Introducing psychological skills training during early adolescence positively affects emotional regulation, self-concept, and self-confidence for increased athletic and academic performance during middle and late adolescence

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Adolescence represents a time of significant growth from childhood to young adulthood and comprises several developmental stages. Various developmental theories consider biological, psychological, psychosocial, cognitive, ecological, social cognitive, and cultural views on human growth and change (Jones et al., 2017; Blair & Raver, 2012; Andrews, et al., 1997) which foster significant perceptual and cognitive development through adaptive responses to challenge (Kahn et al, 2019). Early learning also occurs by modeling behaviors of valued individuals, especially parents and other trusted adults (Andrews et al., 1997).

While physical and behavioral changes are visible, cognitive development has historically been concealed, resulting in postulations and hypotheses based on behavioral observations and postmortem examinations. Advances in technology over the last few decades has allowed researchers to observe functioning brains, leading to discoveries about neural circuitry (Patwell, 2013), dynamic maps of brain maturation (Gogtay et al., 2004), improved understanding about the brain's regional development and function during adolescence (Arain et al., 2013), and provided input for improved pharmacological and behavioral therapies (Patwell, 2013).

Following infancy, adolescence is the time when humans experience the greatest cognitive and behavioral vulnerability where patterns and habits are established with the potential for life-long influence (Fischhoff et al., 2001). Productive advancement of cognitive, emotional, and social facilities throughout adolescence is dependent upon the establishment of foundational competencies such as attention control and impulse control (Kahn et al, 2019; Jones

et al., 2017). Executive functions, mental processes that enable planning, focus, memory, and organization (Executive Function & Self-regulation, 2020), are developed in elementary grades, emphasizing planning, organizing, goal setting, empathy, social awareness, and perspective-taking. These are later expanded during late elementary and middle school when specific interpersonal skills, prosocial and ethical behavior, and conflict resolution are highlighted (Kahn et al, 2019).

Adolescents experience dramatic biological and social transitions while developing foundational mechanisms for dealing with stress and adversity. Parents and coaches highly influence the resulting productive emotional regulation and counterproductive emotional dysregulation during sport participation, but participation does not guarantee productive character and skill development (Theokas, 2009). Optimal adolescent mental skill development demands a healthy perspective on inherent student-athlete stressors, deliberate skill training, and constructive adult influence.

Literature Review

A research review was accomplished to examine the hypothesis that introducing psychological skills training during early adolescence positively affects emotional regulation, self-concept, and self-confidence for increased athletic and academic performance during middle and late adolescence. Existing literature was examined and assessed concerning adolescent developmental stages, learning processes, and environmental influencers as they relate to adolescent emotional skill development, self-concept, and self-confidence as foundational building blocks for adolescent sport and athletic success. Consideration was given to the benefits and challenges associated with adolescent sport participation, the stress associated with filling a student-athlete dual role, positive and negative results of a parent, coach, and trusted adult

influence, and provided developmentally appropriate approaches to adolescent emotional regulation, self-talk, and relaxation for sport and academic performance.

Adolescent Development

Not only is the brain the last organ to mature, but its back to front development leads to delayed maturation of the prefrontal cortex, responsible for cognitive analysis, abstract thought, and moderation of social behavior (Arian et al., 2013). Nonlinear development leads to early maturation of basic functions, such as motor and sensory operations, followed later by executive function and self-regulation aiding attention, focus, and memory as well as task and goal prioritization (Gogtay et al, 2004). Neuroplasticity, the activity-dependent changes to neural circuits guiding adaptive behavior based on fluctuating environmental demands (Pattwell et al, 2013), places the brain in a constant state of development during adolescence while being subjected to influence by many genetic and environmental factors, including stress (physical, mental, economic, and psychological), nutrition, sleep, medication, substance use, and naturally occurring hormones (Arain et al, 2013).

Each region of the brain is more active in adolescence than at any time later in life, meaning the capacity to learn is greater during this time (Arain et al., 2013). While this provides a great opportunity to gain knowledge through academic education as well as physical and mental skill development, this also leaves the brain vulnerable to stress, adversity, and trauma contributing to ineffective and counterproductive development (Fukuta & Yamashita, 2021; Tsai et al, 2020; Zelkowitz et al, 2017; Choi et al, 2014; Arain et al, 2013; Blair & Raver, 2012).

Cognitive development is subjected to conscious learning within an individual's awareness as well as strong learning mechanisms related to unconscious processing leading to the development of neural systems aiding self-regulation of attention, emotion, and executive

function (Blair & Raver, 2012). Conscious, explicit processing occurs through deliberate learning in structured social, academic, athletic, or other pastime environments which allows for selective optimization of behaviors in response to experience (Blair & Raver, 2012). Unconscious, implicit processing can occur through modeling behaviors of others or by forming associations between groups of information (Kuldas et al., 2013). The result of implicit and explicit learning is mediated by the importance of meaning placed on the learning target or aim and may result in knowledge materializing later outside of awareness (Fukuta & Yamashita, 2021), reinforcing the importance of awareness for potential development of counterproductive habits, behaviors, and coping mechanisms resulting from stress, adversity, and trauma.

