear to comprehend the language, the affective filter can reduce success by inhibiting deep processing. Since recall of information is best when deeper cognitive processing occurs (Anderson, 2010), shallower processing levels employed during times when the affective filter is high may be especially disadvantageous to L2 learning outcomes. Those with the highest affective filter have the most challenging time learning the L2 (Krashen, 1981). It is suggested that steps be taken to reduce the affective filter in the L2 classroom by reducing stress and making the learning space as non-threatening as possible (Ni, 2012). Since there is often a great deal of anxiety associated with the decision to take an L2 class, methods of keeping anxiety levels low in the classroom are especially important since low anxiety is correlated with improved learner outcomes (Young, 1991). The use of therapy dogs to assist in reducing classroom stress and anxiety may be an important factor in reducing overall anxiety levels in L2 classrooms.

Motivation and L2 Learning

Motivation is another variable that can have a profound impact on learning an L2. It can be described as how enthusiastic or eager an individual is to learn the L2 and, subsequently, be able to communicate in that language (Engjn, 2009). Language learning is a motivated behavior that requires effort and perseverance (Kormos, Kiddle, & Csizer, 2011). Goals related to L2 learning are too numerous to list but include things such as good course grades, travel, friendship, and “international posture”, or the desire to be prepared to live and work in an increasingly globalized world (Kormos, Kiddle, & Csizer, 2011). The social distance hypothesis posits that learners who are from a culture that has similarities to that of the target language and those who frequently interact with native speakers of the target L2 in a naturalistic setting have more success learning the L2 (Sparks & Ganschow, 1991). A majority of individuals have some type of pre-formed bias when they begin the process of learning a new language (Smith, 2011). The learner’s social environment and attitudes that their friends and family hold toward the L2 also influences their motivation to succeed (Kormos, Kiddle, & Csizer, 2011).

Desire to learn may be the single most important factor in L2 learning (Henter, 2014). At the very least, success in a foreign language class depends partially on ability and partially on motivation and attitude toward the target language (Gardner, Lalonde, & Moorcroft, 1985). Not surprisingly, a positive view of the L2 drastically improves the chances that the individual will learn the language successfully (Denham & Lobeck, 2010). Motivation affects the learner’s overall involvement in the L2 learning process, such as their willingness and desire to participate in class and to immerse themselves in all possible activities related to the L2 and its culture (Gardner & Lysynchuk, 1990).

Learning can be either an intrinsically or extrinsically motivated process. If an individual is intrinsically motivated to learn the L2, he or she wants to learn for the sake of learning and natural enjoyment of the language (Kormos, Kiddle, & Csizer, 2011). Conversely, an extrinsically motivated person sees potential for an external reward of some type (such as a good course grade) or an avoidance of a bad consequence (such as not being able to take a lucrative job located in a foreign country) (Kormos, Kiddle, & Csizer, 2011).

Two types of motivation relevant to L2 learning are integrative and instrumental. Integrative motivation occurs when a person has positive views of the target language's culture and wishes to become a part of it (Carrio-Pastor & Mestre Mestre, 2014). Conversely, adults whose first language is a minority language who are learning a majority L2 language (such as a Latino/a learning English in Tennessee) may experience feelings of resistance and fear that they will lose part of their cultural history and connectedness by learning the L2 (Clement, Gardner, & Smythe, 1980). Such learners may exhibit low levels of motivation to learn the L2 (Clement, Gardner, & Smythe, 1980). In this case, efforts should be made to ensure that use of the non-native language is used in addition to the L1, not instead of it.

Instrumental motivation describes the desire to attain an extrinsic goal such as increased status, good course grade, or a monetary benefit from learning an L2 (Carrio-Pastor & Mestre Mestre, 2014). While many students undoubtedly take L2 classes due to the desire to learn about and participate in another language and culture, most college L2 courses likely tap into instrumental motivation since grades and graduation requirements are common motivators for taking the class. Research indicates that,

while instrumental motivations may be more common motives for taking L2 classes, integrative motivation is a better predictor of long-term use of and success with the target language (Carrio-Pastor & Mestre Mestre, 2014). This is likely because advanced L2 proficiency requires sustained levels of interest and motivation which is easier to attain if integrative motivation is present (Yu & Downing, 2012). The desire to remain diligent in the process of language learning is stronger when one is genuinely interested in the L2 and related culture than if one is merely using the L2 as a means to gain an extrinsic goal.

Social Aspects of L2 Learning

Language is a socially acquired tool (Smith, 2011) and learning an L2 with native-like proficiency outside of a social setting is nearly impossible. Social interactions have the potential to be complex and "potent" stressors (Summers, 2002). Interestingly, the stress response of one individual may affect that of others in close proximity (Summers, 2002). Such a transfer of feelings of stress and anxiety is certainly a possibility in the L2 classroom. Fear of evaluation, as previously mentioned, can hinder student participation and involvement. Whether from instructor's grades or classmate's comments, some type of evaluation of one's L2 skills is likely to occur in nearly every class.

Social psychology theories particularly relevant to the L2 learning discussion include social facilitation and inhibition and the attentional control theory. Social facilitation is the effect that the presence of others has on an individual's behavior and performance (Weiss, & Miller, 1971). This effect can be either helpful or deleterious depending on the circumstances and task being attempted (Weiss & Miller, 1971).

Concern about being evaluated by either supervisors or peers is a key element of the social facilitation theory (Geen, 1983). “Well-learned or instinctive” behaviors are improved by social facilitation (Zajonc, Heingartner, & Herman, 1969, p. 83). According to this finding, behaviors that are already strong become even stronger when others are present. The presence of others, however, is detrimental when a person is attempting a task at which they are not yet an expert (Zajonc, 1965). This is known as social inhibition. Low proficiency L2 learners certainly fall into the non-expert category and are therefore likely to be hindered by the presence of other individuals. This is an important distinction because L2 experts may actually perform better in a classroom setting, while beginners may struggle when learning in a social setting.

Furthermore, the drive theory of social facilitation asserts that social settings increase overall arousal levels (Platania & Moran, 2001). Just as mild, acute stress has the ability to improve cognition and memory, the drive theory may improve ability for some people on certain simple tasks (Rajecki, Ickes, Corcoran, & Lenerz, 1977). Performance on easy or well-learned assignments is increased by the presence of others, according to the drive theory (Geen, 1983). This may be because increased arousal prepares the individual to perform these simple tasks at a higher level. Social inhibition theories claim that learning decreases when others are present, especially if the learner has a low degree of self-efficacy with the subject (Klehe, Anderson, & Hoefnagels, 2007). Performance on difficult or new tasks is inhibited when others are in the room (Geen, 1983). Learning and retention of material are decreased when individuals experience high levels of arousal due to the presence of others (Rajecki, Ickes, Corcoran, & Lenrez, 1977). Comprehending and recalling information are difficult

tasks, and, as such, do not require or need high levels of arousal. Social inhibition is also detrimental to performance when a person must execute the task with a high level of accuracy since increased stress often results in worsened performance when the results must be very precise (Klehe et al., 2007).

According to the attentional control theory, high anxiety individuals are at an increased risk of attending to extraneous or unimportant stimuli and, subsequently, reducing the amount of attention that they have available to focus on the present learning task (Moriya & Tanno, 2010). Elevated stress reduces inhibitory functions which are normally performed by the central executive and decreases overall activity of the prefrontal cortex (Derakshan & Eysenck, 2009). In the theory of working memory created by Baddeley in 1986 (as cited by Anderson, 2010), the central executive is a critical tool for controlling and coordinating the lower levels of working memory which maintain how information is stored and processed (Anderson, 2010). Functions of the central executive include maintaining selective attention, shifting attention between numerous stimuli, and keeping contents of the working memory current (Derakshan & Eysench, 2009). Disinhibition of the central executive can lead an individual to pay attention to irrelevant and distracting stimuli instead of the learning task to which they should be attending (Derakshan & Eysenck, 2009). Lessened attentional control may be caused by social anxiety and is especially harmful when the task is involved or cognitively complex (Derakshan & Eysenck, 2009). Such anxiety-induced states reduce accuracy and efficiency of cognitive functions, especially when focus is required (Derakshan & Eysenck, 2009).

Explicit vs. Implicit L2 Learning

Explicit L2 learning takes place through guidance and instruction as well as the correction of errors during language learning (Krashen, 1981). Explicit learning is defined in more general terms as learning that follows a definite set of rules (Huang-Pollock, Maddox, & Karalunas, 2011). This type of learning uses brain areas that are developmentally late to mature, such as the prefrontal and medial temporal cortices and the anterior cingulate (Huang-Pollock, Maddox, & Karalunas, 2011). Fittingly, then, this explicit process describes the mechanism through which most college-age L2 students learn the language with the help of teaching and instruction. Language acquisition, conversely, occurs at an early age and is a "subconscious" process that occurs without prompting, instruction, or correction (Krashen, 1981). Since implicit learning is described as natural and gradual learning that occurs from interaction with the environment and often does not require conscious thought (Huang-Pollock, Maddox, & Karalunas, 2011), it is apparent that language acquisition is a type of implicit learning that occurs in children. Unlike explicit learning, implicit learning relies on brain structures such as the posterior caudate which are early to mature (Huang-Pollock, Maddox, & Karalunas, 2011).

Universal Grammar

The Universal Grammar (UG) theory offers an explanation that humans may have an innate capacity for language learning and that such a capacity may be "hardwired" into human cognition (Denham & Lobeck, 2010). The UG theory could have important implications for age of L2 learning since it is unknown if later L2 learners could access it in a manner similar to young language learners. Noam Chomsky's UG

hypothesis asserts that humans have an innate mechanism called the Language Acquisition Device (LAD) that gives even young children the ability to automatically recognize and understand the grammatical structure of their language (Yusa et al., 2011). One of the strongest pieces of evidence for UG is the poverty of the stimulus argument, which claims that children know much more about their language than they could realistically be expected to know based on what they have heard and been taught (Yusa et al., 2011). They are able to show knowledge of grammatical processes even if they have never before encountered them.

If UG is indeed a crucial part of language acquisition, the question arises whether late L2 learners would be able to activate it in the same way as would a child learning an L1. If late learners could not access UG mechanisms, they may be less prepared to attain native like proficiency in the L2. Many different ranges for the specific age when L2 learning decreases have been proposed, from around puberty to as young as age seven for acquisition of native-like phonology (Foster, Bolibaugh, & Kotula, 2014). Results from one study, however, indicate that UG activation is possible for later L2 learning and that, combined with other factors such as genetic predisposition to language learning and environment, the UG may help late learners to become proficient in the L2 (Yusa et al., 2011). This study is unique in that it reports that age of learning does not necessarily alter the way that L2 syntax is processed. Though other studies have found that L1 and L2 processing may be similar for other aspects such as semantics, it is an impressive claim to assert that even the difficult aspect of syntax may be understood and created in a similar fashion regardless of age of L2 acquisition (Yusa et al., 2011).

Most studies still contend, however, that true native-like proficiency as an adult L2 learner is either impossible or extremely rare (Abrahamsson & Hyltenstam, 2009). Due to the unlikelihood of a later L2 learner ever achieving native-like phonological proficiency, the current study focuses on using therapy dogs as an anxiety reducing mechanism in hopes of improving phonological proficiency. Significant gains can be made even if native-like proficiency is not attainable for the great majority of college-age L2 learners.

Structural Differences in the Brain

Perhaps the two most widely recognized findings concerning the neural differences of bilinguals are their increased left inferior parietal cortex grey matter volume (Mechelli et al., 2004) and their enhanced left hemisphere language lateralization when compared to monolinguals (Park, Trajikov, & Waldie, 2012). Though those who acquire the L2 at an early age exhibit even more pronounced grey matter increases, even late learners exhibit greater grey matter density than monolinguals (Mechelli et al., 2004). Both early and highly proficient late L2 learners also have more grey matter density in the left inferior parietal cortex than do late low proficiency speakers (Mechelli et al., 2004). Therefore, it appears that early acquisition *or* attainment of a high level of proficiency improves grey matter density in this brain region. High proficiency speakers also have more general structural changes than those will lower L2 skills (Mechelli et al., 2004).

White matter is also affected by speaking two languages. Adult native English speakers learning Chinese as an L2 have white matter reorganization in the frontal lobes, specifically in areas in and near the corpus callosum (Schlegel, Rudelson, & Tse,

2012). Axons ending in Broca's Area are also sparser in moderately proficient L2 learners compared to highly proficient speakers (Hesling et al., 2012). According to these results, both neuronal somas (grey matter) and axons (white matter) are affected by learning an L2, even if it is done during adulthood. Perhaps it is not an overstatement to suggest that being able to represent, describe, and discuss the world through the framework of two different languages structurally changes the brain in nearly every area even weakly associated with language.

Late L2 learners show enhanced prefrontal cortex activation, which is thought to be related to the higher levels of conscious thought to which they must apply to the language learning process (Isel, Baumgaertner, Thran, Meisel, & Buchel, 2010). This infers that the L1 and L2 are processed using different neural mechanisms (Kovelman, Baker, & Petitto, 2008). Later learners also show less left hemisphere language lateralization (Kovelman, Pettito, & Baker, 2008). Early learners and high proficiency L2 speakers, conversely, have decreased prefrontal cortex activity and appear to process the language more automatically (Isel et al., 2010). The left inferior frontal cortex (LIFC) also shows higher blood oxygen level dependent (BOLD) measures in early bilinguals when they are comprehending their L2, again suggesting the link of early L2 acquisition with increased left hemisphere lateralization (Kovelman, Baker, & Pettito, 2008).

Since late L2 learners show less language lateralization they exhibit increased activity in the right hemisphere when processing the language compared to early learners (Park, Badzakova, & Waldie, 2012). The observance of more overall activity and additional cortical regions involved in L2 processing may indicate that the increased effort required to deal with a non-native language necessitates brain regions that are not

typically involved in L1 processing (Park, Badzakova, & Waldie, 2012). Some studies report that bilinguals who suffer from various types of aphasias exhibit selective language loss such that one language may remain intact while the other is lost (Park, Badzakova, & Waldie, 2012). Clearly, this suggests that L1 and L2 processing may recruit separate and distinct neural networks.

High L2 proficiency level, not age of acquisition, is stated as being the most significant factor associated with whether the L2 is processed similarly to the L1 (Hesling, Dilharreguy, Bordessoules, & Allard, 2012; Park, Badzakova, & Waldie, 2012). Proficient L2 speakers do not translate through their L1 but find meaning directly through the L2 (Guo, Misra, Tam, & Kroll, 2012). Highly proficient L2 speakers use the same network for their second language as for their first, while less skilled L2 learners recruit dissimilar brain regions to process the L2 (Hesling et al., 2012). PET scans indicate that those with high L2 skills have similar activity in the superior temporal gyrus (STG) for both languages, while lower proficiency speakers exhibit significantly less STG involvement when processing the L2 (Hesling et al., 2012).

