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Resilience as a Mediating Factor for Behavioral and Academic Outcomes for Adolescents with Executive Functioning Impairments

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RESILIENCE AS A MEDIATING FACTOR FOR BEHAVIORAL
AND ACADEMIC OUTCOMES FOR ADOLESCENTS WITH
EXECUTIVE FUNCTIONING IMPAIRMENTS

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

Bronwyn Louise Lehman

College of Education and Behavioral Sciences
Department of School Psychology

December 2018
This Dissertation by: Bronwyn Louise Lehman

Entitled: Resilience as a Mediating Factor for Behavioral and Academic Outcomes for Adolescents with Executive Functioning Impairment

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in Department of School Psychology, Program of School Psychology

Accepted by the Doctoral Committee

______________________________
Achilles N. Bardos, Ph.D., Research Advisor

______________________________
Robyn Hess, Ph.D., Committee Member

______________________________
Brian Johnson, Ph.D., Committee Member

______________________________
Thomas Dunn, Ph.D., Faculty Representative

Date of Dissertation Defense ______________________

Accepted by the Graduate School

______________________________
Linda L. Black, Ed.D.
Associate Provost and Dean
Graduate School and International Admissions
Research and Sponsored Projects
ABSTRACT


Executive functioning (EF) and resilience have become topics of interest in psychology and education as being key components in determining a person’s ability to engage meaningfully and effectively within their environment as well as a reason for better than expected outcomes. The purpose of this study was to examine whether self-reported resilience factors could account for certain behavioral, adaptive, and academic outcomes for adolescents in the presence of executive functioning difficulties. Mediation analysis was utilized to determine resilience (measured using the Journey to Wellness scale) as a mediating factor for academic and behavioral outcomes (measured using select subscales on the Behavior Intervention Monitoring Assessment System). Executive functioning was measured using the Comprehensive Executive Functioning Inventory-Adult (CEFI-Adult). Study participants ($N = 86$) included two groups: Group 1 had low average scores on the CEFI-Adult and/or endorsed the presence of a disability and Group 2 had average scores on the CEFI-Adult and no disability. As expected, there was a significant positive relationship between EF and wellness. Mediation analysis revealed resilience was significant in predicting outcomes related to both externalizing and internalizing behaviors with Group 1 and externalizing behavior for Group 2. Findings
have implications for intervention planning with a focus on resilience building for students affected by EF weaknesses.
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CHAPTER I

INTRODUCTION

Executive functioning (EF) has only recently become part of everyday psychological and educational terminology, as well as an area targeted for intervention, but has been considered a significant contributor to psychological functioning for decades (Goldstein, Naglieri, Princiotta, & Otero, 2014; Luciana, 2016; Miyake & Friedman, 2012). Executive functioning refers to goal-directed behavior and is essential to successful or efficient human functioning (Diamond, 2013). However, when EF is impaired, most notably in children and adolescents, negative effects are particularly observable in the educational environment (e.g., observable impulsive behavior, poor attentional control, disorganized work, lack of work completion, and failing or poor grades, etc.; e.g., Barkley, 1997; Blair & Diamond, 2008; Welsh, Nix, Blair, Bierman, & Nelson, 2010). Although there is general agreement on the disrupting effects of poor EF, there is no one single agreed upon definition of executive functioning or whether it is a unitary or non-unitary construct (Jurado & Rosselli, 2007; Naglieri & Goldstein, 2014; Rau, Suchy, Butner, & Williams, 2016).

From a unitary perspective, EF is truly the umbrella utility that accounts for specific, goal-directed behavior wherein one is able to utilize an efficient problem-solving strategy in working toward a future goal (Goldstein et al., 2014; Naglieri & Goldstein, 2014). Conversely, research with neurologically impaired patients,
specifically those with injuries to the prefrontal cortex, describes EF as a non-unitary construct given the various and unique profiles of EF dysfunction seen with brain-injured patients (Rau et al., 2016). Additionally, neuroimaging from a large twin study identified unitary EF correlates (i.e., abilities such as updating, shifting and inhibition) as well as separability or uniqueness that were far from 1.0 (Miyake & Friedman, 2012). As noted, despite differences in how EF is defined within the context of a unitary or non-unitary perspective, EF impairments can have a substantial negative effect on a person’s day-to-day functioning.

Relative to the current research, a pertinent discussion is the evaluation of behavioral and academic correlates of executive functioning impairments and implications for potential treatment. Although there is no universally accepted definition of EF, much of the literature supported the understanding that EF refers to goal-directed behaviors involving capacities such as working memory, inhibitory control, planning, and shifting or cognitive flexibility (Barkley, 1997; Chung, Weyandt, & Swentosky, 2014; Clark, Prior, & Kinsella, 2000; Diamond, 2013; Ylvisaker, Hartwick, Ross, & Nussbaum, 1994). For the purposes of the current research, EF was conceptualized as a single entity with the understanding that this construct encapsulated a number of behaviors responsible for higher-order functioning (Naglieri & Goldstein, 2014).

Executive functioning is essential to successful or efficient human functioning in many areas such as school and work, managing daily life decisions, social and psychological development, and mental and physical health (Diamond, 2013). As such, it is not difficult to understand how deficits in EF are linked to a number of psychopathologies (Diamond, 2013; Halperin, 2016; Levine & Craik, 2012; Luciana,
Some notable pathological associations of EF impairment include attention-deficit/hyperactivity disorder (ADHD), traumatic-brain injury, and learning disabilities (LD; Barkley, 1997; Clark et al., 2000; Crowe, Catroppa, & Anderson, 2014; Gray, Fettes, Woltering, Mawjee, & Tannock, 2016; Ryan et al., 2015; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). Recently, researchers have found EF deficits can be found in those with posttraumatic stress disorder (PTSD) as well as individuals exposed to chronic or repeated stressors, especially in the presence of comorbid depression (Olff, Polak, Witteveen, & Denys, 2014; Polak, Witteveen, Reitsma, & Olff, 2012). Further relevant to the current research is the negative relationship of EF impairment to academic performance, even in the absence of comorbid ADHD and/or learning disability (Fuhs, Nesbitt, Farran, & Dong, 2014; Morgan et al., 2016).

Further, people with EF impairment are likely to have less capacity for handling stress responses given that EF is central to managing or coping with stress (Homaifar, Gibian, & Petrik, 2014). Since physiological stress responses interfere with the ability to efficiently adapt or employ cognitive flexibility to engage in optimal coping, it is believed those with EF impairment are more likely to adapt poorly to a given situation (Homaifar et al., 2014; Obradovic, 2012). Conversely, non-impaired EF is associated with well-developed self-regulation capacities including the ability to flexibly tap into a fund of coping strategies (Homaifar et al., 2014). This, in-turn, is a strong predictor of competency across a wide range of risks including the capacity for adaptive response in the face of stressors and adversity (Homaifar et al., 2014; Obradovic, 2012; Shultz et al., 2016).
Just as efficient EF can serve as a buffer to adverse events, decades of research have supported the notion that a number of resilience factors help some children thrive in difficult circumstances (Obradovic, 2016). Conversely, those who lack resilience factors are at higher risk for behavioral, academic, and health problems (Obradovic, 2016). Rutter (2012) described the latter phenomenon as an “interactive concept” that posits clear individual differences in the response of the person and the environmental risk or adverse experience, noting resilience aids in the reduction of vulnerability to environmental risk experiences (p. 336). In this context, resilience is viewed in terms of risk and protective factors (Rutter, 2013). In the former discussion, intact EF is conceptualized as a protective factor, while impaired EF might be defined as a risk factor or vulnerability.