Some researchers have questioned the value of mental skills training for young athletes primarily due to the lack of developmental maturity and the inability to understand abstract concepts (McCarthy et al, 2009). More recent studies have concluded adolescents can benefit from skills coaching if learning occurs within supportive contexts, adult leaders have built their own competencies, learning acknowledges in- and out-of-school environments, targeted skills span multiple domains, are developmentally and culturally appropriate, and reasonable goals are set (Kahn et al, 2019).

Self-Concept

Perception is important in many ways to adolescents, especially regarding the assigned value of their self-worth, which significantly impacts achievement behavior and task choices (Wu et al., 2021). A reflective process of self-perception is self-concept, a mental representation of experiences, attitudes, and the expectations of esteemed others, which helps the individual recognize themselves, determine what they are capable of, and establish social roles and expectations for who they will become across various situations (Wu et al, 2021; Lerner &

Steinberg, 2004). Strong self-concept is soundly related to learning achievement, specifically for effectively managing stress and adversity, academic achievement, physical activity, and sports achievement (Wu et al, 2021). Self-concept is developed through identity, narratives, and self-esteem (Lerner & Steinberg, 2004). Athletic identity is the extent to which someone associates with the role of an athlete and values participation in athletics (Ryba et al, 2016; Shannon, 2011). Narratives are stories individuals tell themselves to bind their reconstructed past, perceived present, and anticipated future into a unified whole (Lerner & Steinberg, 2004). Self-esteem is an individual's subjective sense of self-worth and self-evaluation based on normative or self-related standards, such as succeeding more or less than expected by self or others (Du et al, 2017; Orth & Robins, 2014; Lerner & Steinberg, 2004) and is closely associated with wellbeing (Du et al, 2017).

Research into athletic identity has shown it is part of an adolescent's cognitive processing of information about themselves and allows them to develop a holistic identity (Kohn, 2016). Positive associations with strong athletic identity include higher commitment in training and focus on sport goals (Ryba et al, 2016), lower distressful anxiety (Shannon, 2011), established daily routines to train, practice, or compete, and healthy emphasis on supportive behaviors, such as nutrition, hydration, and rest (Cross & Fouke, 2019). Negative associations include dependence on performance outcomes for self-worth, self-esteem, and motivation (Ryba et al, 2016; Shannon, 2011), greater pressure to succeed leading to higher levels of burnout (Ryba et al, 2016), and less emphasis placed on academics when conflict occurs between athletics and academics (Kohn, 2016). They may also experience conflicting stereotypes, such as assumptions concerning their intelligence and academic motivation (Kohn, 2016) and setbacks associated

with injury and rehabilitation leading to compromised psychological well-being (Ryba et al, 2016).

Self-Confidence

Self-confidence, another reflective process of self-perception, is strongly correlated to sport performance (Hays et al, 2009), academic performance, and supportive family relationships (Lerner & Steinberg, 2004). A reciprocal relationship exists where an individual's interpretation of success or performance will inform or alter their self-belief, affecting future performances (Collins & Bissell, 2004). Successful performance leads to more confidence, increasing willingness to seek more challenges, face difficult situations, and take responsibility for one's actions (Burton, 2015). Confident people are more focused on process solutions when facing difficulties, while those less confident focus on perceived personal inadequacies (Hays et al, 2009). Adolescents with a strong appraisal of their worth, who focus on gaining skills and abilities, and believe they can achieve their goals are more likely to feel better about their role, perform well under pressure, and cope successfully during adversity (Wu et al, 2021; Burton, 2015; Hays et al, 2009).

A foundational building block of self-confidence is belief in one's ability to perform a task or behavior (Collins & Bissell, 2004). The strong belief in their abilities and the training process which provided development opportunity allows peak performance under pressure and coping with adversity during competition (Hays et al, 2009). Previous cumulative performance strengthens an individual's belief in their abilities and results in increased belief and confidence in future success due to familiarity with and being more skilled at tasks (Shipherd, 2019; Sitzmann & Yeo, 2013). Research has also shown increased self-confidence is related to sustained effort on a task (Shipherd, 2019).

Adult Influencers

One of the greatest determining factors of adolescent development is their parents (Lerner & Steinberg, 2004). Parents communicate expectations and set standards for the children's interests, goals, and values. They act as role models and influence how their children deal with environmental demands. They provide support and feedback concerning evaluation of success dealing with demands (Lerner & Steinberg, 2004). Parents who struggle with various stressors and experience depressive symptoms, emotional distress, and express anger and aggression within the household impede productive psychological development in their children (Blair & Raver, 2012). Dysfunctional parents and excessive exposure to distressful environments can negatively impact development of cognitive control, leading to diminished executive abilities later in life (Tsai et al, 2020). Alternatively, a healthy, transformational parenting style communicates acceptance, offers opportunities to gain experience, provides rules and flexible limits, and maintains positive examples (Álvarez et al, 2019). Research suggests that parenting interventions that improve caregiving quality led to reduced child behavioral dysregulation even in families facing stressful poverty-related risks (Blair & Raver, 2012). Thus, potential adverse adolescent development associated with negative effects of stress, adversity, and trauma may be diminished through healthy parenting which demonstrates responsiveness, consistency, and warmth through emotional regulation and emotional support (Blair & Raver, 2012).