L2 Acquisition in Children

An ERP study sought to determine whether mere exposure to an L2 during early developmental stages would alter brain activity and organization (Hidaka et al., 2012). Overall brain and frontal lobe activity in both hemispheres were greater for children exposed to an L2 than for a language that they had never heard; additionally, activity appeared similar for both the L1 and L2 (Hidaka et al., 2012). Even the three to five year old children in the study illustrated that minimal exposure to an L2 during the preschool years could noticeably change brain activity (Hidaka et al., 2012).

Two paths are implicated in language processing: the ventral and dorsal pathways (Friederici, Brauer, & Lohmann, 2011). The ventral pathway includes the inferior frontal gyrus (IFG) and superior temporal gyrus (STG), while the dorsal path links the dorsal IFG with the posterior STG (Friederici, Brauer, & Lohmann, 2011). The arcuate fasciculus connects the two dorsal pathway regions. Age of L2 acquisition may affect processing at the level of these pathways since the dorsal pathway is slower to develop and is not mature until at least seven years of age (Friederici, Brauer, & Lohmann, 2011). Because of this, children recruit different brain regions to process language than do adults (Friederici, Brauer, & Lohmann, 2011). While the IFG is thought to be implicated in syntax for adults, the inferior frontal sulcus (IFS) also plays a part by providing working memory stores from which language processing can proceed (Friederici, Brauer, & Lohmann, 2011). Since children may not be able to access the pathway leading to the dorsal IFG until after age seven, their ability to process syntax is different from adults (Friederici, Brauer, & Lohmann, 2011). This causes children to use more contralateral language processing, specifically in the temporal lobe. The corpus callosum, especially the splenium, is functional very early and is likely the means by which children transmit language information back and forth between hemispheres (Friederici, Brauer, & Lohmann, 2011). Children, similar to later L2 learners and low proficiency speakers, show less left hemisphere lateralization for language (Friederici, Brauer, & Lohmann, 2011). These findings may indicate that age of L2 acquisition and age of the learner affect the manner in which the language is processed and stored.

Since a key component for learning any language is being able to discriminate word boundaries and segment individual words from continuous streams of sound, it is

crucial that successful L2 speakers be able to quickly notice individual phonemes and groups of phonemes (McNealy, Mazziotta, & Dapretto, 2011). McNealy et al. (2011) used an artificial language to investigate if neural activity while discriminating segments of speech is correlated with overall L2 proficiency levels in children. fMRI results show that highly proficient children have more signal increases in the superior temporal gyrus of both hemispheres and the transverse temporal gyrus of the left hemisphere when discriminating statistical regularities of speech (McNealy, Mazziotta, & Dapretto, 2011). Furthermore, children with earlier age of acquisition had more signal increases in the superior temporal gyrus (McNealy, Mazziotta, & Dapretto, 2011). These results suggest that proficiency and age of L2 acquisition, as well as individual differences, play a part in neural organization in these areas and, more generally, that earlier L2 learning makes the task of parsing individual phonemes and words much easier (McNealy, Mazziotta, & Dapretto, 2011).

Individual Differences in L2 Learning

Variations in ease and success of L2 learning between individuals may have a neural explanation (Jakoby, Goldstein, & Faust, 2011). While nearly all children can effortlessly learn their L1, some adults are able to quickly become proficient in an L2 while others struggle with learning another language later in life (Jakoby, Goldstein, & Faust, 2011). In order to learn a new language, one must be able to discriminate an entirely different set of phonemes than those found in the native language. After infancy, individuals are no longer able to recognize all phonemes and become attuned only to those found in their L1 (Jakoby, Goldstein, & Faust, 2011). Using mismatch negativity (MMN) to determine the ability to discriminate parts of speech, an ERP study indicates

that those who can learn an L2 with relative ease have faster vowel recognition and shorter MMN latencies in the frontal lobe (Jakoby, Goldstein, & Faust, 2011). Therefore, late L2 learners who can achieve success with the language fairly easily appear to have an enhanced ability to discriminate non-native phonemes (Jakoby, Goldstein, & Faust, 2011).

Especially for late L2 learners, interference from their native language can pose a challenge when attempting to learn an L2. Interference from knowledge of L1 rules must be dampened during L2 learning; proficiency in the L1 may differentially affect this process (Engel de Abreu & Gathercole, 2012). Interestingly, bilinguals often "switch" between languages and this process also appears to have a neural basis (Isel et al., 2010). Functional magnetic resonance imaging (fMRI) indicates that the dorsolateral prefrontal cortex (DLPC) is active during language "switching"; furthermore, late L2 learners have higher levels of DLPC activation when going back and forth between their L1 and L2 (Isel et al., 2010). Early learners "switch" less and instead process directly through whichever language they are currently using (Isel et al., 2010).

Working memory components such as the phonological short-term memory are thought to be crucial during the learning of novel phonemes (Anderson, 2010; Engel de Abreu & Gathercole, 2012). Phonological awareness, or the ability to differentiate between foreign sounds, is also critical for attaining native-like speaking patterns. Central executive processes help with focus and ignoring irrelevant information (Derakshan & Eysench, 2009) such as the dissimilar phonemes and syntactic rules found in the L1 (Engel de Abreu & Gathercole, 2012). Ignoring previously learned L1 characteristics is often critical when learning to apply L2 rules. Overall, executive

processes, phonological awareness, and phonological short-term memory work together to allow learning of L2 sound patterns and rules to occur (Engel de Abreu & Gathercole, 2012). Differences in these aspects of memory could also account for some of the individual variation found between those who can skillfully learn an L2 and those who have more difficulty.

L2 Retention

Another challenge that L2 learners face is the issue of retaining the language, which may have been learned in a classroom or other setting that is not encountered in their day-to-day life. Research indicates that those who have attained high proficiency levels are less susceptible to loss of L2 abilities over time than are low proficiency speakers (Morgan-Short, Steinhauer, Sanz, & Ullman, 2012). The timeframe required to incur L2 loss, if, indeed, loss does occur, varies widely from two months to three to five years (Morgan-Short et al., 2012). Such losses are likely to plateau instead of continuing to decrease (Morgan-Short et al., 2012).

The setting in which the L2 was learned also affects neural processing of the language. Immersion is typically considered the learning mechanism of choice for acquiring native-like phonology and may hold advantages for retention as well (Morgan-Short, Finger, Grey, & Ullman, 2012). However, L2 classes may be especially beneficial at improving grammar due to their explicit instruction of grammatical rules (Morgan-Short et al., 2012). Classroom-based English as a Foreign Language courses do create neurogenesis and alter neuronal structure even in learners who are adolescents and older (Yusa et al., 2011).

One study tested participants both immediately after they learned an artificial language and several months later, during which time they had no exposure to the fake language (Morgan-Short et al., 2012). The artificial language, Brocanto2, was developed to mirror natural language and was complete with a grammar system and all other aspects of real languages. Participants were trained with either implicit (to model immersion) or explicit (to approximate classroom learning) methods. Event related potentials (ERPs) were employed since they have outstanding temporal results (Morgan-Short et al., 2012).

Results indicate that L2 (Brocanto2) proficiency had not decreased several months after learning and that method of training did not affect attrition of language (Morgan-Short et al., 2012). Surprisingly, event-related potential (ERP) patterns showed that neural processing for the artificial L2 was more native-like after months had passed with no exposure to the language! Memory consolidation, aided by things such as sleep, is thought to be responsible for this improvement in the absence of exposure or practice. Though training method did not affect retention, the implicitly trained group had more native-like processing as found by ERP patterns (Morgan-Short et al., 2012). This finding is congruent with other research that suggests implicit strategies like immersion tend to foster a more natural type of L2 learning and increased native language ERP patterns (Morgan-Short et al., 2012). This study also suggests that semantic processing of the L1 and L2 is, indeed, very similar and that the neural representation of the L2 depends more heavily on the speaker's proficiency level than his or her age of acquisition (Morgan-Short et al., 2012)

Specific Areas of L2 Learning

Though general L2 proficiency is usually said to gradually decline with later age of acquisition, some aspects may be especially difficult to learn at a later age. Specifically, syntax is very challenging to master later in life while semantics are typically quite easy to learn regardless of age (Pakulak & Neville, 2010). Late L2 speakers tend to exhibit reduced syntactic processing abilities (Isel et al., 2010). It is certainly challenging, though not impossible, to attain native-like syntactic proficiency as a late L2 learner. An ERP study tested German native speakers who were late English L2 learners to see if age of acquisition would affect neuronal responses to incorrect syntax (Pakulak & Neville, 2010). As expected, late L2 learners did not show the ERP anterior negativity that native speakers did when presented with a syntactic mistake. These results reinforce the assumption that even highly proficient late L2 learners have different neural networks for processing the L2 than for the L1 (Pakulak & Neville, 2010).

Phonology is frequently considered another of the more difficult aspects for a late L2 learner (Bongaerts, 1999). One explanation for this is that facial musculature abilities and neuromotor development are subject to a sensitive period. After this period, the individual may no longer be physically capable of producing native-sounding L2 phonemes (Bongaerts, 1999). Late L2 learners who achieve exceptional pronunciation abilities are quite rare (Bongaerts, 1999).

The idea that semantics is the easiest aspect of an L2 to learn and the facet that late learners are most likely to master is well supported. The angular gyrus (AG) is thought to be the location where semantic judgments are made and this area shows

equal activation in both moderately and highly proficient L2 speakers (Hesling et al., 2012). Conversely, the superior temporal sulcus (STSp) and posterior middle frontal gyrus (F2p) are asserted be involved in the comprehension syntactic information (Hesling et al., 2012). Moderately proficient speakers show drastically less activation of both of these areas when compared to high proficiency participants, further supporting the claim that syntax is very difficult for late L2 learners and may be the last aspect of speech to become native-like (Hesling et al., 2012). An area not often discussed in the context of language, the precuneus, may be necessary for processing of syntactic information (Yusa et al., 2011). Moderate and low proficiency speakers often process only semantic information and completely fail to comprehend syntax (Hesling et al., 2012).

L2 Summary

By exploring numerous stress, anxiety, and social learning theories, some of the ways in which an L2 learner can be either aided or hindered by emotional, physiological, motivational, and social variables have been described. An investigation into the brain structures involved in language processing has been included, as well as a glimpse into how late/early and low/high proficiency learners differ in respect to neural processing of the target language. Finally, individual differences related to L2 learning and aspects of language learning that are more difficult at a later age have been described.

Next, the effect of therapy dogs on the learning of an L2 in the college classroom setting will be explored. Much of the aforementioned research has described why elevated anxiety levels are detrimental to the L2 learning process as a whole. Therapy dogs have been used in a variety of settings to reduce stress, lower anxiety, and

promote physiological and emotional well-being. The mechanisms through which dogs may exert their amazing benefits will subsequently be explored. Of particular interest to this study are the specific effects that the presence of a dog in a learning environment can have on students.

Therapy Dogs in General

Dogs have long been considered man and woman's best friend. They protect, love, and play with their human companions. They encourage laughter and bring cheer to even the most dismal days with their playful antics and cute expressions. It is well documented that therapy dogs improve learning outcomes in a range of populations from preschoolers to college students, service dogs give the disabled a sense of freedom and control, and simply having a pet tends to increase one's longevity and overall level of health (Friesen, 2010; Jalongo, Astorino, & Bomboy, 2004).

Though all types of dogs may provide benefits, the current study explores therapy dogs since it would not be advisable to take an untrained "pet" dog into the college classroom environment. Certified therapy dogs are highly trained and calm and reliable in all situations. They are healthy, well groomed, and never aggressive or overly hyper. Numerous certifying organizations exist, with the largest and most recognizable being Therapy Dogs International (TDI). TDI certification includes, among other requirements, a passing score on the American Kennel Club's Canine Good Citizen (CGC) test. Requirements such as leaving food on the floor and calmness around wheelchairs and walkers are also imposed by TDI. The extensive training and stringent requirements ensure that TDI certified therapy dogs are able to perform their therapy dog duties at an elite level in all settings.

Throughout much of the history of human/dog interaction, the benefits of dogs as companions were acknowledged but not truly understood. More recently, the question has arisen concerning exactly *how* dogs make humans healthier and happier. Could the physical contact with a warm, furry creature account for the lowered sympathetic nervous system activity when interacting with a dog? Perhaps it is a dog's unconditional acceptance and love that allows them to be such a powerful force for good. Or is it possible that a cute face with large eyes and a pink tongue triggers our evolutionary tendency to care for those we perceive as young and helpless?

Dogs likely contribute to better overall health and life satisfaction levels in a variety of interdependent ways. Any one of the aforementioned mechanisms through which dogs may help people, though significant, is probably not sufficient to explain the entirety of their effect on humans. Instead, borrowing from Gestalt psychology's opinion that the whole is more than the sum of its parts, research suggests that dogs are a special species capable of causing significant and unique effects on the humans with whom they interact for a variety of physiological, social, and evolutionary reasons.

Benefits of Interactions with Dogs

The amazing connection that many people feel with dogs has recently been found to be more beneficial than even the most ardent pet parent may have previously assumed. Benefits of interacting with dogs include diminished stress, reduced blood pressure and heart rate, long-term improved cardiovascular health, and even lower levels of depression (Jalongo, Astorino, & Bomboy, 2004). Children have shown less psychological and behavioral distress during a stress-provoking condition (such as visiting a doctor's office) if a dog is present (Friesen, 2010).

Numerous areas of pet therapy are currently implemented in many types of settings and novel ways of using therapy dogs to help humans are still being discovered (Jalongo, Astorino, & Bomboy, 2004). Dogs interact with nursing home and assisted living facility residents, dementia and hospital patients, sick children, and others with emotional problems. An increasing number of universities are promoting therapy dog visits during freshman orientation and final examinations to ease the anxiety among new or highly stressed students.

The recent increase in programs such as Reading Education Assistance Dogs (READ), founded in Salt Lake City in 1999, illustrates the growing interest in using dogs to enhance educational outcomes. Advantages of therapy dogs interacting with school age children are almost too numerous to list, but include: better emotional stability and more positive attitudes about attending school in children with emotional disorders, longer attention spans, higher willingness to cooperate, greater self-esteem, more relaxed affect, increased levels of participation in both class and social situations (Friesen, 2010). Furthermore, a dog's presence encourages calm and focused classroom interactions and reduces overall tension (Friesen, 2010). While dogs have long been considered family members by many (Walsh, 2009), the newer developments in using dogs with school children of all ages are very exciting and show that the benefits of therapy dogs extend beyond health-related outcomes and into the realm of education and learning environments.