One particular protective factor and a key aspect of EF, self-regulation, appears as a central component to adaptation including positive adaptation to school (Blair & Diamond, 2008). Further, in the context of resilience, self-regulation including emotional regulation is viewed as a critical cognitive ability in increasing the likelihood of positive outcomes (Moffitt et al., 2011; Rutter, 2013). Consequently, the question can be asked: are resilient outcomes less likely in individuals with poor EF? Since individuals might show different levels of resiliency at different times and contexts in their lives, it might not be possible to answer this larger question with a single study. However, a starting point might be to establish whether there is a positive correlation between indicators of EF and indicators of resilience. Additionally, if individuals with poor self-reported EF endorse a number of resilience factors (e.g., competency, wellness, adaptability,
interconnectedness), do these factors mediate potentially negative outcomes, specifically behavioral dysregulation and academic impairment?

**Rationale for Study**

Although EF is most often associated with the prefrontal cortex, it actually requires communication between a number of neural networks including the prefrontal regions, posterior cortex, and subcortical regions such as the basal ganglia and the ventral striatum in order to be efficient (Halperin, 2016; Reynolds & French, 2005). Brain development and maturation take place from the posterior to anterior regions; higher level or more complex behavioral and mental capacities emerge as the brain develops including the development of EF in the prefrontal cortex (Chung et al., 2014; Reynolds & French, 2005).

Luria’s (as cited in Reynolds & Horton, 2008) neurodevelopmental theory, which is often referred to as the primary framework in understanding neuropsychological functional growth, provides an in-depth explanation for the interactive evolution from basic to the most complex neuropsychological functioning. Briefly, Luria’s model contains five stages with the fifth stage most relevant to EF. During this stage, the frontal lobes become functionally developed (around eight years of age), allowing for greater regulation or control of cognitive processes housed within the frontal lobes (as cited in Reynolds & Horton, 2008).

Functional development is the key term as the developmental trajectory of EF is not fully understood with a definitive time-frame set for activation (Anderson, 2002). Rather, EF is thought to emerge in very early childhood (i.e., one to three years of age) with facets of EF activated and developed at varying times during this period (Anderson,
Although exact developmental timeframes are not fully certain, Luria (as cited in Reynolds & Horton, 2008) proposed that key to successful EF emergence and maturation was appropriate interaction with and exposure to nurturing environmental stimuli.

As such, when EF is intact and efficient communication between neural networks is in place, the necessary foundation for cognitive, behavioral, and social development is enabled (Crowe et al., 2014). Conversely, executive dysfunction might impede a child’s capacity to interact with the environment in a strategic manner, leading to reduced social and academic skill acquisition and impairments across the lifespan (Crowe et al., 2014; Reynolds & Horton, 2008). For example, children with executive dysfunction might engage with their environment in an impulsive or hostile manner, employ inappropriate social behavior, demonstrate reluctance to changing routine or activity, and resist modifying maladaptive behaviors (Anderson, 2002).

Emerging and intact executive functioning abilities are critical for childhood development; this capacity continues to develop into adolescence with EF being equally critical during this time period (Guare, Dawson, & Guare, 2012; Kirke-Smith, Henry, & Messer, 2014; Luciana, 2016; Reynolds & Horton, 2008). Importantly, during this developmental period, EF should be continuously refining to meet more complex situational demands (Luciana, 2016). For example, EF is important for self-monitoring, planning, and evaluating adaptive responses across the developmental lifespan; early development of these components sets the stage to enable efficient adaptive response during adolescence (Luciana, 2016; Reynolds & Horton, 2008). Further, as structural neurological changes occur to support continued maturation of EF, abilities such as emotional regulation, inhibition, planning and goal-directed action become more
apparent, which, in turn, are key to making goal-directed decisions as well as adaptive functioning (Guare et al., 2012; Lee, Sibley, & Epstein, 2016).

Conversely, when executive dysfunction is present, students within this age group are more likely to engage in impulsive reward-seeking and risk-taking behaviors (DuPaul, Junod, & Flammer, 2006; Guare et al., 2012; Luciana, 2016). Deficits in EF can also lead to impairments in motor control; decrease the likelihood of inhibition of task-irrelevant responses, insensitivity to response feedback, and inability to execute efficient goal-directed responses; and poorer ability to re-engage in a task after being interrupted (DuPaul et al., 2006). Those with EF impairments have also been shown to have comorbidity with a number of psychopathologies associated with internalizing disorders including depression and bipolar disorder among others and conjointly, creating a more likely scenario in which adaptive responding is diminished (Halperin, 2016; Polak et al., 2012).

When diminished, three elements of EF have continually emerged as the most strongly tied to academic, behavioral, and social difficulties: working memory, inhibition, and cognitive or set shifting (Blair & Diamond, 2008; Luciana, 2016; Rapport, Orban, Kofler, & Friedman, 2013). Two of these executive functions, cognitive flexibility or shifting and emotion regulation (which can be tied to inhibition), have been identified in research as intrapersonal factors important to resilience (Joseph & Linley, 2006). Additionally, working memory and cognitive flexibility have been implicated in the management of stress responses (Homaifar et al., 2014).

Consequently, the presence of such EF difficulties interfere with adaptation; it is thought this adaptive control begins with recruiting such EF-based resources (Luciana,
2016; Olff et al., 2014). For example, a non-impaired executive system allows one to efficiently respond to novel situations, identify previous coping strategies, and obtain identified goals in a complex social structure (Homaifar et al., 2014; Luciana, 2016). In the face of impaired EF, one is less likely able to exert control, even when demands are low, with the implication that adaptive control is even more greatly impacted when demands are more salient (Luciana, 2016).

Shultz et al. (2016) also made the connection between poor adaptive functioning and EF impairment given the role it plays in facilitating a number of adaptive skills (e.g., planning, organizing and responding flexibly; engaging in functional communication, and solving social problems). Further, studies evaluating EF in patients with PTSD and depression linked impairment to a greater likelihood of engaging in maladaptive coping (Porter, Bourke, & Gallagher, 2007). Patients with EF weaknesses displayed greater difficulty with inhibiting negative stimuli (i.e., attentional bias to irrelevant negative information) and correlated with the use of avoidance as a means of coping (Porter et al., 2007).

For the purposes of this research, diminished adaptive ability of those with EF impairments is a critical area of focus given poor adaptive control has the potential to increase the likelihood of negative outcomes. In other words, EF, when impaired, is linked to reduced skills in stress management and poorer adaptive responses. In turn, these deficits might contribute to maladaptive outcomes (e.g., more likely to engage in negative behavioral responses, to utilize ineffective coping strategies, and have worse academic performance; Homaifar et al., 2014; Luciana, 2016).
Furthermore, EF is important for successful engagement and/or response to traditional treatments that target many of these problems (e.g., cognitive behavioral therapy, behavior therapy; Dunkin et al., 2000; Mohlman & Gorman, 2005; Polak et al., 2012). Therefore, when EF is impaired, individuals may experience limited success with behavioral change interventions, i.e., a student needs to have a functional level of EF to benefit from a behavior-based study or social skills intervention.