Structured physical activities provide adolescents opportunities to learn mental skills for sport and life. Interactive activities which engage the individual and provide context for physical and mental skill development are highly effective when integrated into training sessions (Gilbert et al, 2017). Parents, coaches, teachers, and other trusted adults play an important role in providing a constructive and supportive environment. Their competence and confidence in their

knowledge, skills, and abilities, as well as their willingness to seek additional training and support to learn mental skills will soundly impact adolescent mental and emotional growth.

The Student-Athlete

Although adolescent sport participation has proven to be beneficial for physical, mental, and emotional growth, when asked why they play sports, 9 out of 10 children and young adolescents said their number one reason was because it is fun (Visek et al, 2015). However, the fun and novelty of sport may often be neglected for opportunities to compete. Adolescents and parents are feeling pressure to compete earlier, longer and believe early specialization is necessary to remain competitive at later adolescent and young adult stages (O'Sullivan, 2017). Individuals soon begin to feel increased mental and physical stress from sport participation occurring concurrently with academics, family responsibilities, social interaction, and other recreational pursuits.

Sorkkila et al. (2020) reported a 30% increase in burnout among Finnish females within the last two years, potentially leading to increased dropout and difficulty transition into higher education and work life. Another study which observed student-athletes representing multiple sports who were transitioning from early adolescence (7-12 years) to middle and late adolescence (13-18 years) showed consistent increases in multiple burnout variables (Ingrell et al, 2018). However, not all stress and adversity are counterproductive to adolescent growth and development. Success of the student-athlete and prevention of burnout, dropout, and unhealthy identity is possible by balancing sport and other life domains, developing a collection of coping strategies, and receiving support from trusted adults.

Athletic participation includes many inherent and adjacent stressors representing real and perceived demands. Differentiating stress as either challenge or threat provides a strong

association with either productive emotions, task-orientated coping strategies, and increased performance satisfaction, or counterproductive emotions, distraction, and disengagement-orientated coping strategies leading to worry, unhelpful tension, decreased performance satisfaction, and avoidance (Britton, 2019). Facilitating the understanding and acceptance that stress is part of the athletic experience and equipping adolescents with effective coping mechanisms will help them face the stressors that are part of being a student-athlete and prepare them for future experiences throughout the lifecycle (Brandão, 2021; Britton, 2019; Kahn et al, 2019; Theokas, 2009).

Environmental support from parents, coaches, and other trusted adults is essential for adolescent growth and health. Self-determination theory suggests that motivation to prepare, perform, and achieve is greatly influenced by the degree to which an individual feels autonomous, competent, and related to loved and trusted others (Aunola et al, 2018). As strong mediating factors in the development and success of adolescents, influential adults must be confident in their capability to respond with social and emotional support as well as lead skill development. Adults who received adequate training were better able to connect with student-athletes and adolescents reported higher self-esteem and enjoyed participation more (Kahn et al, 2019). The transformational parenting style has shown positive consequences through empowered relationships and autonomy-supportive environments resulting in lower levels of burnout (Álvarez et al, 2019). Similar to the transformational leadership style, these parents show individual consideration by displaying sensitivity and responsibility, transmitting acceptance and non-judgement, provide opportunities through varying levels of challenging experiences, create appropriate rules with flexible limits, and are positive role models (Álvarez et al, 2019).

Skill-based learning in sport is often focused on sport-specific and position-specific development. Coaches mistakenly assume participants will develop mental skills as a by-product of coaching behaviors (Gilbert et al, 2017), leaving adolescents susceptible to derivative, adjustive, generative, and maladaptive approaches (Choi et al, 2014). Adolescent mental skill and coping mechanism development cannot be left to chance. The experiential process of learning through trial and error and reflective practice leading to the coping outcomes of consistent performance, independence in coping, and persistence in coping are dependent upon parents and coaches engaging in structured learning, establishing trust and respect, and fostering independence in adolescent student-athletes.

Although a large majority of adolescents engage in sports because they are fun, the dropout rate from organized youth sports can be as high as 70% (Visek et al, 2015). In addition to the inherent physical and mental stress associated with sports, participants face increased social pressure from peers, coaches, and parents, multi-role conflicts, coping with failure, burnout, and inadequate recovery (Sorkkila et al, 2020; Ingrell et al, 2018; Visek et al, 2015; Stambulova et al, 2015). This sensitive and critical developmental period incorporating elevated learning capacity and long-term embedding of lessons and experiences substantiates the importance of introducing psychological skills training and mindfulness-based interventions during early adolescence to positively affect emotional regulation, self-concept, and self-confidence for increased athletic and academic performance during middle and late adolescence.