Physical Stimulation and Contact Comfort Provided by Dogs

Humans, at a very basic level, desire comforting touch and physical contact. Dogs may have initially been domesticated to fill this need and to provide a living creature to touch and hug (Meyer & Pakur, 1999). During stressful times this contact comfort may be even more crucial for well-being. In fact, pet owners are more likely to turn to their dogs for physical comfort during periods of distress than to their parents, children, or friends (Kurdek, 2009). Dogs rate second only to partners as means of comfort and touch when problems arise (Kurdek, 2009). It is no surprise, therefore, that early research indicated that blood pressure was significantly lowered while stroking and petting a dog compared to sitting alone or reading a book (Jenkins, 1986). Touch is often implicated as a "major component" of the stress relieving effect of dogs and heart rate decreases more significantly when touching a dog than when only seeing or talking to him or her (Vormbrock & Grossberg, 1988). Dogs offer contact comfort, tactile stimulation, and unconditional acceptance, so it is often difficult to ascertain the effects of touch independent of the love the dog provides; however, physical contact with the dog is strongly supported as being a significant stress reducer.

Body temperature, respiratory rate, pain levels, feelings of depression, and epinephrine levels all decrease following as little as three minutes of stroking a dog (Beetz, Uvnas-Moberg, Julius, & Kotrschal, 2012; Halm, 2008). This suggests that touching a dog has the ability to decrease sympathetic nervous system and hypothalamic-pituitary-adrenal (HPA) axis activation. "Fight or flight" mechanisms such as sympathetic nervous system and HPA axis activation during stress cause increases in epinephrine and glucocorticoids (Nelson, 2011) and it appears that physical contact

with a dog may eliminate or substantially lessen stress so that these mechanisms are not engaged.

Tactile stimulation and contact comfort provided by a living being such as a dog also produces many positive effects on human health and learning. Stroking a dog while performing a cognitive task may increase the ability to learn (Beetz, Uvnas-Moberg, Julius, & Kotrshcal, 2012), presumably because stress is reduced. Touching a dog significantly increases immunoglobulin A (IgA) levels when compared to petting a stuffed animal or sitting still for eighteen minutes (Charnetski, Riggers, & Brennan, 2004). IgA is a protective antibody that helps the body defend against invading pathogens and is an indicator of an efficient immune system (Woof & Kerr, 2004). Increases in IgA due to physical contact with a dog could account for one reason why dog owners tend to have better overall health and longevity than non-dog owners (Halm, 2008). Cardiovascular reactivity is decreased and one-year survival rate of hospitalized cancer patients is significantly increased in pet owners who frequently touch their pets compared to those who do not own dogs or do not physically interact with them on a routine basis (Halm, 2008).

Evolutionary Tendency to Care for Young and Preference for "Baby" Faces

Humans have an innate preference for faces of babies, regardless of the species (Proverbio, De Gabriele, Manfredi, & Adorni, 2011). In particular, humans are drawn to certain facial characteristics such as large eyes and round cheeks (Maestripieri, 2004), which are also found in many breeds of dogs. The need to bond and care for other living beings is strong (Vining, 2003) and pet dogs provide a perfect outlet for this desire. Early domesticated dogs may have even provided training in caring for a young and

helpless creature that later enhanced parenting skills (Meyer & Pakur, 1999). Oxytocin enhances social interaction, maternal behavior, and human health in general (Nelson, 2011) and being with a dog for only three minutes significantly increases oxytocin, prolactin, and dopamine levels (Beetz, Uvnas-Moberg, Julius, & Kotrschal, 2012). Through this mechanism, dogs may trigger a maternal instinct and a desire to care for creatures with infant-like facial characteristics and warm, cuddly bodies.

Unconditional Acceptance Provided by Dogs

Dogs accept humans without consideration of characteristics such as wealth, beauty, or achievement. As long as love is provided to them, dogs faithfully return their owners' devotion with no qualifications. This unconditional acceptance and complete lack of judgment is a powerful force and may explain the inseparable bond many pet owners have with their dogs. Simply knowing that there is a living creature who will accept an individual no matter what boosts self-esteem and could be a factor in why dogs often reduce stress and feelings of depression better than even close human friends (Polheber & Matchock, 2013).

Many studies support the fact that dogs improve cognitive performance and decrease stress better than other humans, stuffed animals, or movies (Charnetski, Riggers, & Brennan, 2004; Halm, 2008; Jalongo, Astorino, & Bomboy, 2004). Though a stuffed animal is also non-judgmental, it is not as effective as a dog at decreasing stress. The difference probably lies in the fact that humans yearn for connection with another living creature who will accept them unconditionally (Beetz, Julius, Turner, & Kotrschal, 2012; Vining, 2003). These findings illustrate that dogs may have incredible potential to improve learning outcomes in L2 classrooms since they provide both stress

relief and non-judgmental acceptance. Due to a dog's unconditional acceptance, students who were previously unwilling to communicate may be more likely to engage in speaking the L2 if practice sessions with a therapy dog are provided.

The unconditional acceptance that dogs provide may be especially important in times of stress. During a crisis, pet owners rely heavily on their dogs to listen patiently to their troubles (Kurdek, 2009). This provides an outlet for emotions that humans may otherwise repress due to the fear of judgment from other humans. The presence of a dog attenuates the hormonal and physiological markers of stress so that cortisol levels and heart rate are lower when a dog is present during a laboratory-induced stressful situation such as the Trier Social Stress Test than when a human is designated as the supportive figure (Polheber & Matchock, 2013). Even a good friend may not be as effective as a dog at reducing cortisol and overall stress levels (Polheber & Matchock, 2013).

The historic bond between children and dogs may also have its basis in the unconditional love that the animal provides. In fact, children with insecure or avoidant attachment styles often exhibit stronger connections with dogs than with people and, therefore, dogs may be a better source of emotional support for many (Beetz, Julius, Turner, & Kotrshcal, 2012). Such children show reduced stress and lower cortisol levels during and after a child-adapted Trier Social Stress Test when a dog was the supportive figure (Beetz, Julius, Turner, & Kotrshcal, 2012).

Therapy Dog Summary

Dogs provide health, learning, and emotional benefits to humans. They reduce hormonal correlates of stress in a variety of ways, trigger innate desires to care for adorable creatures, and accept their friends without question. It is likely a combination of these factors that make dogs such powerful tools for good in a therapeutic environment. In the L2 classroom, dogs may be in a unique position to enhance learning by both reducing anxiety and providing a non-judgmental figure to which students can practice. Much like elementary schools that use therapy dogs to improve reading abilities in children, college L2 classes could allow students to read aloud to therapy dogs, thereby giving students a way to practice without feeling anxiety about being evaluated. It is also possible that the mere presence of a dog could reduce the overall anxiety level in the classroom so that students are more relaxed and willing to communicate when going about typical L2 practice activities.

The field of therapy dog research has come a long way in a relatively short period of time and, as studies progress, it is likely that even more unique and novel ways for dogs to be used to enhance the quality of human life will be found. It is also of the utmost importance that further research always remembers that therapy dogs, unlike many other animals used in research, are ultimately pets and cherished family members. As such, care should be taken that they are not exposed to undue stress and that the experience is a positive one for both dogs and humans.

Section 2

Purpose and Hypothesis

The current study seeks to make a connection between two previously well-documented findings. First, research indicates that increased stress leads to reduce learning and worsened long-term retention of material (Yehuda, Rabinovitz, Carasso, & Mostofsky, 2000). Specifically, high levels of anxiety hinder nearly all aspects of L2 learning, including production and retention of material (Macintyre & Gardner, 1991). Secondly, therapy dogs reduce stress, anxiety, and tension in the classroom setting (Friesen, 2010). If therapy dogs reduce stress and lower levels of stress and anxiety are correlated with improved academic learning outcomes, it is logical to surmise that the addition of therapy dogs to L2 classrooms should facilitate learning. Integrating therapy dogs into college L2 classes may prove to be a feasible method of enhancing L2 learner outcomes.

Specifically, this study predicts that therapy dogs will, as previous research suggests, lower stress and anxiety in college Spanish L2 learners. Furthermore, it is hypothesized that this reduced anxiety will lead to enhanced Spanish phonological learning and performance.

Section 3

Method

Participants

Participants (n=12) consisted of University of Tennessee-Knoxville students who were enrolled in Spanish 123, Spanish 150, or Psychology 436. Age range of participants was 19 to 22 years old (M= 20.9 years). The sample was primarily female (91.7%), with only one male participant.

The average number of years that participants had spoken Spanish at any level was 4.2. The majority of participants (83.3%) indicated that they had no consistent interaction with native Spanish speakers. Only one participant had ever lived or studied abroad in a Spanish speaking country. All participants had taken or were currently enrolled in at least one college-level Spanish class. Spanish courses taken ranged from Spanish 123 to Spanish 331. Five participants had taken 100 level Spanish classes, five had taken 200 level courses, and two had taken a 300 level class. No participants considered themselves native-like in Spanish fluency and all indicated that there were phonemes taught during the study that they previously did not know. On a 5 point Likert scale (5=very anxious), the average anxiety level regarding their current or most recent Spanish class was 3.2.

Participants were comfortable around all sizes and breeds of dogs and, overall, indicated that they were very fond of dogs. Participants averaged a 4.6 on a 5 point Likert scale (5=very fond) measuring their fondness for dogs. Nine of the twelve participants (75%) currently owned a dog while three (25%) did not have a dog at the time of the study.

A convenience sampling method was used to recruit students from University of Tennessee Spanish and psychology classes. Informed consent forms were signed by each instructor who wished to allow students to be recruited from his or her class. No study results were disclosed to either Spanish or psychology instructors from whose classes students had been recruited. Participation for both instructors and students was totally voluntary and informed consent was also secured from student participants prior to the beginning of the study. Extra credit in the form of one “100” on a homework grade was given to each student who completed all three conditions of the study. All participants who initially agreed to participate finished all three conditions.

Dr. Dolly Young, Professor of Spanish at the University of Tennessee-Knoxville, Alfonso Hernanz, a Spanish graduate student at the University of Tennessee-Knoxville, and Dr. Dan Hickman, Assistant Professor of Spanish at Maryville College, served as Spanish experts for the study. Dr. Young created the scripts that were read by participants to assess phonological proficiency and wrote the Spanish phoneme lesson that participants were taught. She also served as the first data evaluator. Mr. Hernanz, who is also a native Spanish (Spain) speaker, taught all phonology lessons and served as the second data evaluator. Dr. Hickman assisted with initial creation of the scripts and advised about matching phonemes for level of difficulty in both conditions.

Materials

An informed consent document which provided an overview of the study was given to and signed by instructors who allowed their classes to participate and to all students who attended the study. A baseline questionnaire was included for the purpose of assessing Spanish proficiency level, fondness of dogs, and other pertinent demographic information.

The script which participants read in pairs of two consisted of approximately 15 sentences per participant per condition. Each script was designed to contain three target phonemes which were taught prior to the recording. Though some phonemes were familiar to some participants, there was room for learning to occur as no participant showed complete familiarity and proficiency with all six phonemes. This script was designed for the current study by Dr. Young. Prior to the recording, Mr. Hernanz taught each target phoneme to the group of participants.

The Foreign Language Classroom Anxiety Scale (FLCAS; Horwitz, Horwitz, & Cope, 1986) was included as the primary measure of specific L2 learning anxiety. The FLCAS is a 33-item self-report measure which uses a five point Likert scale to assess anxiety related to learning a second language in a classroom setting. Test anxiety, fear of negative evaluation, and communication hesitancy are evaluated by the FLCAS. Possible scores range from 33 to 165, with higher scores indicating greater L2 anxiety. Nine items (2, 5, 8, 11, 14, 18, 22, 28, and 32) are reversed when scoring. Excellent reliability scores (α=.93) have been found for the FLCAS (von Worde, 2003). See appendix for all measures.

A standard 10 point “anxiety thermometer” was used to get a more general indication of L2 anxiety. Higher scores once again indicated more anxiety. A score of 10 is described as “full panic”, 7-8 as “high anxiety”, 5 as “anxious”, 3-4 as “minor anxiety”, and 1-2 as “calm”.

As a broader measure of current feelings of life stressors, the Perceived Stress Scale (PSS-14; Cohen, Kamarck, & Mermelstein, 1983) was used. The PSS-14 asks participants to report their feelings about general stress levels and the degree to which they felt they had control over those stressors within the past month. It is a 14 item measure that uses a 5 point scale with answers ranging from “never” (0) to “very often” (4). Higher scores indicate more stress. Seven items (4, 5, 6, 7, 9, 10, and 13) are worded positively and are reversed when scoring. Reliability for the PSS-14 is reported as ranging from acceptable to high depending on time interval between administrations (α= .75-86) (Lee, 2012).

The Self Esteem Scale (SES; Rosenberg, 1965) was included to assess participants’ general feelings of self-esteem and to investigate a possible connection between self-esteem and interaction with therapy dogs. The SES is a 10-item measure with a total possible score of 0 to 30. Scores for each question range from “strongly disagree” (0) to “strongly agree” (3). Higher scores suggest greater self-esteem and scores below 15 may be indicative of low self-esteem. Five items (3, 5, 8, 9, and 10) are negatively worded and are scored in reverse valence. High reliability scores are reported for the SES, with Cronbach’s alpha ranging from .84 to .90 (Bagley, Bolitho, & Bertrand, 1997; Tinakon & Nahathai, 2012).

The New General Self-Efficacy Scale (NGSES; Chen, Gully, & Eden, 2001) was included to ascertain participants' feelings of self-efficacy. Though not specific to linguistic self-efficacy, the scale provided insight about how competent participants viewed themselves to be regarding tasks and challenges in a more specific context than that of self-esteem. The NGSES is an eight item measure with answers ranging from "disagree strongly" (1) to "strongly agree" (5). All items are positively worded and higher scores indicate greater levels of self-efficacy. Strong reliability scores have been found for the NGSES with Cronbach's alpha ranging from .85 to .90 (Chen, Gully, & Eden, 2001).

Phonological data evaluators used a 4 point Likert scale designed specifically for rating L2 speaker's phonological proficiency (Snow & Hoefnagal-Hohle, 1977) to rate each target phoneme for proficiency. Higher scores indicate more native-like pronunciation. Scores ranged from "uninterpretable as target sound" (1) to "native-like pronunciation" (4).

Procedure

Following IRB approval of the proposed study, University of Tennessee-Knoxville Spanish and psychology instructors who agreed to allow students to be recruited from their courses made a short announcement about the study and the potential for extra credit in the form of one "100" on a homework grade upon completion of all three study conditions. All twelve participants who attended the first condition completed all sessions of the study and earned the extra credit.