Although considerable research has gone into these traditional treatments as a means of improving functioning, recent trends in psychology promote the use of positive approaches to developing strengths as opposed to only targeting negative behaviors for change. An alternative perspective might be to consider the role factors of resilience play in tempering these maladaptive outcomes for adolescents with EF impairment. In other words, if resilience factors can be shown to reduce or buffer against the effects of EF impairment, new treatment approaches might incorporate strategies to enhance resiliency factors rather than solely focusing on remediating EF deficits. These types of approaches could be used either in isolation or in conjunction with traditional therapeutic approaches.

**Theoretical Basis of Resiliency**

Resilience is a term for which there is no universally adopted definition but it has been aggregately defined as the ability to bounce back, adapt to stressors, or positively adapt despite adversity (Haglund, Nestadt, Cooper, Southwick, & Charney, 2007; Huberty, 2012). One early definition offered by Rutter (1990) described resilience as “maintaining adaptive functioning despite serious risk hazards” (p. 209). The key term in Rutter’s definition was “maintaining adaptive functioning,” suggesting a focus on outcomes. Therefore, resilience might be best defined and understood as “an end product
of buffering processes that do not eliminate risks and adverse conditions in life but allow the individual to deal with them effectively” (Werner & Smith, 2001, p. 3). Resilience is a critical concept in the mental health of children as it has been linked to countering innate vulnerability and risk-factors; it also aids in the ability to maintain or regain mental health (i.e., better outcomes; Modesto-Lowe, Yelunina, & Hanjan, 2011; Stewart, 2011).

Consistent in resilience research is not only the focus on vulnerability or risk-factors but recognition of protective factors or protective mechanisms (Masten, 1994; Werner & Smith, 2001). Protective factors can be defined as buffering mechanisms that aid an individual’s response to stressors or chronic adversity, allowing for better adaptation. These factors might include innate, biological factors as well as those in the family, social network, and community (Masten, 1994; Werner & Smith, 2001; Wright, Masten, & Narayan, 2013).

Within many models of risk and resiliency (e.g., diathesis stress model), protective factors play a key role in mitigating potential adverse outcomes due to an individual’s biologic vulnerabilities or environmental risks. In fact, the presence of protective factors has been demonstrated to predict long-term positive outcomes despite risk (Modesto-Lowe et al., 2011; Zuckerman, 1999). For example, factors associated with resilience, those that buffer against adversity such as environmental supports and opportunities, predicted positive outcomes in more than 50% of high-risk populations (Bernard, 2004; Werner & Smith, 2001).

A key understanding of resilience is the conceptualization of person x environment interaction (Ungar, Ghazinour, & Richter, 2013). This conceptualization includes individuals and their unique development in the context of their socio-cultural
experiences (Ungar, 2011). From this perspective, resilience is an end product of the interaction between the individual (including biological, psychological, and dispositional attributes) and his or her external supports and systems when faced with stressors. With the latter, attributes and external supports/systems are classified as protective factors if they serve to buffer or enhance the likelihood of better outcomes or enhance the likelihood of better outcomes.

As discussed, at the core of resiliency is the focus on the outcome wherein a person demonstrates the ability to adapt and, therefore, thrive despite serious risk. Stemming from this concept is the idea that if a person’s innate tendency to adapt is manifested appropriately, there is greater likelihood to overcome adversity (Harvey, Pearrow, & Seaver, 2015). Therefore, learning to adapt appropriately in the face of adversity, including fostering resilient outcomes in adolescents who have been exposed to risk factors (e.g., environmental risk and vulnerable biological predispositions), has become a target of preventive interventions (Armistead, 2007; Goldstein, 2008; Huberty, 2012; Ungar, 2011). Recent research has established that those who possess factors contributing to resilience (i.e., innate protective factors, social and cultural protections) are better at adapting and handling the stress response and has now turned toward demonstrating that these individual processes can be taught (Goldstein, 2008; Wright et al., 2013).

As noted, one such group that displays difficulty adapting to situational changes including daily stressors is individuals with EF dysfunction or deficits (Homaifar et al., 2014). Not only are they likely to have poorer adaptive skills, they are at greater risk for adverse experiences given the impairment they experience in their daily functioning
(Coleman & Hagell, 2007). For example, impulsive, risk-taking behaviors might contribute to an increased chance of injury. In summary, individuals with impaired EF are considered to be at risk due to their poor adaptive abilities. Although many adolescents with executive dysfunction have significant to moderate functional disruption across social, emotional, and occupational domains, a small percentage of these are youth (about 20%) who do not display impairment across these domains (Schubiner & Katragadda, 2008). Therefore, a logical next step is identifying what sets this subgroup apart, starting with a focus on outcome predictors (Lee et al., 2016; Modesto-Lowe et al., 2011).

**Need for Study**

Luria (as cited in Reynolds & Horton, 2008) proposed that successful development of higher cognitive functions, including EF, required the interaction of healthy neurological development with environmental stimuli. The result of this appropriate interaction would include higher cortical functioning such as language, intention, memory, and EF (Reynolds & Horton, 2008). Similarly, resilience can be understood as an adaptive interaction with one’s environment, particularly if such external stimuli are threatening or averse to human functioning (Rutter, 1990).

Therefore, if EF has not developed appropriately due to the interaction stemming from vulnerable neurological factors and an adverse environment, and resilience processes are also poor, one might conclude greater negative effects. Conversely, if more resiliency factors are present, even in the face of poor EF, might they mitigate or mediate such negative outcomes?
Of additional relevance to the current research on the role of resilience on development is the notion that schools, including institutions of higher education, possess many of the tools needed to promote positive development and facilitate resilience for those most at risk for negative outcomes (Armistead, 2007; Masten, Herbers, Cutuli, & Lafavor, 2008). However, there is limited current research on the role of resilience factors in adolescents/emerging adults with EF dysfunction. This population might benefit from interventions that target resilience building given the ongoing plasticity of the adolescent brain and dynamic nature of the development at this stage, making this age group particularly susceptible to environmental influences (both positive and negative; Guare et al., 2012; Konrad, Firk, & Uhlhaas, 2013; Sibley, Kuriyan, Evans, Waxmonsky, & Smith, 2014). Such interventions might also be needed due the fact that this time period is marked for increased demands on autonomy and a need to develop future planning and goal setting abilities among others (Konrad et al., 2013).

**Purpose of Study**

Recent trends in psychology promote the use of positive approaches to enhance strengths as opposed to only targeting negative behaviors for change (Cohn & Fredrickson, 2010; Seligman, Ernst, Gillham, Reivich, & Linkins, 2009). Therefore, this study explored the role of resiliency factors in buffering the negative effects of EF impairments on adolescent students. The purpose of this study was to evaluate resilience factors as a mediator on behavioral and academic outcomes among students with self-identified executive functioning impairments. An understanding of how resilience factors interact with EF impairment might assist in developing interventions that build on critical protective factors to help foster resilience. These types of strategies could be used
in conjunction with the provision of explicit resilience-based strategies to those who present with underdeveloped or poor internal resilience factors (Climie & Mastoras, 2015; Modesto-Lowe et al., 2011). When applied to the adolescent/early adult population of individuals with weaker EF, there might be potential to see long-term and/or generalized benefits.