Early adolescence has been described as sampling years, in which basic identities, motives, values, and beliefs about sport are developed. This stage precedes the specializing years of middle adolescence in which athletes choose certain domains over others and limit their participation to these preferred sports (McCarthy et al, 2009). Research has shown athletes in the

specializing years implicitly understand foundational psychological performance skills better than those in the sampling years. This is likely due to developmental differences in understanding abstract concepts and exposure to education and guidance specifically related to these skills (McCarthy et al, 2009). Adolescents in the sampling years are capable of learning and implementing developmentally appropriate psychological skills when they are integrated into practice and competition while learning to work with teammates and coaches, begin to share responsibilities and opportunities, and learn the importance of practice and hard work to gain skills (McCarthy et al, 2009)

Emotional Regulation

Emotional regulation is vital to success in all life domains, allowing humans to consciously or unconsciously adapt their quality, intensity, duration, and expression of emotion based on goals and needs, as well as understanding the emotional perspectives of others (Aguilera et al, 2021; Zhang et al, 2019; Arain et al, 2013). Alternatively, emotional dysregulation is excessive or rapidly changing emotions which are counterproductive to the event, environment, age, and developmental stage, often observed as irritability, anger, physical outbursts, and sometimes aggression (Pylypow at al, 2020). Quick emotional responses are experienced throughout the life cycle due to the limbic system impacting self-control, decision making, emotions, and risk-taking behaviors (Arain et al, 2013). These effects are substantial in the rapidly developing adolescent brain resulting in a higher demand for emotional regulation techniques than in later developmental stages.

Adolescence consists of the most drastic biological and social transitions of the lifespan, comprising rapid and frequent physiological and cognitive changes stimulated by neuroendocrine processes, hormone activity, and physical growth (Lerner & Steinberg, 2004). These changes can

amplify the results of emotional dysregulation but can also be positively influenced through deliberate learning and skill building. Given the constant state of development, great capacity to learn, and variety of opportunities for structured learning during adolescence, it is an optimal time to provide instruction for increased self-awareness and maturity of emotional regulation skills. During adolescence, learning and development form the foundation for identity, cognitive motivational strategies, and long-term life skills experienced throughout the lifespan (Ryba et al, 2016), but not every experience, lesson, and skill leads to productive results. Poor emotional control is commonly experienced at all ages and has been linked with many psychiatric and medical disorders through genetic and environmental factors (Pylypow et al, 2020). Proactively and deliberately teaching individuals how to identify, express, understand, regulate, and use emotions, referred to as emotional intelligence, has been shown to improve performance and outcomes across various stressful environments, including athletics and academics, with lasting effects (Aouani et al, 2019).

Emotional regulation skills, fundamental competencies for coping with stress and adversity, are often learned and enhanced during sports participation (Kohn, 2016). Additionally, sport participation benefits overall health through multiple health-related dimensions (Kahn et al, 2019; Snyder, 2010). The reciprocal relationship between physical activity and social-emotional development occurs when adolescents are provided opportunities to learn and use social, emotional, and cognitive skills, which enhance well-being and functioning in several performance domains (Kahn et al, 2019). This collection of knowledge and skills allows athletes to manage stress effectively, tolerate frustration, regulate mood, and exercise emotional restraint while being observed and analyzed by others (Aouani et al., 2019). However, sports participation does not guarantee productive character and skill development. Theokas (2009) warns that sport

itself is not a magical solution since sport association and presence on a field of play does not inherently contribute to development or attainment of skills. The degree to which participation, training, and competition can be positive or negative is largely dependent upon how experiences are perceived by the individual (Choi et al, 2014).

Emotion Regulation Strategies

Zhang et al. (2019) recognize cognitive reappraisal and behavioral suppression as two essential emotional regulation strategies.

Cognitive Reappraisal

Cognitive reappraisal changes an individual's emotional course by reframing emotionally-triggering events. It is best used prior to a complete activation of emotional response to produce productive behavior for the social interaction and an emotionally engaging and responsive attitude (Zhang et al, 2019). Recognized as an implicit part of Albert Ellis' Rational Emotive Behavior Therapy and his ABC model, cognitive reappraisal aids the conscious focus and reassessment of emotions and reactive behaviors resulting from primal perceptions of harm, loss, threat, or challenge (Ziegler, 2001). The way an individual defines the personal significance of an encounter or event determines how they react emotionally. When an event is unnecessarily evaluated as potentially harmful or threatening, counterproductive emotions which are inappropriate for the realities of the situation are created. When the meaning of a situation or event is reappraised as less negative or neutral, the individual is more likely to focus on beneficial thinking patterns leading to situationally appropriate emotions and physical reactions (Ertl et al, 2013; Ziegler, 2001). Ideally, the ability to appraise a situation as a challenge enables the individual to grow, leading to reduced anxiety and more productive emotions (Horn & Smith, 2019)

Effective assessment of the event-appraisal-emotion sequence associated with cognitive reappraisal is dependent on increased self-awareness, the inward focused attention and contemplation intended to enhance knowledge and familiarity of conscious and unconscious values, beliefs, and habits. Self-awareness is enhanced by intentionally and objectively questioning oneself in a moment of action, looking back on past actions or behaviors, and considering feedback provided by others (Carden et al, 2022). This deliberate evaluation increases mindfulness of the internal state that drives observable behaviors and enhances discernment of how others are impacted and influenced (Carden et al, 2022).