A within subjects design was used to compare participants across the three study conditions. When participants arrived at the first condition, they read and signed an

informed consent document (see appendix). They were then assigned a participant number and asked to remember their number for subsequent conditions as no identifying information was gathered on any of the study documents such as questionnaire packets or audio recordings. The study took place in a quiet library room where chairs were arranged in a semi-circle. During the therapy dog condition, the dog was therefore able to have equal contact with all study participants. Each study session occurred between the hours of 8 and 11 A.M. in order to minimize the effect of naturally declining cortisol levels during the afternoon.

The baseline condition occurred first and consisted only of questionnaires and saliva sampling. No dog was present and no Spanish phonemes were taught in order to ascertain participants' average, day-to-day stress and anxiety levels. A packet containing the following questionnaires stapled together in the same order was administered during all three conditions: the Foreign Language Classroom Anxiety Scale (FLCAS), the anxiety thermometer, the Perceived Stress Scale-14 (PSS-14), the Self Esteem Scale (SES), and the New General Self Efficacy Scale (NGSES). During the baseline condition only, the "baseline" questionnaire was added as the first document. After all participants completed all surveys in the packet, saliva samples were collected and participants were free to leave. Condition one took approximately 20 minutes.

During the second ("no dog") condition, the session began with a UTK Spanish graduate student teaching a 10-15 minute Spanish phoneme lesson. Three phonemes of approximately equal difficulty were taught during the second and third conditions, respectively. For this "high stress" condition where no therapy dog was present the

following phonemes were taught: /b/, /s/, and /k/. The phonology lesson consisted of an explanation of pertinent rules, modeling of proper pronunciation by the native Spanish speaking graduate student, and opportunities for all participants to practice repeated the phonemes as a group. Upon completion of the lesson, the Spanish graduate student left the room. Participants were then asked to stand and come to the front of the room in pairs of two. The experimenter stood in between the pair of participants with an audio recorder and taped as they read the script (see appendix) to each other. Each participant would say their participant number, followed by the sentence indicated by that number. In instances where an uneven number of participants were present, the experimenter or study assistant would read the other part so that all participants were actively reading the conversation with another person. Next, participants completed the same packet of questionnaires again. Finally, saliva samples were collected and participants were told they were finished for the day. Conditions two and three took approximately one hour.

The third (“therapy dog”) condition was identical to the second condition except for the presence of a Therapy Dog International (TDI) certified therapy dog. Prior to the beginning of the study, participants were given approximately ten minutes to pet and interact with the therapy dog. The three Spanish phonemes taught by the same graduate student during this 10-15 minute Spanish lesson were /h/, /g/, and /x/. Participants were once again called to stand at the front of the room in pairs of two and read a second script which emphasized the target phonemes while the experimenter audio recorded the conversation. Questionnaire packets were then completed and saliva samples rendered.

The therapy dog was present and accessible during all parts of condition three. During the Spanish lesson, she sat near participants who were seated in a semi-circle. No desks were present and chairs were arranged so that participants had no barriers to touching the dog. When participants stood in pairs of two to read the script, the therapy dog and her handler stood between them so that they could touch the dog while they read if they so desired. The therapy dog walked around the room and mingled with individuals as they completed the questionnaires as well. Participants were told that they were allowed, and indeed encouraged, to stop and pet her at any point during this session. After completion of this final study condition, several participants chose to remain several extra minutes to talk to the therapy dog and ask questions about her.

The therapy dog present during the “low stress” condition was a four-year old Therapy Dog International and American Kennel Club Advanced Canine Good Citizen certified Bernese Mountain Dog named Wonder (Bear-Acres The Wonder of Glory, CGC, CGCA, TDI). Wonder has extensive therapy dog experience and has participated in a previous research study in 2013. She has attended dozens of college classes with her owner/ handler and consistently demonstrates not only a gentle and loving temperament but also a unique ability to attend to each person present in the room without being asked to go up to each individual. Wonder is a medium-large (75 pound) dog with a striking, silky tri-color coat and the typical “soft” Bernese Mountain Dog expression which readily draws many people to her.

Saliva samples were collected at the end of each condition for the purpose of assessing salivary cortisol levels. Cortisol is an important bio-marker of stress and is present in both saliva and blood. During saliva sampling, participants were asked to sit

quietly and allow saliva to pool in their mouths for one minute. They were then instructed to expectorate into a sanitized 50 ml collection tube. This process was repeated for three minutes (Navazesh, 1993). All samples were kept refrigerated and centrifuged on the day of collection. They were stored in microtubes as -70° C until analysis. Saliva samples were analyzed for cortisol levels using a cortisol assay kit (Salimetric, State College, PA). This salivary cortisol analysis yielded physiological stress data in addition to the self-report information gathered about stress levels by the FLCAS, PSS-14, and anxiety thermometer.

Quantitative data in the form of cortisol levels, questionnaires, and phonological ratings were employed in this study. Audio recordings of the scripts were coded using only participant numbers and were evaluated by a Spanish professor and a Spanish graduate student who is also a native Spanish speaker. Only the six taught “target” phonemes were evaluated for proficiency using the five point Likert scale previously described. An inter-rater reliability test in the form of a correlation coefficient was performed to ensure that both phonological evaluators had acceptable levels of agreement when scoring.

Section 4

Results

Results were analyzed to test the hypothesis that the presence of the therapy dog would be associated with lower FLCAS, anxiety thermometer, PSS-14, and cortisol scores. Similarly, it was predicted that higher self-esteem, self-efficacy, and phonology scores would occur in the therapy dog condition compared to the no therapy dog condition. To determine if a significant difference between conditions existed for any given measure, a repeated measures analysis of variance (ANOVA) was conducted. Significant results were subsequently subjected to paired sample *t*-tests to determine where the difference occurred. Correlational analyses to assess relationships between measures dependent on condition were also performed. The alpha level was set at .05 for all statistical testing.

As predicted, a repeated measures ANOVA revealed that the difference between conditions on foreign language anxiety levels as assessed by the FLCAS was significant, $F(2,10) = 6.51$, $p = .02$. Post hoc analyses indicated that mean FLCAS scores were significantly lower in the therapy dog condition (M=94.75, SD=25.80) than in either the baseline condition (M= 101.33, SD= 24.43), $t(1, 11) = 2.20$, $p = .05$, or the no dog condition (M=107.92, SD= 27.06), $t(1, 11) = 3.70$, $p = .003$. Figure 1 illustrates mean FLCAS scores by condition and Table 1 lists individual participant FLCAS scores.

In the baseline condition, FLCAS scores were significantly positively correlated with anxiety thermometer scores ($r = .76$, $p = .004$) such that high FLCAS scores were associated with high anxiety thermometer scores. Baseline FLCAS scores were significantly negatively associated with NGSES scores ($r = -.66$, $p = .02$), indicating that

there was a correlation between high FLCAS scores and low self-efficacy scores. The no dog condition also showed a significant, positive relationship between FLCAS scores and anxiety thermometer scores (r = .83, p = .001). In no dog condition, FLCAS scores were also negatively correlated with SES scores (r = -.58, p = .05), illustrating that high FLCAS scores were associated with low levels of self-esteem. Once again, in the no dog condition, there was a significant, negative correlation between FLCAS scores and NGSES scores (r = -.65, p = .02). The no dog condition also revealed a negatively significant association between FLCAS scores and phonology scores *(*r = -.66, p = .02), indicating that high foreign language anxiety was correlated with poorer phonological proficiency in this condition. As with the previous two conditions, there was a significant, positive correlation between FLCAS scores and anxiety thermometer scores in the therapy dog condition (r = .89, p = .000), suggesting that the FLCAS and anxiety thermometer results are highly correlated across all conditions. No other correlations were significant for the FLCAS in the therapy dog condition.

Anxiety thermometer scores between conditions were also significantly different, $F(2, 10) = 4.5$, p = .04. As hypothesized, post hoc analyses revealed that general anxiety about L2 learning as assessed by the anxiety thermometer was significantly lower in the therapy dog condition (M = 3.83, SD = 2.33) than in either the baseline condition (M = 5.00, SD = 2.44), $t(1, 11) = 2.62$, p = .02, or the no dog condition (M = 5.13, SD = 2.24), $t(1,11) = 3.08$, p = .01. Table 2 lists anxiety thermometer scores by participant and Figure 2 depicts mean anxiety thermometer scores.

During the no dog condition only, anxiety thermometer scores were significantly negatively correlated with NGSES scores (r = -.59, p = .05) and phonology scores (r = -

.66, p = .02). This suggests that when no dog was present during phonological learning, higher anxiety levels were associated with lower self-efficacy and reduced phonological performance.

General levels of perceived stress, as measured by the PSS-14, were identical in both the baseline (M = 25.50, SD = 4.91) and therapy dog conditions (M = 25.50, SD = 6.26). As expected, PSS-14 scores were highest in the no dog condition (M = 28.33, SD = 6.21). Figure 3 shows mean PSS-14 scores by condition. A repeated measures ANOVA revealed that this difference between groups was significant, $F(2, 10) = 4.24$, p = .05. PSS-14 scores were significantly lower in the therapy dog condition than in the no dog condition, $t(1, 11) = 2.42$, p = .03. Baseline PSS-14 scores were also significantly lower than no dog condition scores, $t(1, 11) = .02$, p = .02.

Perceived stress scores were significantly, negatively correlated with both self-esteem and self-efficacy in all three conditions. This association suggests that self-esteem and self-efficacy decreased as perceived stress increased regardless of condition. In the baseline condition, PSS-14 scores were significantly negatively correlated with SES scores (r = -.82, p = .001) and NGSES scores (r = -.78, p = .003). The same significant, negative correlation was also present between PSS-14 scores and SES scores (r = -.78, p = .003) and NGSES scores (r = -.69, p = .01) in the no dog condition. Finally, PSS-14 scores were negatively correlated with SES scores (r = -.90, p = .000) and NGSES scores (r = -.92, p = .000) in the therapy dog condition.

As anticipated, self-esteem scores as assessed by the SES were slightly higher in the therapy dog condition (M = 21.58, SD = 6.46) than in the baseline (M = 20.83, SD = 4.43) or no dog condition (M = 20.92, SD = 6.96). However, a repeated measures

ANOVA revealed that this difference between conditions was not significant for the SES, $F(2, 10) = .68$, $p = .53$. A significant, positive correlation was present between SES scores and NGSES scores in all three conditions (baseline $r = .87$, $p = .000$; no dog $r = .83$, $p = .001$; therapy dog $r = .95$, $p = .000$). This relationship reveals that self-efficacy increases as self-esteem increases regardless of condition. See Figure 4 for mean SES scores.

Self-efficacy scores (NGSES) were higher in the therapy dog condition ($M = 30.92$, $SD = 6.46$) than in the baseline ($M = 30.17$, $SD = 5.65$) or no dog condition ($M = 29.58$, $SD = 6.56$), though the difference was not significant, $F(2, 10) = .99$, $p = .41$. Figure 5 illustrates NGSES mean scores.

Cortisol levels were highest in the no dog condition ($M = .72$ µg/dL, $SD = .92$), followed by the therapy dog condition ($M = .59$ µg/dL, $SD = 1.06$) and then the baseline condition ($M = .49$ µg/dL , $SD = .46$). This difference was not significant, $F(2, 10) = .76$, $p = .49$. Figure 6 shows mean cortisol levels for each condition. Cortisol levels were also not significantly correlated with any other measure during any condition.

Phonology Likert scores consisted of mean results from two evaluators. Inter-rater reliability was very strong for both the therapy dog ($r = .84$) and no dog ($r = .78$) conditions. Phonological proficiency scores for the therapy dog ($M = 3.47$, $SD = .18$) and no dog ($M = 3.60$, $SD = .18$) conditions were not significantly different, $t(1,11) = 1.83$, $p = .095$.

Pearson's correlation coefficient indicating the strength of association between Condition 2 phonemes (/b/, /s/, /k/) and Condition 3 phonemes (/h/g/x/) was low,

r = -.169. Condition 2 contained 42 target phonemes compared to the 25 target phonemes present in Condition 3. Based on the 4 point Likert scale employed to assess phonological proficiency, the mean individual phoneme scores were as follows for Condition 2: /b/=2.8, /s/=3.7, and /k/=3.6. Condition 3 mean individual phoneme scores were as follows: /h/=3.1, /g/=3.9, /x/=4.

Section 5

Discussion

The hypothesis that the presence of a therapy dog during Spanish L2 learning and performance would reduce stress and anxiety levels was strongly supported by all self-report measures. FLCAS scores, which serve as an assessment of L2 specific anxiety, were significantly lower in the therapy dog condition than in either the baseline or the no dog condition. General anxiety as measured by the anxiety thermometer was also significantly reduced when the therapy dog was present. Significant decreases in perceived stress (PSS-14) were also reported during the therapy dog condition compared to the no dog condition. For both the FLCAS and anxiety thermometer, the addition of the dog during Spanish L2 learning and performance resulted not only in lower scores than when participants were learning and speaking with no dog present, but also in lower scores than when participants were under no study-induced stressors during the baseline condition.

The significant reduction in self-reported stress and anxiety on multiple measures when the therapy dog was present is congruent with previous research. Unconditionally accepting and emotionally soothing, dogs often lower stress levels in both children and adults (Friesen, 2010). Previous studies, however, have also found significant decreases in physiological measures of stress such as heart rate and blood pressure when therapy dogs are present (Jalongo et al., 2004). Since the current study's physiological stress measurement, cortisol, was trending in the predicted direction, it is very possible that the small sample size (n=12) precluded cortisol results from being significantly lower in the therapy dog condition.

Self-esteem and self-efficacy scores were also the highest during the therapy dog condition; however, significance was not reached for these measures. As anticipated, cortisol levels were highest during the no dog condition. Though baseline cortisol levels were the lowest, participants did show a reduction (non-significant) in cortisol when the dog was present during Spanish learning and performing compared to when they were completing the same tasks with no dog present. It is possible that the study's small sample size prevented significance from being achieved for the SES, NGSES, and cortisol measures.

Phonological proficiency scores were quite similar in both the therapy dog and no dog conditions, with mean scores slightly higher during the no dog condition. No statistically significant phonological score differences were present. Though attempts were made to ensure that the three phonemes taught during the therapy dog and no dog conditions were of equal difficulty, it is likely that the phonemes taught during the therapy dog were actually more difficult as many students seemed to struggle more with those phonemes and appeared less familiar with them than the phonemes taught during the no dog condition.