**Research Questions**

The following research questions guided this study:

Q1 What is the relationship between psychological well-being as measured by the Journey to Wellness Scale (JWS) and executive functioning as measured on the Comprehensive Executive Functioning Inventory For Adults (CEFI-Adult)?

Q2 Does psychological wellness mediate externalizing behavioral outcomes (conduct-related behaviors; as measured by the Behavior Intervention Monitoring Assessment System [BIMAS2]) of students with and without executive functioning impairment?

Q3 Does psychological wellness mediate internalizing behavioral outcomes (negative affect; as measured by the BIMAS2) of students with and without executive functioning impairment?

Q4 Does psychological wellness mediate academic outcomes (as measured by the BIMAS2) of students with and without executive functioning impairment?

Q5 Does psychological wellness mediate social adaptive skills (social functioning; as measured on the BIMAS2 Social Functioning Scale) for students with and without executive functioning impairment?

**Delimitations**

This study was time-limited in that EF, resilience, and outcomes were measured at one point in time. Resilience might be best studied through longitudinal research given the natural developmental maturation of EF. An additional limitation that might have compromised conclusions and generalizability of the study was participants were drawn
from a convenience sample. Although individuals who are 18-years-old are considered adolescents developmentally, this research was directed toward a restricted age range within the period of adolescence. Further, the fact that many participants were enrolled in a university or community college likely spoke to the fact that their executive functioning was more intact than their non-college-attending counterparts.

**Definition of Terms**

**Attention.** Ability to focus on tasks, sustain concentration, and avoid distractions (Fenwick & McCrimmon, 2015, p. 65).

**Adaptability.** Ability to navigate difficult situations and stressors and reflective of one’s ability to be prepared for change (Weller-Claire, 2006).

**Buffering processes.** Internal and external protective mechanisms that aid in resilient outcomes. Salient buffering processes include but are not limited to positive adaptation, competence, interconnectedness, cognitive flexibility/reappraisal, social-support, and positive emotions (humor, optimism; Haglund et al., 2007; Herrman et al., 2011; Huberty, 2012; Luthar & Zelazo, 2003; Rutter, 1990; Weller-Claire, 2006; Werner & Smith, 2001).

**Competency.** Ability to meet expected developmental tasks defined by the child’s culture or society in spite of exposure to adversity (Wright et al., 2013).

**Emotion regulation.** Management and control of emotions including reacting with appropriate emotional responses to situations (Fenwick & McCrimmon, 2015, p. 65).

**Executive dysfunction.** Reflective of difficulties that interfere with goal-directed, purposeful, and adaptive behavior such as organization, problem-solving,
decision-making, cognitive flexibility, reduced working memory, inhibition, and task initiation, which can affect cognitive, emotional, and behavioral functioning (DeBattista, 2005; Homaifar et al., 2014).

**Executive functioning.** A set of cognitive and behavioral control abilities that allow for goal-directed, purposeful behavior in everyday life (Rau et al., 2016; Suchy, 2009).

**Flexibility.** One’s ability to meet the circumstances of the situation by adjusting his/her behavior including using various approaches to problem-solve (Fenwick & McCrimmon, 2015, p. 65).

**Frontal lobes.** The most anterior or frontal part of the human brain and where the prefrontal cortex is located. Responsible for higher order cognitive functions needed to successfully perform complex tasks involving a variety of psychological processes including but not limited to executive functioning (e.g., perception, working memory, self-directed behavior, planning, organization, and behavioral regulation, among many others; Otero & Barker, 2014).

**Inhibitory control.** Ability to control one’s emotional and/or behavioral and impulses (Fenwick & McCrimmon, 2015, p. 65).

**Initiation.** Ability to independently begin tasks or projects including being motivated showing initiative and taking on tasks easily (Fenwick & McCrimmon, 2015, p. 65).

**Organization.** Ability to manage personal work, belongings, or multiple tasks including effective time management and task organization (Fenwick & McCrimmon, 2015, p. 65).
Planning. Creating and implementing strategies to complete tasks including decision making and planning ahead (Fenwick & McCrimmon, 2015, p. 65).

Problem-solving. “Temporal organization of behavior towards goal attainment” and broadly, the capacity to respond effectively through action to a new or unique situation (Garcia-Barrera, Duggan, Karr, & Reynolds, 2014, p. 294)

Protective factors/protective mechanisms. External and internal assets operating as interactive processes that serve as buffers to promote resilient outcomes (Bernard, 1995; Rutter, 1990; Weller-Clarke, 2006).

Resilience. Ability to bounce back and maintain adaptive functioning despite serious risk hazards. An end product of buffering processes that do not eliminate risks and adverse conditions in life but allow the individual to deal with them effectively (Rutter, 1990)

Self-monitoring. Ability to evaluate one’s behavior to determine when a different approach is needed (Fenwick & McCrimmon, 2015, p. 65).

Wellness. Strengths and competencies involving mindfulness, self-efficacy, optimism, connectedness, social-competence, adaptability, initiative, emotional self-regulation, conscientiousness, and empathy (Copeland, Nelson, & Traughber, 2010; Seligman & Csikszentmihalyi, 2014; Weller-Clarke, 2006). A mechanism that promotes positive outcomes in the face of risk or adversity, demonstrating that resilience is engaged, and speaks to the dynamic processes being activated (Bernard, 2004).

Working memory. Ability to hold information in his or her mind that is relevant for knowing what and how to do something (Fenwick & McCrimmon, 2015, p. 65).
CHAPTER II

REVIEW OF THE LITERATURE

This current review of the literature explored the history and evolution of EF, demonstrating the wide-range of understanding and current definitions related to executive functioning. Specifically, this review demonstrated the importance of intact EF during adolescence and the implications for EF impairment as seen through poor behavioral and academic outcomes. Further, this review showcased the relationship between executive dysfunction and poor adaptive functioning with implications for poor behavioral and academic outcomes. Finally, the review highlighted key research in conceptualizing and evaluating resilience as well as the role of resilience factors in relation to executive function.

Evolution of Executive Functioning

Vygotsky (1980) proposed a theory of development rooted in stages in which one’s higher-order development is influenced by interactions with environmental and cultural stimuli (Goldstein et al., 2014; Horton, 1987). This theoretical framework influenced Luria’s (1966) brain-behavior developmental framework in which a dynamic and functional component to brain development was a critical feature for understanding one’s interactions and response to the environment (Goldstein et al., 2014). Importantly, Luria postulated that certain stages of development could be linked to stages of cortical maturation and through an ideal (i.e., healthy) interaction of brain development and
appropriate environmental stimuli would lead to efficiency in cortical functioning including the intact development of executive functioning (Horton, 1987; Goldstein et al., 2014).

How this pattern played out was evident in the child maltreatment literature. Because early maltreatment alters the structure of the brain, including the prefrontal cortex (Wilson, Hansen, & Li, 2010), children who have experienced abuse tend to have poorer executive functioning (a higher order brain function) than those who have not experienced maltreatment. For example, research evaluating differences between maltreated children and non-maltreated children demonstrated significance between the groups on executive functioning tasks involving working memory and fluency (Kirke-Smith et al., 2014).