Behavioral Suppression

Behavioral suppression, also referred to as response modulation, challenges an individual to think about and either hide, inhibit, or reduce behaviors related to their emotional responses and is used after an emotional response is activated (Zhang et al, 2019; Cutuli, 2014; Friesen, n.d.). Although Cutuli (2014) indicates cognitive reappraisal is healthier than behavioral suppression, behavioral suppression can be effectively employed following an unexpected emotionally triggering event to produce a situationally and socially acceptable response (Friesen, n.d.). It should be noted that behavioral suppression does not mean emotional suppression, the conscious hiding or attempting to stop one's own emotions (Gross & Levenson, 1993). Rather, observable behavior is regulated while effectively processing emotions and utilizing psychological skills toward a better resolution.

Both cognitive reappraisal and behavioral suppression can be difficult to implement when an individual is experiencing strong emotional reactions. Adolescents can benefit from the assistance and guidance of trusted adults. However, social learning theory states that modeling can lead to both healthy and unhealthy behaviors (Zelkowitz et al, 2017) so adults who are

themselves vulnerable to emotional dysregulation may perpetuate unproductive emotional and behavioral patterns. Therefore, adults who wish to support development of adolescent emotional regulation should themselves exercise reflective practice by critically assessing their behaviors and continuously adapting to more productive emotional regulation. Proactive adult behavior modification through emotional regulation techniques can build more stable relationships with adolescents and ensure youth feel secure and confident in the relationship (Lisinskienė & Lochbaum, 2018).

An effective technique for deescalating an emotional reaction is the Name It & Tame It skill (Siegel & Bryson, 2012) which is strongly supported by Affect Labeling (Lieberman et al, 2007). As a strong emotional response is recognized by the subject or an observer, the emotional and behavioral response can be de-escalated by identifying and putting into words the accurate emotion being felt or expressed. The explicit marking and labeling of the emotion down regulates the brain's automatic response allowing logical processing to reengage and work toward a more productive resolution (Lieberman et al, 2007). As with any skill, this psychological technique requires repeated efforts to address emotional challenges as they arise which test an individual's sources of psychological resources (Cutuli, 2014).

Psychological Skills

Athletes and other performers who compete, act, or entertain "on stage" are expected to execute proficient actions, meet standards, respond to high demands, employ coping strategies under stress, manage judgment about proficiency or excellence, and face the consequences for their level of performance (Hays, 2009). Research shows that up to 80% of performers experience anxiety, 59% believe performance anxiety affects their performance quality, and anxiety increases as public performance approaches (Su et al, 2010). Self-talk and relaxation are

foundational mental performance skills which help manage the mind and body's response to performance anxiety. Both are often taught during late adolescence and adulthood but are also beneficial for early adolescents when adapted with a developmentally appropriate approach. Just as deliberate practice is required to advance sport-specific skills, psychological skills should be practiced well before important events to fully absorb them into the skill inventory. Lack of practice may lead to inappropriate application and may hinder other mental and physical skills (Su et al, 2010).

Self-Talk

The skill of self-talk, part of a larger thought management strategy, is the proactive production of short, concise, healthy, and helpful thoughts, verbalizations, or statements directed toward the self to counter unproductive, disruptive, and anxiety-producing cognitions (Horn & Smith, 2019; Hays, 2009; McCarthy et al, 2009) such as self-critical opinions, counterproductive monologues, irrational thoughts, and cognitive distortions (Hays, 2009). These destructive self-statements are often conditioned in the mind as over-learned automatic responses to performance stress and pressure (Hays, 2009) and have a negative effect on performance (Hays & Brown, 2004). Self-talk allows an individual to reframe their situation, especially valuable during cognitive reappraisal and behavioral suppression, to reinterpret the circumstances into a more constructive fashion (Hays, 2009). Along with affirmations and cue words, this psychological skill can be instructional or motivational and improves performance by directing attention, restricting distractions, and maintaining confidence in competitive environments (Hays, 2009; Hays & Brown, 2004).

Early adolescents have been reported to have a marginal inherent understanding of the purpose and benefit of self-talk (McCarthy et al, 2009), so they will likely need assistance from

trusted adults to understand the skill's purpose and implementation. The skill can be learned and enhanced by creating a list of self-talk statements and situations where they would find them helpful. They can also identify recent and meaningful unhealthy thoughts and pair them with healthy thoughts to focus on instead. They may also benefit from discussing real life challenges and situations, expressing what they learned, what productive actions they took, and what they can do better next time. These lessons can generate more specific statements that can be added to their self-talk list.