A correlation coefficient performed on phonemes taught in Condition 2 versus Condition 3 revealed a low degree of association. This low correlation coefficient may imply that the target phonemes taught in a particular condition were more difficult. Alternatively, the overall frequency of target phonemes was higher in Condition 2 (42) than in Condition 3 (25). Though this frequency difference reflects the pattern of use of the phonemes found in native speech samples, it could serve as another explanation for the low correlation coefficient between mean target phoneme scores for the therapy dog

versus no dog conditions. Challenges in creating phonological learning assessments that are of identical difficulty may be hard to overcome. Using a more complex design that tested participants on all phonemes both with and without a therapy dog present may help to assuage this possible discrepancy in phoneme difficulty.

An interesting but unexpected finding was that, only during the no dog condition, anxiety thermometer scores were significantly negatively correlated with both self-efficacy and phonological proficiency scores. Since this association did not occur in the therapy dog condition, it may be possible that the therapy dog mediated the deleterious effect that anxiety otherwise had on self-efficacy and phonological learning. Through a mechanism not understood at present, the addition of a therapy dog may make anxiety that is present somehow less detrimental to the phonological learning process and less likely to reduce feelings of self-efficacy.

A previous study reports that blood pressure reduction was found only *after* participants had interacted with a therapy dog and suggests that autonomic physiological processes which are affected by touching and talking to a dog are delayed and may not be noticeable until some time after the interaction has taken place (Somervill et al., 2008). Though the current study attempted to allow ample time for therapy dog-participant interaction and though saliva samples were collected at the end of each session, time constraints may still have prevented accurate data from being collected. Each session was completed in approximately 45 minutes; therefore, it is possible that cortisol levels did not have time to maximally decrease in response to the therapy dog.

Previous research suggests that long-term interaction with a dog, such as from dog ownership or from more extended visits with a therapy dog, is likely to be more beneficial than short interactions (Somervill et al., 2008). While short visits with therapy dogs are associated with moderate improvements in physiological measures and stress reduction, only more extended time spent with a dog yields effects such as cardiovascular benefits (Somervill et al., 2008). In the current study, though the therapy dog was constantly present and spent equal time with each participant, time limitations prevented any individual student from spending more than a couple of minutes in one-on-one interaction with the dog. Ample time spent individually with the therapy dog may be required to produce significantly reduced cortisol levels. Considering both the small sample size and lack of sufficient time spent with the therapy dog, it is still promising that the dog did reduce cortisol levels compared to the no dog condition, even if statistical significance was not attained in the current study for this measure.

Limitations include a small sample size, less than ideal generalizability since all participants were in their early 20s and all were college undergraduates, and a participant gender distribution that was heavily female. Varying levels of Spanish proficiency were also present among participants; however, since no participants were rated as highly proficient at the target phonemes, room for pronunciation improvement appeared to be present for all participants. Participants also indicated verbally that at least some of the phonological material taught was new to them and/or was material that they did not feel they had mastered.

The practical importance of finding methods to reduce L2 anxiety and increase Spanish L2 learning outcomes is highlighted by this study. Though it is ideal to learn an

L2 through immersion in a natural setting (Morgan-Short, Finger, Grey, & Ullman, 2012), that learning method is not possible for most students. However, it is conceivable that therapy dogs could be added to L2 classes. Just as therapy dogs have been found to be very effective at increasing children's reading skills (Friesen, 2010), they could also help college students cope with the anxiety associated with L2 classes.

Future research should explore the physiological and behavioral changes that occur when longer duration therapy dog interactions occur in the classroom setting. Studies examining how dogs may affect other areas of L2 learning, such as semantics and pragmatics, are also recommended. Since it also appears that self-esteem and self-efficacy may be improved by the presence of a dog, follow-up studies with larger sample sizes examining the effects of therapy dogs on these measures would be beneficial. It would also be advisable to implement a more complex design that includes counter-balancing the order of conditions so that all participants would be tested on every phoneme both with and without a therapy dog present. This way, any order effects could be determined. Increasing participant numbers would, once again, be necessary to implement this design modification.

Finally, it would be interesting and useful to know if all breeds and sizes of dogs provide similar stress-reduction benefits or if, perhaps, certain facial styles (such as larger eyes and "soft" expressions compared to more protective, intimidating expressions) and coat types (such as a long, silky coat that provides a soothing sensory experience when stroked compared to a short, harsh coat) make some breeds more effective at reducing stress and anxiety than others.

References

Abrahamsson, N., & Hyltenstam, K. (2009). Age of L2 acquisition and degree of native-likeness: Listener perception versus linguistic scrutiny. *Language Learning, 59*(2), 249-306.

Anderson, J.R. (2010). *Cognitive Psychology and Its Implications. (7th Ed.).* New York: Worth.

Bailey, P., Onwuegbuzie, A.J., & Daley, C.E. (2000). Correlates of anxiety at three stages of the foreign language learning process. *Journal of Language and Social Psychology, 19*(4), 474-490.

Bagley, C., Bolitho, F., & Bertrand, L. (1997). Norms and construct validity of the Rosenberg Self-Esteem Scale in Canadian high school populations: Implications for counseling. *Canadian Journal of Counseling, 31*(1), 82-92.

Barlow, D.H. (2000). Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. *American Psychologist, 55*(11), 1247-1263.

Barlow, D.H. (1988). *Anxiety and its disorders: The nature and treatment of anxiety and panic.* New York: Guilford.

Beetz, A., Julius, H., Turner, D., & Kotrshcal, K. (2012). Effects of social support by a dog on stress modulation in male children with insecure attachment. *Frontiers in Psychology, 3,* 1-9.

Beetz, A., Uvnas-Moberg, K., Julius, H., & Kotrschal, K. (2012). Psychosocial and psychophysiological effects of human-animal interactions: The possible role of oxytocin. *Frontiers in Psychology, 3,* 1-15.

Bogdan, R., Perlis, R.H., Fagerness, J., & Pizzagalli, D.A. (2010). The impact of the mineralocorticoid receptor ISO/VAL genotype (rs5522) and stress on reward learning. *Genes, Brain, and Behavior, 9,* 656-667.

Bongaerts, T. (1999). Ultimate attainment in L2 pronunciation: The case of very advanced late L2 learners. In D. Birdsong (Ed.)., *Second Language Acquisition and the Critical Period Hypothesis* (pp. 133-155). Mahwah, NJ: Lawrence Erlbaum Associates.

Brantmeier, C. (2005). Anxiety about L2 reading or L2 reading tasks? A study with advanced language learners. *Reading Matrix, 5*(2), 67-85.

Carrio-Pastor, M.L., & Mestre Mestre, E.M. (2014). Motivation in second language acquisition. *Procedia Social and Behavioral Sciences, 116,* 240-244.

Charmandari, E., Tsigos, C., & Chrousos, G. (2005). Endocrinology of the stress response. *Annual Review in Physiology, 67,* 259-284.

Charnetski, C.J., Riggers, S., & Brennan, F.X. (2004). Effect of petting a dog on immune system function. *Psychological Reports, 95*(3), 1087-1091.

Chen, G., Gully, S.M, & Eden, D. (2001). Validation of a New General Self-Efficacy Scale. *Organizational Research Methods, 4,* 62-83.

Cheng, Y.S., Horwitz, E.K., & Schallert, D.L. (1999). Language anxiety: Differentiating writing and speaking components. *Language Learning, 49(*3), 417-446.

Chomsky, N. (1965). *Aspects on the Theory of Syntax.* Cambridge, MA: MIT Press.

Clement, R., Gardner, R.C., & Smythe, P.C. (1980). Social and individual factors in second language acquisition. *Canadian Journal of Behavioral Science, 12*, 292-302. doi: 10.1037/h0081081

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385-396.

Denham, K., & Lobeck, A. (2010). *Linguistics for Everyone: An Introduction.* Boston: Wadsworth.

Derakshan, N., & Eysenck, M.W. (2009). Anxiety, processing efficiency, and cognitive performance: New developments from attentional control theory. *European Psychologist, 14*(2), 168-176.

Dewaele, J.M. (2007). The effect of multilingualism, sociobiographical, and situational factors on communicative anxiety and foreign language anxiety of mature language learners. *International Journal of Bilingualism, 11*(4), 391-409.

Dibbets, P., van den Broek, A., & Evers, E.A. (2015). Fear conditioning and extinction in anxiety- and depression-prone persons. *Memory, 23*(3), 350-364.

Domagk, S. (2010). Do pedagogical agents facilitate learner motivation and learning outcomes? *Journal of Media Psychology, 22*(2), 84-97.

Engel de Abreu, P.M., & Gathercole, S.E. (2012). Executive and phonological processes in second-language acquisition. *Journal of Educational Psychology, 104*(4), 974-986.

Engjn, A.O. (2009). Second language learning success and motivation. *Social Behavior and Personality, 37*(8), 1035-1042.

Ertekin, E., Dilmac, B., & Yazici, E. (2009). The relationship between mathematics anxiety and learning styles of preservice mathematics teachers. *Social Behavior and Personality, 37*(9), 1187-1196.

Foster, P., Bolibaugh, C., & Kotula, A. (2014). The influence of exposure, memory, age of onset, and motivation in foreign language and immersion settings. *Studies In Second Language Acquisition, 36*(1), 101-132.

Friederici, A.D., Brauer, J., & Lohmann, G. (2011). Maturation of the language network: From inter- to intrahemispheric connectivities. *Plos One, 6*(6), 1-6.

Friesen, L. (2010). Exploring animal-assisted programs with children in school and therapeutic contexts. *Early Childhood Education Journal, 37,* 163-171.

Gardner, R.C., Lalonde, R.N., & Moorcroft, R. (1985). The role of attitudes and motivation in second language learning: Correlational and experimental considerations. *Language Learning, 35*(2), 207-227.

Gardner, R.C., & Lambert, W.E. (1965). Language aptitude, intelligence, and second-language achievement. *Journal of Educational Psychology, 56*, 191-199.

Gardner, R.C., & Lysynchuk, L.M. (1990). The role of aptitude, attitudes, motivation, and language use on second-language acquisition and retention. *Canadian Journal of Behavioural Sciences, 22*(3), 254-270.

Geen, R.G. (1983). Evaluation apprehension and the social facilitation/inhibition of learning. *Motivation and Emotion, 7*(2), 203-212.

Greenberg, N., Carr, J.A., & Summers, C.H. (2002). Causes and consequences of stress. *Integrative and Comparative Biology, 42*(3), 508-516.

Gregersen, T., & Horwitz, E.K. (2002). Language learning and perfectionism: Anxious and non-anxious language learners' reactions to their own oral performance. *Modern Language Journal, 86*(4), 567-570.

Guo, T., Misra, M., Tam, J., & Kroll, J.F. (2012). On the time course of accessing meaning in a second language: An electrophysiological and behavioral investigation of translation recognition. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 38*(5), 1165-1186.

Halm, M.A. (2008). The healing power of the human-animal connection. *American Journal of Critical Care, 17*(4), 373-376.

Henter, R. (2014). Affective factors involved in learning a foreign language. *Procedia Social and Behavioral Sciences, 127,* 373-378.

Hernandez, A.E., Li, P. (2007). Age of acquisition: Its neural and computational mechanisms. *Psychological Bulletin, 133*(4), 638-650. doi: 10.1037/0033-2909.133.4.638

Hesling, I., Dilharreguy, B., Bordessoules, M., & Allard, M. (2012). The neural processing of second language comprehension modulated by the degree of proficiency: A listening connected speech fMRI study. *The Open Neuroimaging Journal, 6,* 44-54.

Hidaka, S., Shibata, H., Kurihara, M., Tanaka, A., Konno, A., Maruyama, S.,…Koizumi, M. (2012). Effect of second language exposure on brain activity for language processing among preschoolers. *Neuroscience Research, 73,* 73-79.

Horwitz, E.K. (2000). It ain't over 'til it's over: On foreign language anxiety, first language deficits, and the confounding of variables. *Modern Language Journal, 84*(2), 256-259.

Horwitz, E.K., Horwitz, M.B., & Cope, J.A. (1986). Foreign language classroom anxiety. *Modern Language Journal, 70*(2), 125-132.

Huang-Pollock, C.L., Maddox, W.T., & Karalunas, S.L. (2011). Development of implicit and explicit category learning. *Journal of Experimental Child Psychology, 109,* 321-355.

Isel, F., Baumgaertner, A., Thran, J., Meisel, J.M., & Buchel, C. (2010). Neural circuitry of the bilingual mental lexicon: Effect of age of second language acquisition. *Brain and Cognition, 72,* 169-180.

Jakoby, H., Goldstein, A., & Faust, M. (2011). Electrophysiological correlates of speech perception mechanisms and individual differences in second language attainment. *Psychophysiology, 48,* 1516-1530.

Jalongo, M.R., Astorino, T., & Bomboy, N. (2004). Canine visitors: The influence of therapy dogs on young children's learning and well-being in classrooms and hospitals. *Early Childhood Education Journal, 32*, 9-16.

Jenkins, J.L. (1986). Physiological effects of petting a companion animal. *Psychological Reports, 58*, 21-22.

Johnson, E.O., Kamilaris, T.C., Chrousos, G.P., & Gold, P.W. (1992). Mechanisms of stress: A dynamic overview of hormonal and behavioral homeostasis. *Neuroscience and Biobehavioral Reviews, 16,* 115-130.

Kao, P.C., & Craigie, P. (2013). Coping strategies of Taiwanese university students as predictors of English language learning anxiety. *Social Behavior and Personality, 41*(3), 411-420.

Kelly, S., Rice, C., Wyatt, B., Ducking, J., & Denton, Z. (2015). Teacher immediacy and decreased student quantitative reasoning anxiety: The mediating effect of perception. *Communication Education, 64*(2), 171-186.

Klehe, U.C., Anderson, N., & Hoefnagels, E.A. (2007). Social facilitation and inhibition during maximum versus typical performance situations. *Human Performance, 20* (3), 223-239.

Kormos, J., Kiddle, T., & Csizer, K. (2011). Systems of goals, attitudes, and self-related beliefs in second-language-learning motivation. *Applied Linguistics, 32*(5), 495-516.

Krashen, S.D. (1981). The “Fundamental Pedagogical Principle” in second language teaching. *Studia Linguistica, 35*(1), 50-70.

Kurdek, L.A. (2009). Pet dogs as attachment figures for adult owners. *Journal of Family Psychology, 23(*4), 439-446.

Lambert, K.G., & Kinsley, C.H. (2011). *Clinical Neuroscience: Psychopathology and the Brain.* New York: Oxford.

Lazarus, R.S. & Folkman, S. (1984*). Stress, Appraisal, and Coping*. New York: Springer.

Lee, E.H. (2012). Review of the psychometric evidence of the Perceived Stress Scale. *Asian Nursing Research, 6*, 121-127.