Similarly, in another study evaluating childhood maltreatment, approximately 80% of the maltreated child population displayed dysregulated emotional patterns in contrast to just 37% of the non-maltreated controls (Maughan & Cicchetti, 2002). Although dysregulation has complex neurological underpinnings as a construct, the ability to inhibit and regulate one’s verbal and behavioral impulses is a core component of executive functioning (Maughan & Cicchetti, 2002; Miyake & Friedman, 2012; Shonkoff, Duncan, Fisher, Magnuson, & Raver, 2011). One could perhaps argue that in these circumstances, the fund of resilience must be greater to counter the toxic environmental stressors that are taxing to the development of such skills, especially given a child’s sustained ability for resilience (O’Connor, Rutter, Beckett, Keaveney, & Kreppner, 2000).
While the lay person (teacher, caregiver, parent) can often pinpoint difficulties in a child’s self-regulation, organization, planning, attentional control, and short-term memory, a false belief is these skills, some of which are the core features of EF, will develop automatically (Shonkoff et al., 2011). Rather, as the Shonkoff et al. (2011) study determined, these skills or absence thereof must be identified and fostered with the early educational environment being a critical component for such development. It is recommended that this environment allow for positive, sensitive, and responsive adult-child relationships to guide a child toward independence requiring the use of executive skills. Failure to do so as well as absence of a nurturing environment might lead to poor EF development with implications for later difficulties in adolescence. It is made worse by the potential development of a learned stress response, setting the stage for maladaptive coping as well as poor behavioral and academic outcomes (Cook et al., 2005; Shonkoff et al., 2011).

Harkening back to Luria’s (1966) model is the well-recognized understanding that EF involves complex neural circuitry. Specifically, the frontal lobes and, in particular, the prefrontal cortex are identified as being a primary activation site for EF but in communication with a wide-range of cortical and subcortical regions (i.e., anterior cingulate, parietal cortex, hippocampus, among others; Diamond, 2002; Halperin, 2016). However, as noted in the introduction, there is widespread debate in the literature whether to classify executive functioning as a unitary construct, with related behaviors that comprise the umbrella EF, or whether there are multiple types of functioning that work conjointly to allow for effective functioning. Halperin (2016) succinctly espoused,
“Much of what we now call executive functions, appears to be in the ‘eye of the beholder’” (p. 444).

There is some consensus that core EF components include the following (with related terms found interchangeably): working memory, inhibition (self-control/self-regulation, resisting impulses) and cognitive flexibility (shifting, task-switching, evaluating different perspectives; Diamond, 2013; Fuster, 1988; Goldstein et al., 2014; Miyake & Friedman, 2012; Shonkoff et al., 2011). Other conceptualizations added selective attention and parsed apart inhibition to include response inhibition and cognitive inhibition (Diamond, 2013). Barkley (1997), a noted researcher in the area of ADHD, has gone so far as to explicitly state that inhibitory control is itself not a true EF; rather, it allows for the necessary delay for executive functioning to be executed. To date, there is no consensus as to whether EF is a unitary or non-unitary structure.

From a unitary system perspective, Baddeley, Della Sala, and Robbins (1996) identified EF as a central executive with information overseen through this executive feature and a sub-system meant to enact certain functions depending on the input of the central executive. This unitary approach has been given more credence in work with young children, specifically in the context of school readiness, but becomes more muddied as the child develops (Fuhs et al., 2014; Hughes, Ensor, Wilson, & Graham, 2009). Further complicating matters is the diversity and impurity of EF assessments, i.e. these measures often assess different behaviors through different theoretical lenses and using varied methods (e.g., performance vs observation; Pennington & Ozonoff, 1996).

Lastly, recent research speaks to convergent evidence for a combined unitary and non-unitary framework with which to view EF (Latzman, Elkovitch, Young, & Clark,
2010; Lehto, Juujärvi, Kooistra, & Pulkkinen, 2003; Miyake et al., 2000). Essentially, this framework supported the idea that EF consists of a central executive with diverse functions—simultaneously unified, yet diverse, but with general consensus on at least three main features: working memory, inhibition, and shifting (Latzman et al., 2010; Lehto et al., 2003; Miyake et al., 2000). Regardless of how strictly one defines EF, this construct has the potential to impact an individual’s life across domains, from mental and physical health to school functioning, and it contributes to effective cognitive, social, and psychological development (Diamond, 2013).

**Academic and Behavioral Characteristics of Students and Adolescents with Executive Dysfunction**

Historically, executive functioning was most commonly evaluated and studied in the context of brain-injured patients but the focus of EF has begun to shift from brain-injured as well as pathological populations to the inclusion of healthy populations given the implications for individual differences on health outcomes (Rau et al., 2016). In their study, Rau et al. (2016) evaluated the presence of hemispheric executive dysfunction in 315 participants considered to be neurotypical (median age 20.8; p. 997). Participants were asked to complete three different EF tasks that tapped various EF demands: a modified computer-based switching task (evaluated form shifting ability to maintain the mental set), a verbal classification, and a spatial classification task (tapping concept formation, switching, and maintaining the set). The first task required differential hemispheric processing demands; it was hypothesized the latter two tasks primarily tapped left hemispheric demands (verbal) and right hemispheric demands (spatial).

Results yielded three separate profiles of healthy participants with particular attention given to localized hemispheric impairment:
1. Average performance, no hemispheric weaknesses

2. Distractibility and decreased alertness in line with right hemisphere weakness

3. Cognitive rigidity (diminished cognitive flexibility) and related to left hemisphere weakness (Rau et al., 2016).

These findings suggested subtle, but identifiable behavioral differences in EF functioning even amongst otherwise healthy individuals when evaluating differences through the lens of lateral hemispheric functioning.

Even among typically developing young adults, differences are likely in EF impairment depending on the individual and/or the population being studied, making the study of executive functioning an important task for a number of reasons. One particular reason centered on the notion that EF is a key component for successful behavioral and emotional regulation, which has implications for classroom functioning—an environment that generally depends on inhibitory control to maximize the likelihood of success (Miyake & Friedman, 2012; Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006).

In the famous marshmallow test, which has been continuously replicated and evolved into a life-span developmental study, Mischel and colleagues (1972) at Stanford University designed a test that tapped a young child’s ability to delay immediate gratification. Implications of the original experiment were evaluated in a study by Mischel et al. (2010) who reviewed longitudinal findings of the original study. Conclusions spoke to the importance of the ability to inhibit an impulsive response (i.e., one that serves immediate gratification) as such early ability to do so seemed to have the potential to lead to protective health outcomes including adaptive mental responding.
(Mischel et al., 2010). Further, Mischel, Shoda and Peake in 1988 and a later study in 1990 by Shoda, Mischel, and Peake demonstrated predictive outcomes and meaningful implications of delaying gratification (i.e., higher SAT scores and better attuned emotional coping in adolescence).