Relaxation

Relaxation is a collection of skills and techniques used to direct physical and mental energy by managing stress, anxiety, and muscle tension associated with performance demands (Hays, 2009). Anxiety is an internal feeling of uncertainty or self-doubt caused by disproportionate focus on an unknown future and is often accompanied by unreasonable thinking patterns, such as catastrophic thinking and overgeneralizing (Su et al, 2010). Although athletics and other performance domains, including academic events such as test taking, are inherently stressful and participants benefit from some pre-performance anxiety, the initial emphasis on relaxation to reduce mental and physical effects of stress provides a simple introductory skill during early adolescence. Basic relaxation techniques help adolescents learn to regulate their mind and body which sets them up to engage more complex body-based skills later, such as energy management, focus, attention, mindfulness, and meditation.

Shallow, irregular, or dysregulated breathing stimulates the sympathetic nervous system, triggering anxious physical responses such as elevated heart rate, tense muscles, and decreased motor control (Chen et al, 2017; Hays, 2009), increasing performance angst and potentially overriding previously learned mental skills (Hays & Brown, 2004). Diaphragmatic breathing, a

foundational relaxation technique, utilizes deep, controlled breaths which activate the parasympathetic nervous system, helping to reduce anxiety, increase concentration and relaxation, raise body temperature, and stabilize heart rate and blood pressure (Chen et al, 2017). Additionally, reduced anxiety and muscle tension preserves energy longer, allowing the athlete to stay relaxed, loose, and focused longer, and reduces fatigue late in performances (Hays, 2009). Focused breathing may also direct attention away from unhealthy cognitions by providing a distraction, such as counting breaths or the duration of each breath.

Relaxation breathing is best applied shortly before a performance. Su et al (2010) recognized significant short-term reductions in performance anxiety when techniques were applied five minutes prior to an event versus 30 minutes prior. The simplicity of the skill, lack of necessary equipment or space, and dramatic impact in a short period of time makes relaxation breathing a practical method for reducing performance anxiety. Although the skills is best applied just prior to a performance, the ability to learn the skill for effective application requires deliberate practice over a longer time period.

Adolescents generally grasped the sport and performance psychology understanding of mental and physical relaxation by focusing on stress reduction, anger management, confidence, concentration, and success (McCarthy et al, 2009). They will likely need help from parents, coaches, and other trusted adults to understand and integrate relaxation into practice for greatest benefit.

Method

The author reviewed and directly cited 60 references to support the research hypothesis that introducing psychological skills training during early adolescence positively affects emotional regulation, self-concept, and self-confidence for increased athletic and academic

performance during middle and late adolescence. The information presented is based on previously published articles and does not report original research. This research review summarized existing literature on the topic of adolescent developmental stages, learning processes, and environmental influencers as they relate to adolescent emotional skill development, self-concept, and self-confidence as foundational building blocks for adolescent sport and athletic success. Information was summarized, and references were cited to explore the benefits and challenges associated with adolescent sport participation, the stress associated with filling a student-athlete dual role, the positive and negative result of the parent, coach, and trusted adult influence, and provided developmentally appropriate approaches to adolescent emotional regulation, self-talk, and relaxation for sport and academic performance.

The vast majority of references were critically analyzed published literature selected based on their recent publication of no more than ten years, many of which reflected recent advancements in the study of physical brain development throughout the lifecycle, neuroimaging research exploring neurocognitive mechanisms through fMRI, and observational behavioral research. The oldest reference from Andrews et al. (1997) was used in conjunction with more recent research and helped provide long-term relevant study and opinions specifically concerning adolescent modeling of poor parent behavior.

Another older reference from McCarthy et al. (2009) was found to be relevant due to the use of open-ended questionnaires received from 118 young athletes between ages 10 and 15 who had participated in school or organized sport in England. The questionnaire aimed to explore what young athletes implicitly understood about psychological skills, specifically goal setting, mental imagery, self-talk, and relaxation as they relate to sport. Participants answered four questions without adult assistance, asking “What do you think (*psychological skill*) means?”

each containing one of the skills. Responses were analyzed for qualitative data as it related to the research team's predetermined definitions encompassing 1st, 2nd, and 3rd order dimensions.

Results

Adolescent Brain Development

Several publications were reviewed to explore adolescent brain development through the various categorical stages of growth. These included both research reviews and participant studies. Participant studies further explored previous themes by including new participants through active or passive involvement, such as observed testing, collected responses, and imaging and mapping of the brain. Research reviews summarized prior publications on maturation of the adolescent brain, child development during significant undesirable adversity, and conscious vs unconscious learning processes.

Gogtay et al. (2004) used longitudinal brain imaging of participants between ages 4 and 21 years, allowing for time-lapse sequences every two years, to study cortical (the outer surface layer of the brain) and sulcal (deep, narrow furrow or grove) landmarks for visual development. They witnessed higher-order associations (voluntary behavior, thinking, perceiving, planning, and understanding language) mature after lower-order (body sensations: touch, pressure, temperature, tickle, and pain; visual information) associations. Although cortical development appears to follow evolutionary sequence, these developments were perceived to be non-linear (not sequential or straightforward).

Arian et al. (2013) provided a literature review that explored MRI studies particular to the formation and development of myelin sheaths, the tissue that protects nerve cells required for insulation and efficient nervous system communication. They concluded maturation of the adolescent brain is structurally and functionally vulnerable to impulsive habits, heredity,

environmental factors, and hormone development. They also established development and maturation of the prefrontal cortex, the frontal lobe implicated in planning complex cognitive behavior, personality expression, decision making, and moderating social behavior, is not fully accomplished until approximately 25 years of age.