MacIntyre, P.D., & Gardner, R.C. (1991). Methods and results in the study of anxiety and language learning: A review of the literature. *Language Learning, 41*(1), 85-117.

Maestripieri, D. (2004). Developmental and evolutionary aspects of female attraction to babies. *Science Briefs*, 1-2.

McNealy, K., Mazziotta, J.C., & Dapretto, M. (2011). Age and experience shape developmental changes in the neural basis of language-related learning. *Developmental Science, 14*(6), 1261-1282.

Mechelli, A., Crinion, J.T., Noppeney, U., O'Doherty, J., Ashburner, J., Frackowiak, R. S., & Price, C.J. (2004). Structural plasticity in the bilingual brain. *Nature, 431,* 757. doi: 10.1038/431757a

Meyer, W., & Pakur, M. (1999). Thoughts about the domestic dog as the catalyst for relations between humans and a body contact object for humans. *Schweiz Arch Tierheilkd, 141*(8), 351-359.

Mika, A., Mazur, G.J., Hoffman, A.N., Talboom, J.S., Bimonte-Nelson, H.A., Sanabria, F., & Conrad, C.D. (2012). Chronic stress impairs prefrontal cortex dependent response inhibition and spatial working memory. *Behavioral Neuroscience, online first edition,* 1-15.

Morgan-Short, K., Finger, I., Grey, S., & Ullman, M.T. (2012). Second language processing shows increased native-like neural responses after months of no exposure. *Plos One, 7*(3), 1-17.

Morin, C.M., Rodrigue, S., & Ivers, H. (2003). Role of stress, arousal, and coping skills in primary insomnia. *Psychosomatic Medicine, 65*(2), 259-267.

Moriya, J., & Tanno, Y. (2010). Attentional resources in social anxiety and the effects of perceptual load. *Cognition and Emotion, 24*(8), 1329-1348.

Murray, I.R., Baber, C., & South, A. (1996). Towards a definition and working model of stress and its effects on speech. *Speech Communication, 20,* 3-12.

Nelson, R.J. (2011). *An Introduction to Behavioral Endocrinology. (4th ed.).* Sunderland, MA: Sinauer.

Ni, H. (2012). The effects of affective factors in SLA and pedagogical implications. *Theory and Practice in Language Studies, 2*(7), 1508-1513.

Noormohamadi, R. (2009). On the relationship between language learning strategies and foreign language anxiety. *Pan-Pacific Association of Applied Linguistics, 13*(1), 39-52.

Pakulak, E., & Neville, H.J. (2010). Maturational constraints on the recruitment of early processes for syntactic processing. *Journal of Cognitive Neuroscience, 23*(10), 2452-2465.

Park, H.R., Badzahova-Trajkov, G., & Waldie, K.E. (2012). Language lateralisation in late proficient bilinguals: A lexical decision fMRI study. *Neuropsychologia, 50*, 688-695.

Pinto, V., Costa, J.C., Morgado, P., Mota, C., Miranda, A., Bravo, F.V., Oliveira, T.G., Cerqueira, J.J., & Sousa, N. (2014). Differential impact of chronic stress along the hippocampal dorsal-ventral axis. *Brain Structure and Function, 220*(2), 1205-1212.

Platania, J., & Moran, G.P. (2001). Social facilitation as a function of the mere presence effect of others. *The Journal of Social Psychology, 141*(2), 190-197.

Polheber, J.P., & Matchock, R.L. (2013). The presence of a dog attenuates cortisol and heart rate in the Trier Social Stress Test compared to human friends. *Journal of Behavioral Medicine.*

Proverbio, A.M., De Gabriele, V., Manfredi, M., & Adorni, R. (2011). No race effect in the automatic orienting toward baby faces: When ethnic group does not matter. *Psychology, 2*(9), 931-935.

Radenbacha, C., Reitera, A.M., Engert, V., Sjoerdsa, Z., Villringerd, A., Heinzeh, H.J., Desernoa, L., & Schlagenhaufa, F. (2015). The interaction of acute and chronic stress impairs model-based behavioral control. *Psychoneuroendocrinology, 53,* 268-283.

Rajecki, D.W., Ickes, W., Corcoran, C., & Lenerz, K. (1977). Social facilitation of human performance: Mere presence effects. *The Journal of Social Psychology, 102*(2), 297-310.

Rastegar, M., & Karami, M. (2015). On the relationship between foreign language anxiety, willingness to communicate, and scholastic success among Iranian EFL learners. *Theory and Practice in Language Studies, 5(*11), 2387-2395.

Reeder, D.M., & Kramer, K.M. (2005). Stress in free-ranging mammals: Integrating physiology, ecology, and natural history. *Journal of Mammalogy, 86*(2), 225-235.

Rosenberg, M. (1965). *Society and the Adolescent Self-Image.* Princeton, NJ: Princeton University Press.

Saito, Y., Garza, T.J., & Horwitz, E.K. (1999). Foreign language reading anxiety. *Modern Language Journal, 83*(2), 202-218.

Sapolsky, R.M. (2004). *Why Zebras Don't Get Ulcers.* New York: Holt.

Sara, M., Arezo, N., Fatemeh, K., Mansoureh, S., Mohammad, A., & Mahmood, B. (2015). Iron administration prevents BDNF decrease and depressive-like behavior following chronic stress. *Brain Research, 1596,* 79-87.

Schlegal, A.A., Rudelson, J., & Tse, P.U. (2012). White matter structure changes as adults learn a second language. *Journal of Cognitive Neuroscience, 24*(8), 1664-1670.

Sellers, V. (2000). Anxiety and reading comprehension in Spanish as a foreign language. *Foreign Language Annals, 33,* 512-521.

Shi, Z., Gao, X., & Zhou, R. (2015). Frontal theta activity during working memory in test anxiety. *NeuroReport: For Rapid Communication of Neuroscience Research, 26(4),* 228-232.

Slavish, D.C., Graham-Engeland, J.E., Smyth, J.M., & Engeland, C.G. (2015). Salivary markers of inflammation in response to acute stress. *Brain, Behavior, and Immunity, 44,* 253-269.

Smith, K. (2011). Learning bias, cultural evolution of language, and the biological evolution of the language faculty. *Human Biology, 83*(2), 261-278.

Snow, C.E., & Hoefnagal-Hohle, M. (1977). Age differences in the pronunciation of foreign sounds. Language and Speech, *20,* 358.

Somervill, J.W., Kruglikova, Y.A., Robertson, R.L., Hanson, L.M., & MacLin, O.H. (2008). Physiological responses by college students to a dog and a cat: Implications for pet therapy. *North American Journal of Psychology, 10*(3), 519-528.

Sparks, R.L., & Ganschow, L. (1991). Foreign language learning differences: Affective or native language aptitude differences? *The Modern Language Journal, 75*(1), 3-16.

Spielberger, C.D. (1985). *Anxiety, Cognition, and Affect: A State-Trait Perspective*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Summers, C.H. (2002). Social interaction over time: Implications for stress responsiveness. *Integrative and Comparative Biology, 42*(3), 591-599.

Taylor, S.E. (2012). *Health Psychology.* 8th Ed. McGraw-Hill: New York.

Tinakon, W., & Nahathai, W. (2012). A comparison of reliability and construct validity between the original and revised versions of the Rosenberg Self Esteem Scale. *Psychiatry Investigations, 9*(1), 54-58.

van Compernolle, R.A., & Zhang, H. (2014). Dynamic assessment of elicited imitation: A case analysis on an advanced L2 English speaker. *Language Testing, 31(*4), 395-412.

Vining, J. (2003). The connection to other animals and caring for nature. *Human Ecology Review, 10*(2), 87-99.

von Worde, R. (2003). Students' perspectives on foreign language anxiety. *Inquiry, 8*(1), 1-15.

Vormbrock, J.K., & Grossberg, J.M. (1988). Cardiovascular effects of human-pet dog interactions. *Journal of Behavioral Medicine, 11*(5), 509-517.

Walsh, F. (2009). Human-animal bonds II: The role of pets in family systems and family therapy. *Family Process, 48*(4), 481-498.

Weiss, R.F., & Miller, F.G. (1971). The drive theory of social facilitation. *Psychological Review, 78*(1), 44-57.

Woof, J.M., & Kerr, M.A. (2004). IgA function-variations on a theme. *Immunology, 113*(2), 175-177.

Yehuda, S., Rabinovitz, S., Carasso, R.L., & Mostofsky, D.I. (2000). Fatty acid mixture counters stress changes in cortisol, cholesterol, and impair learning. *International Journal of Neuroscience, 101,* 73-87.

Young, D.J. (1992). Language anxiety from the foreign language specialist's perspective: Interviews with Krashen, Omaggio Hadley, Terrell, and Rardin. *Foreign Language Annals, 25*(2), 157-172.

Young, D.J. (1991). Creating a low-anxiety classroom environment: What does language anxiety research suggest? *The Modern Language Journal, 75*(4), 426-437.

Young, D.J. (1986). The relationship between anxiety and foreign language oral proficiency ratings. *Foreign Language Annals, 19*(5), 439-445.

Yu, B., & Downing, K. (2012). Determinants of international students' adaptation: Examining effects of integrative motivation, instrumental motivation, and s second language proficiency. *Educational Studies, 38*(4), 457-471.

Yusa, N., Koizumi, M., Kim, J., Kimura, N., Uchida, S., Yokoyama, S., …Hagiwara, H. (2011). Second-language instinct and instruction effects: Nature and nurture in second-language acquisition. *Journal of Cognitive Neuroscience, 23*(10), 2416-2430.

Zajonc, R.B. (1965). Social facilitation. *Science, 149*(3681), 269-274.

Zajonc, R.B., Heingartner, A., & Herman, E.M. (1969). Social enhancement and impairment of performance in the cockroach. *Journal of Personality and Social Psychology, 13*(2), 83-92.

Zoladz, P.R., & Diamond, D.M. (2009). Linear and non-linear dose-response functions reveal a hormetic relationship between stress and learning. *Dose-Response, 7,* 132-148.

Zoladz, P.R., Kalchick, A.E., Hoffman, M.M., Aufdenkampe, R.L., Burke, H.M., Woelke, S.A., Pisansky, J.M., & Talbot, J.N. (2014). Brief, pre-retrieval stress differentially influences long-term memory depending on sex and corticosteroid response. *Brain and Cognition, 85,* 277-285.

Appendix

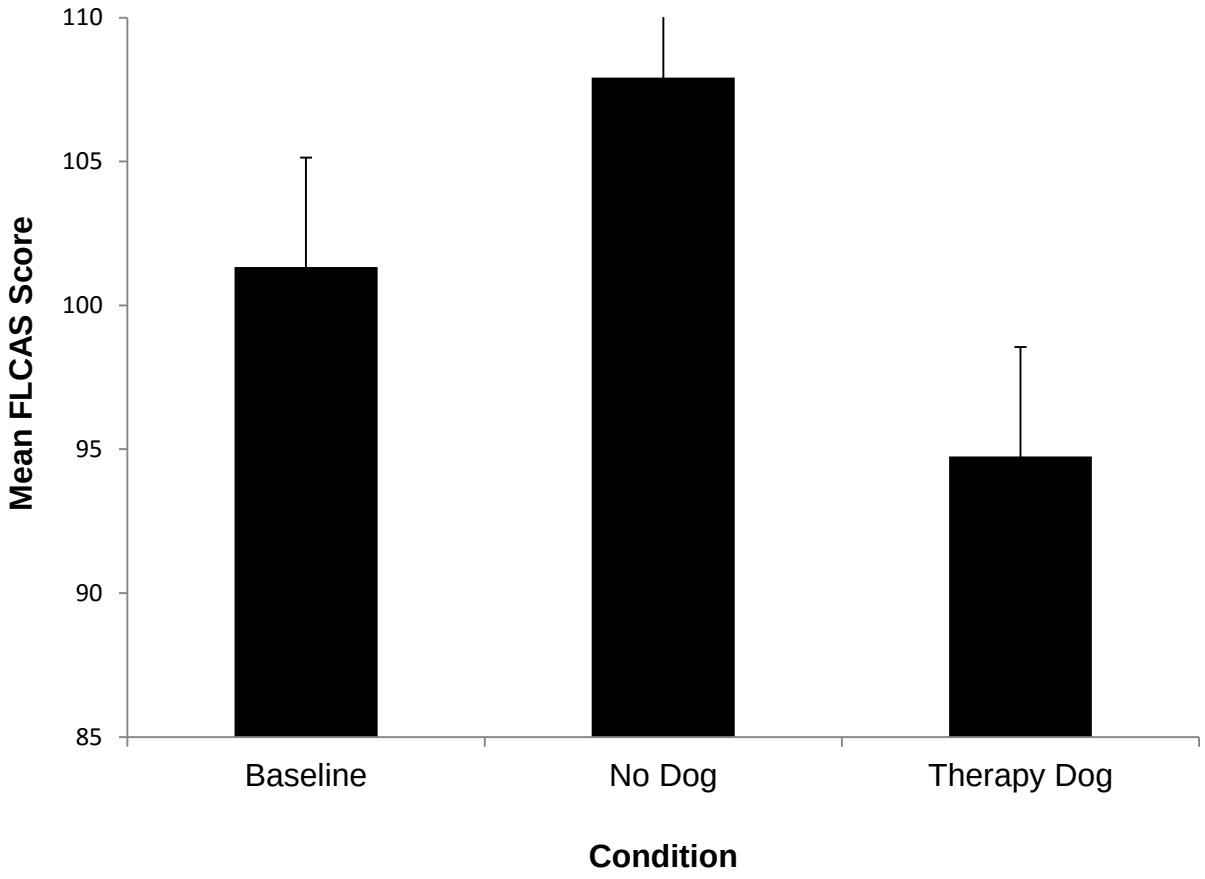

Figure 1. Bar chart illustrating mean Foreign Language Classroom Anxiety Scale (FLCAS) scores for the therapy dog (*M* = 94.75), no dog (*M* = 107.92), and baseline (*M* = 101.33) conditions. Higher FLCAS scores indicate greater levels of L2 classroom-specific anxiety.