A driving hypothesis for the delay in gratification/impulse control is the notion of attentional control and reappraisal, or the ability to redirect one’s attention away from the motivating stimuli, and/or reappraising the value of the object (Mischel et al., 2010). As noted, the ability to do so early on has demonstrable long-term effects and implications for adaptive and functional well-being. These findings were also supported in a thorough review of the literature by Luciana (2016) on adolescents with depression and executive functioning impairment, namely the role of executive control processes. The ability to control one’s response was primarily tested in situations motivational in nature with executive functioning being the arbiter of such control (Luciana, 2016).

In her review of the nature of impact of depression on EF and, namely, its effect on regulatory processes with the depressed adolescent, Luciana (2016) proposed two key ideas: the first was adolescence itself is a time marked for increased demand on regulatory capacity due to heightened motivational influences and the second was a time in which higher capacity executive systems were going through a critical period of refinement. Although motivational influences might lead to more impulsive acting-out/reward-seeking type behaviors or what typically might be classified as externalizing behaviors (discussed in more detail later), in the case of adolescents with depression and other mood disorders, the problem might lie in allowing the executive load to be activated by motivational demands (Colich, Foland-Ross, Eggleston, Singh, & Gotlib,
Essentially the desire to work toward a future goal is diminished; by extension, activation of effective EF is diminished while at the same time inhibiting the processing of negative response or stimuli is simultaneously more difficult (Colich et al., 2016; Luciana, 2016).

This relationship was demonstrated in a study by Colich et al. (2016) in which 18 adolescents diagnosed with major depressive disorder (MDD) were compared with 15 age and gender matched healthy controls. Participants were tasked with performing an inhibitory control task in the presence of an emotional distractor--a happy or sad face (Colich et al., 2016). Following the provision of a happy or sad face, participants were presented with the go/no-go inhibitory control target and tasked with inhibiting a motor response. In an analysis of variance (ANOVA), participants with MDD were more likely to make inhibitory errors following the sad-face and in general demonstrated abnormal recruitment of control in the prefrontal regions during the inhibitory trial. Subsequently, it appeared the MDD participants had more difficulty inhibiting a response in the presence of a negative or mood-congruent stimulus (Luciana, 2016). Further, Colich et al. hypothesized the selective attention nature of depression, in which one’s attention might be more biased toward negative stimuli, compounded the effect of difficulty, inhibiting the processing of such stimuli.

These key EF abilities--the ability to inhibit primary responses, reattribute, and use attentional control to shift focus to obtain a later reward--were not only diminished in adolescents with depression but also in children and adolescents with disruptive (externalizing) behavioral disorders (i.e., ADHD, oppositional defiant disorder, conduct disorder) and exemplified by adolescents who were more likely to use illicit drugs
The interplay in adolescence between increased motivational influences and an internal neurological striving toward mature cognitive control is perhaps most apparent in externalizing behavior or those classified as reward-seeking, risk-taking, and generally impulsive in nature (Hummer et al., 2015; Olson, Hooper, Collins, & Luciana, 2007).

In their research, Sisk and Zehr (2005) suggested these externalizing behavioral trends—meaning a continual increase and desire toward high-risk, acting out type behavior—occur simultaneously as the brain goes through the restructuring period of refinement and modification. This pruning of neuronal connections in typical development reflects changes in cortical thinning as evidenced by a decrease in prefrontal gray matter but an increase in organization and the volume of white matter (Giedd et al., 1999). Similar to the first 18 months to three years of life in which neuronal connectivity is rapid and there is a pruning of those connections not actively used, a similar effect is occurring during adolescence (Guare et al., 2012; Hummer et al., 2015; Sisk & Zehr, 2005).

This reorganization makes adolescence a somewhat chaotic time period in general but it is especially difficult for adolescents who as a result of delayed or impaired brain maturation are prone to EF weaknesses (e.g., children with ADHD, learning disabilities, mood disorders, etc.; Konrad et al., 2013; Mangina & Beuzeron-Mangina, 2004). For those with EF weaknesses, the executive system might not be refined enough to counter salient environmental influences, leading to manifestations of externalizing behaviors.
such as sensation seeking, reckless behavior, and emotional dysregulation (Guare et al., 2012; Hodgkinson & Parks, 2016).

While refinement of EF capacity, among other neurological changes, is a hallmark during adolescence, weaknesses in EF make this a particularly vulnerable time period. Implications of EF impairment might be best understood through an evaluation of children and adolescents with ADHD—a disruptive behavior disorder in which executive dysfunction is a considerable factor (Barkley, 1997; Willcutt et al., 2005).

In his seminal 1997 article on ADHD, Barkley re-conceptualized ADHD as being a primary impairment in inhibition. Taking influence from Bronowski (1967), Barkley refined a model of ADHD predicated on the neuropsychological function of the prefrontal lobe, specifically a primary component of EF—behavioral or response inhibition. He further linked ADHD impairment to four related EF constructs, all of which collectively lead to diminished control of behavior: working memory, self-regulation of affect/motivation/arousal; internalization of speech; and reconstitution (Barkley, 1997). Specific behaviors potentially impeded included goal-directed behavior and persistence, inhibiting task-irrelevant responses, execution of novel sequences, sensitivity to response-feedback, and control of behavior by internal schema (Barkley, 1997).

A 2005 meta-analysis conducted by Willcutt et al. reexamined the relationship between executive functioning and ADHD. They reviewed 83 studies in which EF tasks—ranging from response inhibition, vigilance, set-shifting, planning, and working memory (verbal and spatial)—were administered to participants with ADHD ($n = 3,734$) and those without ($n = 2,969$; Willcutt et al., 2005). Overall, significant impairment was
found on all EF tasks with effect sizes in the medium range. Most consistent and strongest effects were found with response inhibition, vigilance, working memory, and planning (Willcutt et al., 2005).

In addition to ADHD in their research with adolescents with disruptive behavior disorders (DBD), specifically oppositional defiant disorder and conduct disorder populations, Hummer et al. (2015) found brain maturation was abnormal compared to healthy controls with behavioral weaknesses also attributed to weaknesses in EF. Using magnetic resonance imaging and neuropsychological testing with 33 participants identified with DBD and a matched control sample, researchers identified decreased pruning of grey matter in the anterior cingulate and significantly less fractional anisotropy in white matter tracts in the DBD sample in the corpus callosum and the superior longitudinal fasciculus (Hummer et al., 2015).

Fractional anisotropy contributes to efficiency in organization and coherence in white matter tracts, suggesting such aberrant maturation might contribute to behavioral impairments including weaknesses in working memory (Beaulieu, 2002; Hummer et al., 2015). Importantly, in their research, Hummer et al. (2015) found participants with co-occurring DBD and ADHD were much more likely to be impaired than their healthy counterparts but less so when controlling for ADHD, which might suggest a notable influence of an often co-morbid but separate diagnosis. A key point, however, is when EF is impaired, albeit tied to psychopathology, it tends to worsen outcomes (Halperin, 2016; Shonkoff et al., 2011).

In cases where EF is impaired, implications extend beyond behavioral disruption and, not surprisingly, affect academic development as well (Janke et al., 2014; Kirke-
Smith et al., 2014). In fact, research over time has shown EF is a significant contributor to academic achievement across ages as well as those with and without learning disabilities (Best, Miller, & Naglieri, 2011). At the youngest ages, research related to academic readiness/early skill development suggested executive functioning skills such as inhibitory control, shifting and working memory were important for early math development and early reading development (Janke et al., 2014; Reiter, Tucha, & Lange, 2005). The relationship between academic outcomes and EF has also been substantiated based on research that demonstrated young children made considerable gains in EF and academic skills simultaneously, implying a possible overlap in developmental processes (Fuhs et al., 2014; Shonkoff et al., 2011; Welsh et al., 2010).