Fukuta & Yamashita (2021) performed a 40-person participant study which included undergraduate and graduate students, 18-23 years of age, at national universities in Japan to investigate the complex relationship between conscious and unconscious learning and conscious and unconscious knowledge. By identifying and measuring awareness during learning phases, they deduced implicit and explicit learning are complexly linked to conscious and unconscious knowledge. Although this study was focused on linguistics, it shows conscious and unconscious learning is dependent upon the prominence placed on the meaning of an object or experience.

An earlier research review by Kuldas et al. (2013) supports the recent findings of Fukuta & Yamashita (2021) with an emphasis on unconscious learning processes through a mental integration of verbal and pictorial materials. They determined unconscious processing is likely to precede conscious processing through learning processes consisting of interconnected perceptual, cognitive, and emotional stages. Humans experience and engage in highly stimulating environments which provide more data than can be processed through limited conscious capacity. Therefore, unconscious mental symbols, images, and depictions are rapidly taken in and supply information for conscious processing.

Environmental Factors & Influencers

Multiple sources determined parents are an immense determining factor of adolescent development, alongside coaches, teachers, and other trusted adults (Tsai et al., 2020; Álvarez et al., 2019; Blair & Raver, 2012; Lerner & Steinberg, 2004). Tsai et al (2020) observed data from

an on-going 674-person longitudinal study and pulled variables of interest at three adolescent ages for analysis of environmental stress exposure and predictors of late adolescent anxiety with cognitive control as a mediator. Cognitive control was outlined with examples of "capacity to perform an action when there is a strong tendency to avoid it, the capacity to focus and shift attention when desired, and the capacity to suppress and regulate dominant impulses" (p. 3). They determined dysfunctional parents and excessive exposure to distressful environments can negatively impact the development of cognitive control, leading to diminished executive abilities later in life.

Alternatively, Álvarez et al. (2019) reviewed 360 adolescent athletes' responses to the Transformational Parenting Questionnaire asking to what degree each parent behaves as someone that can be trusted (idealized influence), treats the adolescent in ways that builds the adolescent's respect for the parent (inspirational motivation), shows respect for the adolescent's ideas and opinions (intellectual stimulation), and shows comfort and understanding when the adolescent is upset or frustrated (individualized consideration). Scores were totaled to represent perceived transformational parenting behaviors. Also, autonomy support was determined from the supportive behaviors scale, and burnout was assessed with the Athlete Burnout Questionnaire. The authors concluded parental behaviors are a model to inspire children through open communication, explaining limits, listening to adolescent perspectives, opinions, and arguments, and displaying mutual respect.

Lerner & Steinberg (2004) provide an in-depth handbook of adolescent psychology. Their empirical study of adolescence provided multiple citations concerning developmental science. They touched on psychological development, cognitive and brain development,

socialization and self-development, parent-adolescent relationships and influences, developmental stages, and their associated transitions.

Blair & Raver (2012) presented an effective review of child development in the context of adversity with integrated findings from research on stress physiology, neurocognitive function, and self-regulation. Utilizing the life span theory, which conceives humans selectively improve abilities over time, dependent upon biology and experience, and largely unnoticed to influence behavior. Their research was helpful in showing the massive impact on adolescents when they experience significant adversity early in their cognitive development. They also reinforced the effect parents and other caregivers have to potentially harm adolescent development through dysfunctional emotional control and behavior as well as their potential to aid productive and healthy adolescent development by engaging in parenting interventions which alter caregiving practices.

Emotional Regulation, Self-Concept, & Self-Confidence

Several studies provided participant studies or research reviews examining the importance of emotional regulation, self-concept, and self-confidence for student-athlete success. The majority of these examined success and sense of self from an adolescent perspective, including parental expectations, athletic identity, internal and perceived narratives, self-esteem, self-efficacy as well as the perceived stress associated with the dual student athlete role.

Aouani et al (2019) sampled 285 participants with ages ranging 12-18 years and classified them into groups of athletes and non-athletes for the purpose of testing an Arabic version of the Profile of Emotional Competence (PEC) questionnaire. Previous studies reported differing results when they studied theoretical differences between athletes' and nonathletes' emotional competences. Each participant attended three data collection session, each one week

apart, and presented with a PEC designed to evaluate identification, comprehension, expression, regulation, and utilization of emotions. Results validated the assessment tool across cultures and confirmed the importance of assessing and improving emotional intelligence in athletes to enhance and optimize performance.

Wu et al (2021) present a study with 385 adolescent student athletes, ages 12-16 years, exploring adolescent athletes' physical self-concept and how it mediates the relationship between parental expectations and athlete sport achievement. Participants provided numerical responses to various questions concerning parental expectations, physical self-concept, and sports achievement. Descriptive statistics and correlation analysis supported their hypothesis which is reflective of previous research.