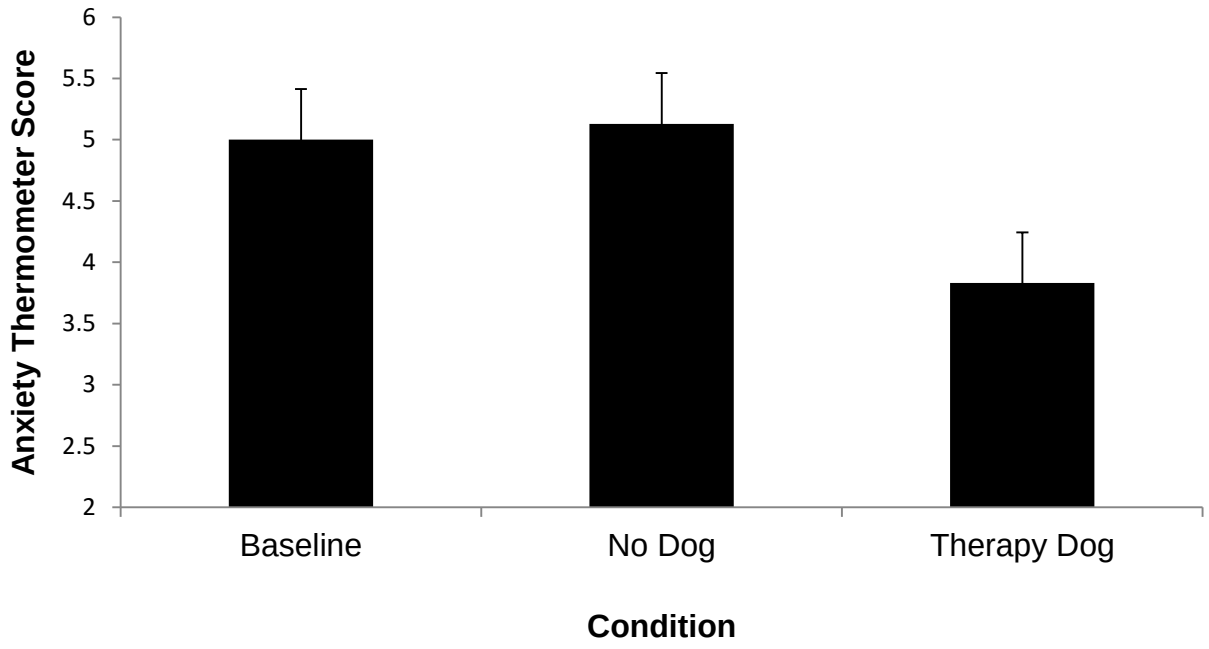

Figure 2. Mean anxiety thermometer scores for baseline (*M* = 5.00), no dog (*M* = 5.13) and therapy dog (*M* = 3.83) conditions. Higher anxiety thermometer scores are indicative of increased general L2 anxiety.

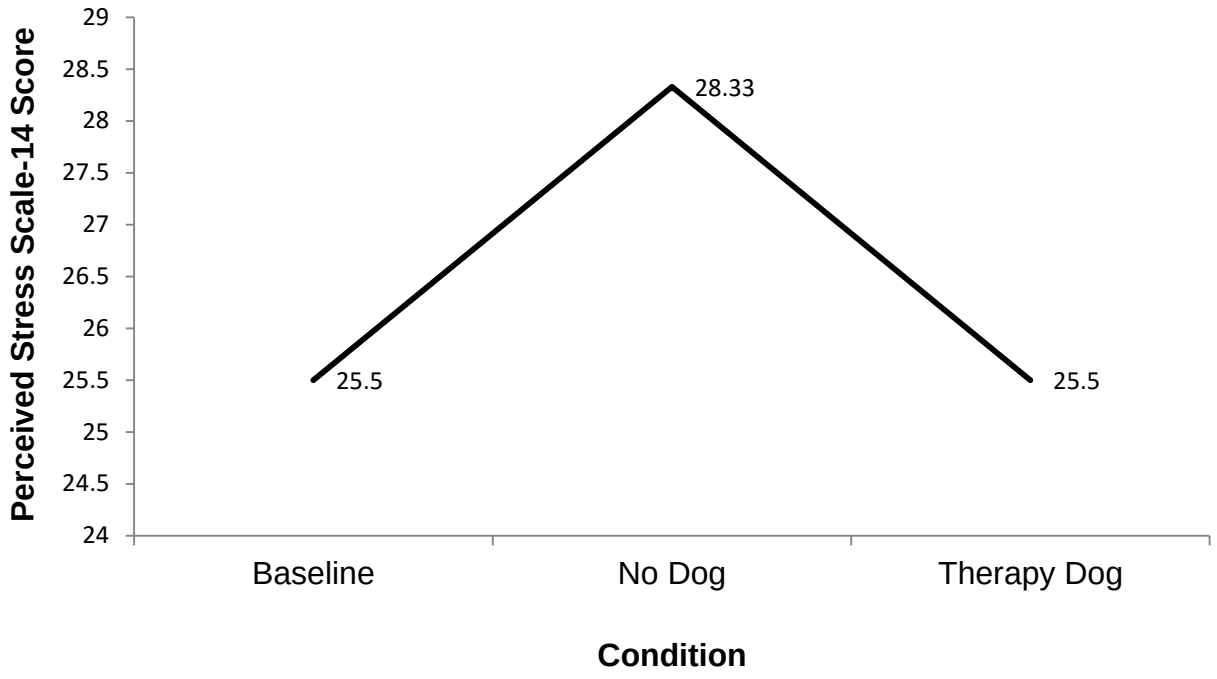

Figure 3. Mean Perceived Stress Scale-14 (PSS-14) scores by condition. Higher scores indicate more perceived stress about general life circumstances.

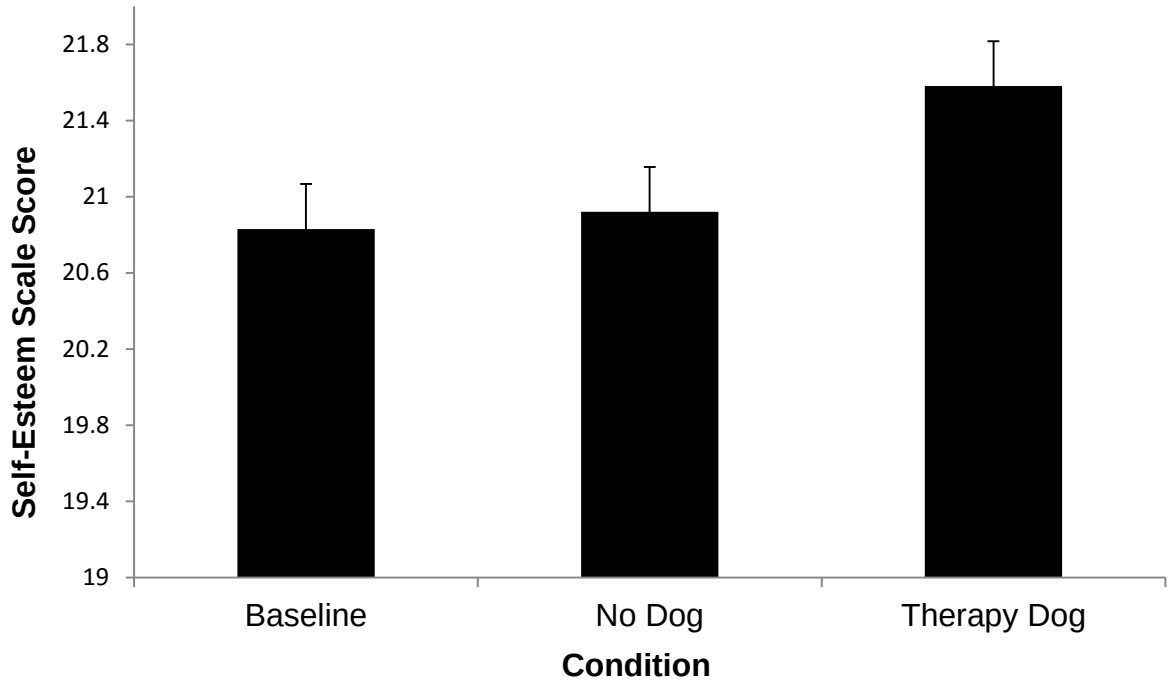

Figure 4. Mean Self-Esteem Scale (SES) scores for baseline (*M* = 20.83), no dog (*M* = 20.92), and therapy dog (M = 21.58) conditions. Higher SES scores indicate greater self-esteem levels.

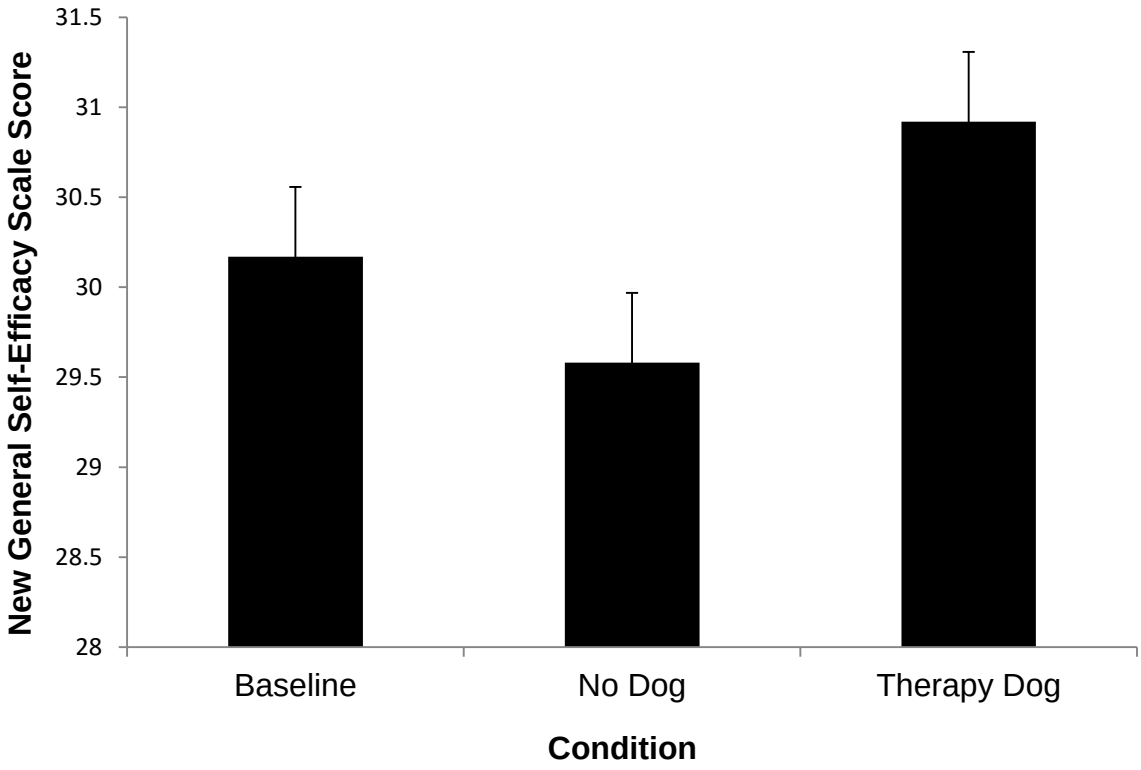

Figure 5. Mean New General Self-Efficacy Scale (NGSES) scores for baseline (*M* = 30.17), no dog *(M* = 29.58), and therapy dog *(M* = 30.92) conditions. Higher NGSES scores are indicative of greater levels of self-efficacy.

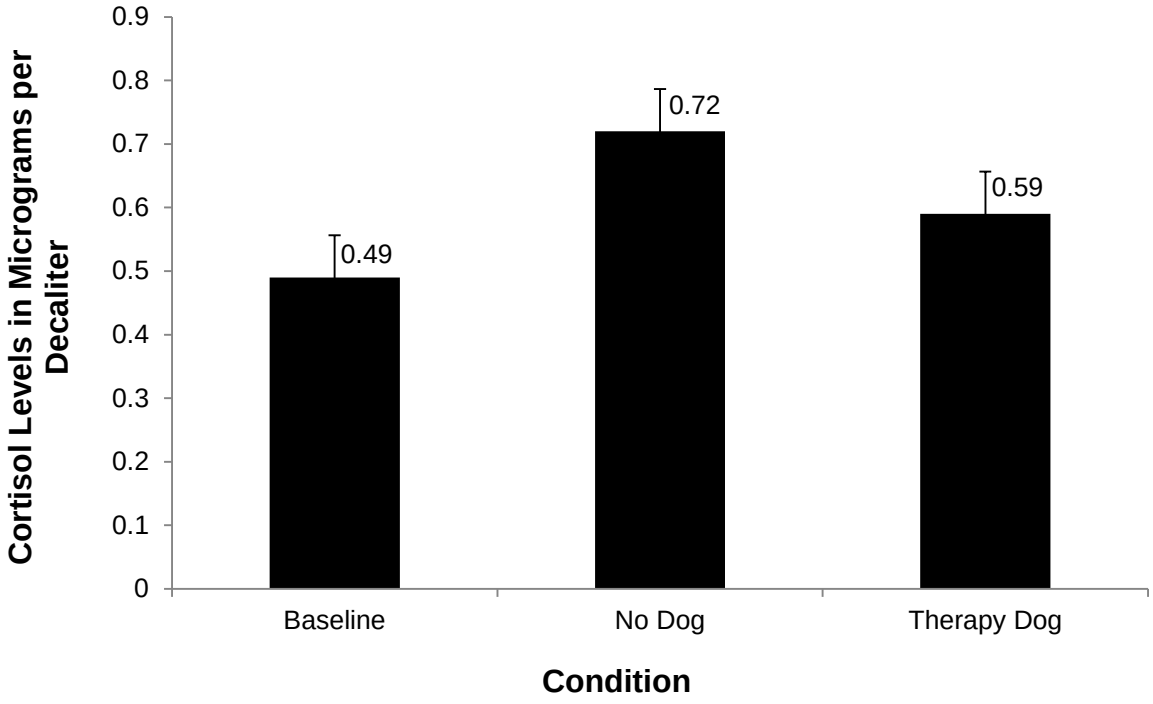

Figure 6. Mean cortisol levels (µg/dL) by condition. Higher cortisol levels indicate greater physiological stress.

Table 1.

Foreign Language Classroom Anxiety (FLCAS) Scores by Participant and Condition

Participant #	Baseline	No Dog	Therapy Dog
1	115	136	125
2	116	118	**96**
3	116	130	**102**
4	135	147	**130**
5	113	107	108
6	93	87	92
7	69	76	**51**
8	59	66	67
9	94	111	**81**
10	79	80	**62**
11	135	140	**126**
12	92	97	97

Note. Participants with lowest FLCAS scores during therapy dog condition are in bold.

Table 2.

Anxiety Thermometer Scores by Participant and Condition

Participant #	Baseline	No Dog	Therapy Dog
1	10	8	8
2	6.5	7	**2**
3	6	4	**3**
4	7	9	7
5	4	5	5
6	3	3	3
7	2.5	3.5	**1**
8	3	3	**2**
9	3	4	3
10	4	4	**2**
11	8	8	**7**
12	3	3	3

Note. Participants with lowest anxiety thermometer score in therapy dog condition are in bold.