In research conducted by Welsh et al. (2010), researchers compared the performance of 164 children from Head Start on three early literacy measures, a norm-referenced standardized math achievement test, and three tests of general executive functioning abilities. The first test tapped verbal working memory and the second and third tests required inhibitory and attentional control for successful completion; the third test also required cognitive shifting or cognitive flexibility (Welsh et al., 2010). The children were tested three times, once at the start of prekindergarten, again at the end of prekindergarten, and, finally, at the end of kindergarten. The researchers found intact working memory and attention control were particularly important to emerging reading and numeracy skills in prekindergarten. In their longitudinal follow-up, these executive function skills were found to make unique contributions in the prediction of math and reading achievement one year later (Welsh et al., 2010).
Similar findings were apparent in research conducted by Purpura, Schmitt, and Ganley (2016) in which EF and early academic readiness were evaluated with 125 preschool children. Purpura et al. (2016) found response inhibition was generally related to most early math components with working memory and cognitive flexibility linked to higher math skills (e.g., comparisons and abstract reasoning). Additionally, working memory and cognitive flexibility were found to be related to print knowledge and working memory was related to phonological awareness (Purpura et al., 2016).

Further, using a one-factor EF solution rather than evaluating different EF abilities, Fuhs et al. (2014) evaluated early academic achievement and EF with 562 four-year-olds at the beginning and end of prekindergarten and end of kindergarten. Six measures of EF were used to develop a unitary construct and tests of achievement were administered. The results demonstrated bidirectional associations for the one-factor EF solution, math skills, and oral comprehension but not with literacy (Fuhs et al., 2014). Notably, EF was found to be a strong predictor for math gains and moderate predictor for language-based achievement gains in kindergarten, supporting an interrelationship of EF and academic achievement development (Fuhs et al., 2014).

Finally, in an analysis of the Early Childhood Longitudinal study from 2011 (a nationally representative dataset maintained by the National Center for Educational Statistics), Morgan et al. (2016) evaluated the performance of 18,080 children on item response theory, scaled reading and math assessments, and performance on verbal working memory and cognitive flexibility tasks. Using a multivariate logistical regression, the researchers found poor working memory and reduced cognitive flexibility increased the risk of kindergartners having reading and math difficulties in first grade.
Importantly, Morgan et al. also found the predictive nature of the EF difficulties was able to be differentiated from potentially confounding variables (i.e., children’s prior learning histories, low socioeconomic status (SES), poor behavior regulation).

Beyond academic readiness, executive functioning impairments or weaknesses also have implications for academic performance for adolescent students but the literature was sparse (Best, Miller, & Jones, 2009; Janke et al., 2014; Latzman et al., 2010). In one of the first studies that evaluated specific aspects of EF on adolescent academic performance, Latzman et al. (2010) examined the performance of 151 male students aged 11- to 16-years-old. Specifically, the researchers measured aspects of EF as a predictor of academic performance in reading, science, math, and social studies. Similar to other studies, Latzman et al. delineated executive functioning as a three-factor structure with similar yet different areas identified: conceptual flexibility, inhibition, and monitoring. In the research, EF contributed to prediction on all academic domains but with different EF factors accounting for unique variance depending on the academic subject. Further, even when controlling for ability level, EF predicted academic outcomes (Latzman et al., 2010).

At a post-secondary level, EF was also found to be predictive of student academic outcomes in a large sample (n = 1,760) of first year college students who ranged in age from 17- to 20-years-old (Baars, Bijvank, Tonnaer, & Jolles, 2015). Unlike previous studies, this research study utilized a self-report measure of EF to evaluate attention, planning, self-control and self-monitoring. Not surprisingly, regression analyses conducted with the total score showed higher levels of EF were positively associated with study (credit) progress; higher levels of EF in each of the three domains also related to
greater study progress (Baars et al., 2015). Notably, gender had a small effect with females outperforming their male counterparts on self-control/monitoring and with number of study credits (Baars et al., 2015).

From these studies, it was clear there is a link between EF impairment or weaknesses and academic outcomes; however, as shown through an evaluation of the research, it was not entirely clear which EF skills or behaviors were most predictive of academic difficulty or even if a unitary factor of EF was the best model for accounting for diminished academic acquisition and later performance. While some research implicated working memory, inhibitory control (inhibition), and cognitive flexibility tied to early math and literacy acquisition, others found more effects due to working memory, attentional control, and performance monitoring.

Arguably, however, the importance lies in the recognition of the predictive quality of EF impairment on negative academic outcomes through early childhood and into adolescence. As such, through increased understanding of how EF decision-making skills develop in children and evolve into adolescence, it could aid providers including school psychologists in differentiating poor behavioral decisions or academic impairments due in part to EF weaknesses from students with other disabilities such as emotional disturbances (Reynolds & Horton, 2008; Shonkoff et al., 2011). Doing so decreases the likelihood of greater impairment by means of preventing possible exposure to an adverse environment in which the blame for failure or difficulty is misunderstood and misallocated (Shonkoff et al., 2011).
Executive Functioning and Resilience: The Ability to Adapt

Luria’s (1966) model imparted the importance of genetic and environmental interaction to research, further supporting deficits in EF due to the complex interaction between the environment and genetic make-up; interaction with one’s environment is a critical feature of both resilience and EF (Ahern, 2006; Kirke-Smith et al., 2014; Ungar et al., 2013). This might be particularly true in adolescents, especially as this is when outcomes for those with prior weaknesses in self-regulatory abilities and/or previous trauma are likely to manifest (Cook et al., 2005). Much of the latter explicitly evaluated behavioral and academic outcomes for students, primarily adolescents with EF impairment arguably related to these difficulties, and an underlying impairment in adaptive abilities (Luciana, 2016; Obradovic, 2016).

Poor adaptability or reduced adaptive control, while notable for behavioral and academic impairment, is also a hallmark of many psychopathologies, particularly behavioral and emotional disorders, and is a factor in stress response (Damasio & Anderson, 2003; Halperin, 2016; Williams, Suchy, & Rau, 2009). For example, Williams et al. (2009) proposed that response to stress, which involves exposure to reactivity, recovery, and restoration, are all acted on by executive functioning given that intact EF allows one to use novel strategies for complex situations and to solve unique problems. Further, EF aids in helping to modify or adapt behavior with the introduction of new information and, importantly, inhibits motivating emotional and behavioral response (Williams et al., 2009).

Luciana (2016) argued that this adaptive control originates with the ability to tap EF-based cognitive resources including attention, inhibitory control, cognitive flexibility,
and working memory. She further stated that this might be especially salient with adolescents who are in the midst of developing both top-down executive behavioral control and bottom-up emotional processing; the latter (deficits in emotional regulation) is linked to an emotional load this population is not able to efficiently regulate (Luciana, 2016; Luciana & Collins, 2012). Currently, however, limited research has evaluated the link between EF and resilience factors that might act as a buffer and contribute to healthy coping and adaptation despite the link that adaptive functioning, among other important domains, is diminished in the face of weaker executive functioning (Martel et al., 2007).