Shipherd (2019) took a mixed methods approach to exploring self-efficacy, a function within self-confidence, focused on belief in one's knowledge, skills, and abilities, and sources of self-efficacy through puzzle tasks. Quantitative and qualitative data was collected in the same phase, then analyzed separately and transformed into another form of data before finally analyzing the mixed data together. Eighty-four college student-athletes over age 18 were presented with the Tower of Hanoi puzzle, used to study cognitive problem solving which often requires multiple attempts to solve. Measures were based on number of trials to solve the puzzle, number of moves to solve, and fastest time to solve. Participants rated their confidence based on number of moves and time to complete. Results matched a previous research hypothesis concerning self-efficacy which stated "individuals who are confident in their ability to learn and improve may put forth more time and effort into practicing and improving on tasks, thus resulting in improved performance" (p 230). Sources of self-efficacy were assessed through an open-ended questionnaire asking on a scale of 1-10, "How well can you bounce back after you

tried your best and failed?" Quantitative and qualitative results suggest self-efficacy changes over time.

Hays et al (2009) examined the role of confidence in sport performance by interviewing 14 athletes through an open-ended, semi-structured interview. The three sections comprised of a description of a time they felt least confident going into an important competition (including factors responsible for debilitating confidence), a time they felt most confident going into an important competition, and an examination of any other relevant information which may have been overlooked. All participants recalled performing well when confidence was high and poor when experiencing low confidence. High confidence was dependent upon positive affect, effective competition behaviors, and effective competition focus.

Conclusion

Multiple participant studies and literature reviews acknowledge the adolescent brain experiences immense growth through multiple developmental stages. Structural and process-oriented changes occurring in a non-linear course result in foundational functions and processes maturing early while the full growth and development of logic, reason, emotional control, and goal-directed behavior is delayed, some well into late adolescence and early adulthood. Collective findings show young adolescents lack the ability to grasp complex, abstract ideas and concepts, yet they are able to learn, mimic, and develop gross motor patterns and behaviors through unconscious learning such as modeling the actions of adults.

Parental behavior, along with behaviors of coaches, teachers, and other trusted adults, strongly impacts adolescent implicit and explicit learning. Adults who struggle with stressors and cannot regulate their emotions effectively may disrupt adolescent emotional regulation with effects lasting throughout the life cycle. Alternatively, adults who are well equipped and willing

to develop their self-awareness and regulatory processes will not only provide productive examples, but they may also help adolescents overcome environmental stressors, which otherwise may lead to negative impact.

Sport participation has long been valued to develop fundamental competencies for coping with stress and adversity. Parents and coaches should be warned participation does not guarantee productive character and skill development. Adolescent perception of experience and value of the activity and corresponding relationships determines whether sports are accepted as positive or negative. Adolescent self-perception is vital to the development of self-concept and self-confidence. These reflective mechanisms, which encompass athletic identity, narratives, self-esteem, and self-efficacy, help develop a holistic identity and are necessary elements of healthy growth and optimal sports performance.

The information collected and presented by this publication review has determined age-appropriate psychological skills training during early adolescence positively affects emotional regulation, self-concept, and self-confidence for increased athletic and academic performance during middle and late adolescence with lasting effects throughout the life cycle. Adolescents can learn and retain mental skills during any of the theoretically established developmental stages so long as the learning process is appropriate and environmental factors are healthy.

Discussion

The ability to regulate emotions is essential for adolescent student-athlete success. Early development of coping skills and adaptation abilities contribute to self-control, decision making, and optimal performance in academic, athletic, and life domains. Increased awareness of self and environmental influencers as well as deliberate practice and reflection of mental skills are likely to benefit adolescents throughout developmental stages. The combination of psychological skills

development and supportive trusted adults leads to the enhanced ability of adolescents to manage inherent stress of sport participation and other activities concurrent with academic, social, and home life experiences. Cognitive reappraisal and behavioral suppression help adolescents and influential adults become more socially interactive, emotionally engaged, and situationally responsive by reframing events and producing more productive emotions and behaviors.

Learning psychological skills and coping mechanisms is an experiential process where adolescents learn best by doing, and they perform best when parents and coaches create a supportive environment. As adolescents progress through developmental stages, they experience the need for continued support from parents and other trusted adults while striving for autonomy by testing their boundaries and abilities. Transformational parents and adult leaders can enhance adolescent self-confidence, effort, and empowerment by inspiring and motivating adolescents to exceed performance expectations, shaping their beliefs and attitudes, and positively effecting motivation, commitment, satisfaction, and other outcomes applied in many domains, including athletics, academics, and home life.

Adult behavior is observed, internalized, and mimicked by conscious and unconscious adolescent learning mechanisms. Productive and counterproductive behaviors demonstrated by adults can lead to similar behaviors being assimilated by adolescents with lasting impacts throughout the lifecycle. Responsive adults can help adolescents develop healthy emotional regulation and coping mechanisms by developing their emotional regulation strategies, modeling appropriate behavior, exposing adolescents to productive environments with other adults who demonstrate effective use of mental skills and emotional regulation, and providing opportunities for adolescents to deliberately practice mental skills without fear of shame or punishment for perceived mistakes.

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