The Effect of Therapy Dogs on Spanish Second Language Learning
Human Participant Consent Form

Purpose and Procedure

1. This research will investigate the relationship between therapy dogs and Spanish L2 learning. Participants will be asked to learn several Spanish phonemes during the 3 data collection periods. In some conditions, a therapy dog will be present. Students will complete several self-report surveys (e.g., demographic, stress, and anxiety) as well as a read a script aloud to a partner while being audio-recorded. In addition, participants will be asked to render a saliva sample during all three conditions to be used in a cortisol analysis.

2. As many as 30 undergraduate students will be recruited to participate.

3. The duration of the experiment will not exceed three (3) sessions and is expected to take up one hour per session.

4. Participants will learn the Spanish phonemes, complete the self-report measures, read a Spanish script while being audio-recorded and render a saliva sample at the end of each of the three data collection periods. Audio-recordings will be coded numerically with no identifying information available. Furthermore, my Spanish course instructor will have no access to the audio recording or any of my study documents.

Risks

5. Risks for participation are minimal, and participation is strictly voluntary. Those with any fears or allergies to dogs should note this on the screening questionnaire, should they decide to participate in the study. There is no penalty from withdrawing from the study.

Benefits

6. Expected benefits to this research are to gain insight about the process of learning a second language, to investigate how stress affects such learning, and to understand the influence of dogs on L2 learning. Each participant, if they so desire to contact the experimenter after the completion of the study, will receive an explanation of their results.
7. Participants who complete all three conditions will have one “0” on a homework grade replaced with a “100”. There is no pro-rating of extra credit. Participants who complete one or two conditions only will receive no credit.

Confidentiality

8. All data will be coded without the individual's name. No report or publication of the project will contain data that can be identified with any individual participant. Student names will not be available to Spanish instructors. Only the investigator and thesis advisor will have access to identifying data. All data will be stored on a computer with password protection.

Contact Information

9. For questions about the research, contact the principal investigator:

Elaine M. Henry

Dr. Debora Baldwin, Dissertation Advisor
Department of Psychology, University of Tennessee-Knoxville

If you have any questions about your rights as a research participant, please contact the UT Office of Research Compliance Officer at (865) 974-7697.

I understand that my participation in this study is completely voluntary. The choice not to participate will not lead to any penalty and will not adversely affect my course grade in any way. I understand that I may withdraw from the study at any time with no penalty.

I have read and understood the information above. I consent to take part in this study. The researchers have answered my questions to my satisfaction. I understand a copy of this form is available upon request.

_____ _____
Participant's Signature Date

_____
Print Name

_____ _____
Researcher's Signature Date

Baseline

Participant number: _____

1) Age: _____ years

2) Gender: _____

3) How many years have you spoken Spanish at any level? _____

4) Do you have regular interaction with native Spanish speakers? YES NO

5) Have you ever studied or lived abroad in a Spanish speaking country? YES NO

6) On a scale of 1(not at all anxious) to 5 (very anxious), how would you describe your anxiety level about your current Spanish 123 class? _____

7) On a scale of 1 (not fond) to 5 (very fond), how fond are you of dogs? _____

8) Do you currently have a dog of your own? YES NO

Foreign Language Classroom Anxiety Scale

Please write the number in the blank that best describes your feeling about each question.

1=Strongly Disagree
2=Disagree
3= Neither Agree nor Disagree
4=Agree
5= Strongly Agree

1. I never feel quite sure of myself when I am speaking in my foreign language class.

_____

2. I do not worry about making mistakes in language class. _____

3. I tremble when I know that I am going to be called on in language class. _____

4. It frightens me when I do not understand what the teacher is saying in the foreign language. _____

5. It would not bother me at all to take more foreign language classes. _____

6. During language class, I find myself thinking about things that have nothing to do with the course. _____

7. I keep thinking that the other students are better at languages than I am ._____

8. I am usually at ease during tests in my language class. _____

9. I start to panic when I have to speak without preparation in language class. _____

10. I worry about the consequences of failing my foreign language class. _____

11. I do not understand why some people get so upset over foreign language class.

_____

12. In language class, I can get so nervous I forget things I know. _____

13. It embarrasses me to volunteer answers in my language class. _____

14. I would not be nervous speaking the foreign language with native speakers. _____

15. I get upset when I do not understand what the teacher is correcting. _____

16. Even if I am well prepared for language class, I feel anxious about it. _____

17. I often feel like not going to my language class. _____

18. I feel confident when I speak in foreign language class. _____

19. I am afraid that my language teacher is ready to correct every mistake I make.

_____

20. I can feel my heart pounding when I'm going to be called on in language class.

_____

21. The more I study for a language test, the more confused I get. _____

22. I do not feel pressure to prepare very well for language class. _____

23. I always feel that the other students speak the foreign language better than I do.

_____

24. I feel very self-conscious about speaking in the foreign language in front of other students. _____

25. Language class moves so quickly that I worry about getting left behind. _____

26. I feel more tense and nervous in my language class than in my other classes.

_____

27. I get nervous and confused when I am speaking in my language class. _____

28. When I am on my way to language class, I feel very sure and relaxed. _____

29. I get nervous when I do not understand every word the language teacher says.

_____

30. I feel overwhelmed by the number of rules you have to learn to speak a foreign language. _____

31. I am afraid that the other students will laugh at me when I speak the foreign language. _____

32. I would probably feel comfortable around native speakers of the foreign language. _____

33. I get nervous when the language teacher asks questions which I have not prepared in advance. _____

Anxiety Thermometer

Using this “anxiety thermometer” as a guide, please list the number (1 through 10) that indicates your overall level of anxiety. _____

Perceived Stress Scale-14

INSTRUCTIONS:

The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, you will be asked to indicate your response by filling in the circle representing HOW OFTEN you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

Never: 0
Almost Never: 1
Sometimes: 2
Fairly Often: 3
Very Often: 4

IN THE LAST MONTH:

1. How often have you been upset because of something that happened unexpectedly?

2. How often have you felt that you were unable to control the important things in your life?

3. How often have you felt nervous and "stressed"?

4. How often have you dealt successfully with day to day problems and annoyances?

5. How often have you felt that you were effectively coping with important changes that were occurring in your life?

6. How often have you felt confident about your ability to handle your personal problems?

7. How often have you felt that things were going your way?

8. How often have you found that you could not cope with all the things that you had to do?

9. How often have you been able to control irritations in your life?

10. How often have you felt that you were on top of things?

11. How often have you been angered because of things that happened that were outside of your control?

12. How often have you found yourself thinking about things that you have to accomplish?

13. How often have you been able to control the way you spend your time?

14. How often have you felt difficulties were piling up so high that you could not overcome them?

Self-Esteem Scale

Please write the number in the blank that best describes your feeling about each question.

Strongly agree: 3
Agree: 2
Disagree: 1
Strongly disagree: 0

1. I feel that I am a person of worth, at least on an equal plane with others. _____

2. I feel that I have a number of good qualities. _____

3. All in all, I am inclined to feel that I am a failure. _____

4. I am able to do things as well as most other people. _____

5. I feel I do not have much to be proud of. _____

6. I take a positive attitude toward myself. _____

7. On the whole, I am satisfied with myself. _____

8. I wish I could have more respect for myself. _____

9. I certainly feel useless at times. _____

10. At times I think I am no good at all. _____

New General Self-Efficacy Scale

Indicate your level of agreement with each statement by writing the corresponding number in the blank.

5-Strongly agree
4-Agree
3-Neutral
2-Disagree
1-Disagree strongly

1. I will be able to achieve most of the goals that I have set for myself. _____

2. When facing difficult tasks, I am certain that I will accomplish them. _____

3. In general, I think that I can obtain outcomes that are important to me. _____

4. I believe I can succeed at most any endeavor to which I set my mind. _____

5. I will be able to successfully overcome many challenges. _____

6. I am confident that I can perform effectively on many different tasks. _____

7. Compared to other people, I can do most tasks very well. _____

8. Even when things are tough, I can perform quite well. _____

Likert Scale for Evaluators (phonological learning)

Please listen to the recording of each participant's pronunciation of the six target phrases **twice**, then use the following scale to assign one score to each participant. Please note that each participant should receive only one score and that it should represent their average performance on all of the phrases. Each participant will get a separate score for each of the conditions.

1: uninterpretable as target sound

2: correct target sound, very strong (non native) accent

3: correct target sound, noticeable (non native) accent

4: correct target sound, native-like accent

Script for Phonological Recordings
Condition 2
En un restaurante (270 words)

Instructions: Please say your participant number when the recording starts as well as at the beginning of every sentence. For example, you will say “Participant 1. Hola”.

Participant 1:-Hola / ¡Buenas noches!
Participant 2:-Hola / ¡Buenas noches!
1: -¿Tiene usted una reserva?
2: -Si, he hecho una reserva a nombre del señor/de la señorita García.
1: -¡Perfecto! Por aquí por favor.
2: -¡Gracias!
1: -Aquí tiene el menú.
2:- Gracias por ser tan amable.
1: -¿Desea algo para tomar?
2: Claro, tráigame una botella de agua.
1: – ¿Fría o del tiempo?
2: – Del tiempo por favor. Y sin gas.
1: -¿Qué va a beber con su comida?
2: -Vino, por favor.
1**:** -¿Blanco o tinto?
2: – Blanco. Y de primero, me gustaría una ensalada mixta por favor.
1: -¿Y de segundo plato?
2: – Paella de marisco para uno.
1: -¿Desea algo más?
2: -No, por ahora, gracias.
[Después de la comida]
1: -¿Va a tomar un postre?
2: – Sí, se me antoja el arroz con leche, por favor.
1: – ¿Alguna cosa más? ¿Café? ¿Infusión?
2: -Nada más.
1: – *[After dessert, waiter returns]* ¿Estaba todo de su gusto?
2: Estaba todo buenísimo. Delicioso ¿Me trae la cuenta por favor?
1: – ¿Va a pagar al contado o con tarjeta?
2: – Al contado.
1: – Son 65,50 euros.
2: – Aquí tiene. Muchas gracias.
1: – Gracias a usted que ha sido un cliente ideal. ¡Hasta luego!
2: – Hasta luego

Script for Phonological Recordings
Condition 3
En un restaurante (279 words)

Participant 1: Buenas tardes, ¿quiere la carta o el menú del día?
Participant 2: (Sitting at a table) La carta, por favor.
1: Aquí tiene.
2: Muchas gracias. ¿Podría traerme un poco de agua, por favor? ¿Qué está pasando afuera? Parece ser una huelga.
1: No, no es huelga. Es el desfile de la Semana Santa. Algunos se visten como esclavos sin zapatos para demostrar la pobreza.
1: *(Waitor returns, gives menu and water to cliente).* Aquí tiene. ¿Quiere pedir algo de aperitivo?
2: Sí, tráigame un poco de queso y jamón, por favor.
1: Dicho y hecho. (A few minutes later) Aquí tiene.
2: Gracias. Por suerte, parece que ya han terminado el desfile.
1: Este…, ¿ya sabe lo que quiere pedir de primero?
2: Sí, una ensalada mixta con huevos,
1: Muy bien, ¿y de segundo?
2: De segundo me gustaría tomar la merluza a la vizcaína.
[Más tarde, después de cenar]
2: Camarero, por favor. Me gustaría pedir un postre. ¿Qué me recomienda?
1: Tenemos flan, helado y una tarta de queso, especialidad de la casa.
2: Ah, pues entonces tráigame la tarta. Y también la cuenta, si es tan amable.
1: Aquí tiene, señor/señorita. ¿Quiere pagar en efectivo o con tarjeta?
2: Con tarjeta.
1: Aquí tiene la máquina. Introduzca su número PIN.
2: Muchas gracias. Y felicite al cocinero de mi parte. Estaba todo muy rico.
1: Así lo haré, señora. Muchas gracias por su visita. Esperamos tenerla con nosotros pronto.

Vita

Elaine Maralee Henry received an Associate of Science degree, *Summa Cum Laude*, from Northeast State Community College (Blountville, TN) in 2008 with concentrations in nursing, speech communication, and psychology.

Elaine was selected as the Outstanding Student of the Year at Northeast State in 2008, graduated with a 4.0 GPA, and was named to the All-Tennessee Academic team and Who's Who in American Junior Colleges. Additionally, she served as President of the college's Phi Theta Kappa Honor Society chapter (*Alpha Iota Chi)* and President of *A Toast to Education* Toastmasters club. She holds Advanced Communicator Bronze and Advanced Leader Bronze certifications from Toastmasters International. In 2008, Elaine was selected as one of the top 25 outstanding chapter officers for Phi Theta Kappa at the International level. She twice won the honor society's statewide essay contest where her works entitled *From This Day On: An Analysis of Ibsen's "A Doll's House"* and *Out of the Darkness: A Comparison of the Poetry of Emily Dickinson and Sylvia Plath* were published in the Tennessee Region Literary Anthology.

Elaine graduated *Magna Cum Laude* from Maryville College in May 2011 with a Bachelor of Arts degree in psychology. She served as a Maryville College Ambassador and was the 2010 recipient of the College's Outstanding Achievement Award in Spanish. Her undergraduate thesis explored the effect of age of Spanish second language acquisition on pronunciation and phonological proficiency. Elaine is a member of *Psi Beta, Psi Chi, Phi Theta Kappa, Phi Kappa Phi, and Omicron Delta Kappa* honor and leadership societies.

In August 2011, Elaine began her position as Graduate Teaching Assistant at the University of Tennessee-Knoxville. She completed her Master of Arts degree in Experimental Psychology (biological concentration) at UTK in May 2013. Her master's thesis also explored the effect of therapy dogs on academic stress and Spanish L2 learning. Elaine has also been a part time English as a second language (ESL) instructor at Maryville College. Upon completion of the Ph.D. degree from the University of Tennessee-Knoxville, Elaine hopes to teach psychology and ESL classes at a liberal arts or community college while also pursuing her dream of showing dogs.

Elaine is involved with American Kennel Club conformation dog shows and Therapy Dog International work. She is the proud owner, groomer, and trainer of AKC Group Placing Bernese Mountain Dog Bear-Acres The Wonder of Glory, CGC, CGCA, TDI "Wonder". Elaine has a lifelong passion for showing dogs and handles dogs in conformation competition whenever she can. Her article entitled *Working Wonders: Therapy Dog Helps College Spanish Students Relax While Learning a Second Language* was published in the Spring 2015 issue of *The Alpenhorn*, the national publication of the Bernese Mountain Dog Club of America. Elaine is a member of the Bernese Mountain Dog Club of America and the Kentuckiana Bernese Mountain Dog Club.