For example, children with EF problems are likely to make poor decisions as well as have a tendency to make false assumptions when making choices, resulting in inappropriate or ineffective adaptive behaviors (Damasio & Anderson, 2003). Additionally, research evaluating the mediating effects of executive functioning with patients with severe traumatic brain injury found global adaptive functioning and conceptual and social adaptive functioning were much more impaired with patients who reported worse EF (Shultz et al., 2016). Further, pediatric patients with intractable epilepsy who self-reported poor EF were also found to report significantly worse quality of life (Love et al., 2016). Notably, those in the research sample with executive dysfunction were nearly 10 times more likely to report poor quality of life (Love et al., 2016).

The latter discussion reflected the premise that resilience includes the psychological aspects of coping or as a stress response, which have underlying EF components (Tusaie & Dyer, 2004). When resilience has been studied in the context of EF, not surprisingly, results have demonstrated the protective factors linked to resilience
buffering against negative outcomes (Martel et al., 2007; Tonks et al., 2011; Zahodne, Nowinski, Gershon, & Manly, 2015). For example, in the Martel et al. study (2007), researchers found high levels of resiliency were tied to better performance on tests of EF. The authors indicated this not unexpected outcome was due to adaptive control characteristic of both resilience and EF (Martel et al., 2007). In essence, it was concluded that in the presence of reported resilience, people are more likely to respond successfully to environmental and situational demands due to their ability to modify the level of control.

The Martel et al. (2007) study also spoke of the additive and incremental contributions of resilience and EF in contributing to adolescent behavioral and social outcomes. Essentially, each is uniquely responsible for behavioral and social outcomes but enhanced by the other, especially over time. This was supported by their results but also stemmed from the understanding that both resilience and EF are linked to many of the same brain regions (Eisenberg et al., 2003; Martel et al., 2007). Notably, development of internal resilience factors has been hypothesized to be linked to maturation of frontal regions of the brain, specifically neural circuitry that is linked to deliberate self-regulation (Eisenberg et al., 2003).

This critical component (self-regulation) of resilience, as with EF, assists in the intentional control of behavior, especially in response to situational changes (Eisenberg et al., 2003; Martel et al., 2007). Therefore, the conclusion could be drawn for potentially worse outcomes when deprivation or dysfunction of both EF and internal resilience factors is present. However, given the proposed expectation that resilience factors are related to competence and inversely to negative behavioral outcomes, negative outcomes
could potentially be buffered in the presence of internal resilience factors (Eisenberg et al., 2003).

This phenomenon was evaluated in a study with veterans with PTSD in which researchers proposed EF was compromised with this population (Kent, Rivers, & Wrenn, 2015). Kent et al. (2015) hypothesized EF dysfunction would be most apparent in the context of intentional goal-directed action in the face of exposure to traumatic stress. It was further proposed that with this population, the traumatic stress response, which is a much more automatic and reactive stimulus-based response, might become the primary coping response in the face of trauma. In this model of stress response, the researchers investigated the effect of a targeted intervention on resilience on patients with PTSD, recognizing in their proposal a possible link between higher internal resilience and more effective, adaptive responding (i.e., a deliberate, goal-directed action; Kent et al., 2015).

In the study of 39 veterans, 20 were enrolled in the goal-directed resilience training and 19 were randomly placed in a wait-list control group (Kent et al., 2015). The intervention consisted of 12 weekly, 90-minute group sessions with all participants completing pre and post measures of PTSD and depression, health and wellness surveys, and neuropsychological EF testing (Kent et al., 2015). Results demonstrated moderate declines in PTSD and depression symptoms for the treatment group in addition to gains in self-reported well-being and EF performance compared to the control group (Kent et al., 2015). Therefore, they concluded a resilience-based intervention demonstrated growth in EF (among other areas) with an at-risk group (Kent et al., 2015).

In relation to educational outcomes, research conducted by Zahodne et al. (2015) evaluated the role of self-efficacy (identified as a factor of resilience) in mitigating
outcomes of educational disadvantage including reduced executive functioning abilities such as set-switching (cognitive flexibility) and attention/inhibition. The large, nationally representative sample of 1,032 adults (ages 30 to 85) obtained from the United States norming study for the National Institutes of Health Toolbox (Health Measures, 2018) was evaluated using a web-based cognition and emotion module assessment identified as part of the Toolbox (Beaumont et al., 2013; Zahodne et al., 2015). The emotion module contained a self-efficacy survey that evaluated an individual’s level of self-efficacy on a continuum while the cognition module included tests of EF as well as processing speed, memory, vocabulary, and reading (Zahodne et al., 2015).

Controlling for age, sex, race, ethnicity, education, reading ability, testing language, and depressive symptoms, self-efficacy was found to be higher in individuals with stronger EF even in the context of low educational attainment (Zahodne et al., 2015). Overall, findings demonstrated those with low educational attainment but high self-efficacy performed just as well on EF tasks as individuals with high educational attainment (Zahodne et al., 2015). However, self-efficacy was not correlated to EF with the higher education participants, concluding self-efficacy (a feature of resilience) might buffer against negative effects of poor educational attainment, specifically on certain facets of EF development (Zahodne et al., 2015).

Interestingly, research has also been conducted that evaluated EF as the mediating variable rather than as the independent variable (Tonks et al., 2011). In evaluating outcomes of children with an acquired brain injury (ABI), researchers were interested in the role of executive functioning in mediating negative outcomes, specifically social-emotional-behavioral outcomes (Tonks et al., 2011). It was hypothesized that more intact
EF would permit better ability to access resilience resources following the ABI and thereby lessen or mitigate negative behavioral outcomes. Twenty-one children with an ABI were compared to a matched sample of 70 healthy controls on a measure of resilience, depression and anxiety, strengths and difficulties, and EF and behavior (Tonks et al., 2011).

Researchers first ran independent $t$-tests to compare standardized score differences between the two groups on resilience and the Beck measures (Tonks et al., 2011). Overall and as expected, self-report of resilience correlates, particularly sense of mastery, emotional reactivity, and resourcefulness was lower for the ABI group with higher scores on measures of depression and anxiety, indicating more impairment with depression and anxiety (Tonks et al., 2011). Additionally, results demonstrated a correlation between two sub-constructs of resilience on the resilience scale used (vulnerability and resourcefulness scales) with depression and anxiety in both groups and when examined as one total group with the exception of no significant correlation between resourcefulness and anxiety with either group (Tonks et al., 2011).

Finally, and most pertinent to the current research was the finding of a mediating effect of EF in the relationship between resilience and social-emotional-behavioral functioning (Tonks et al., 2011). Using a mediation model, Tonks et al. (2011) found the level of EF mediated the relationship between resilience (independent variable) and social-emotional-behavioral functioning (reported as overall stress; dependent variable), making the relationship between resilience vulnerability and social-emotional-behavioral functioning no longer significant (i.e., $p = .44$). In the absence of the mediating effect of EF, resilience was significantly correlated to social-emotional-behavioral functioning at a
.001 level, subsequently demonstrating an underlying connection between resilience and EF in which EF was a key factor in the ability to tap resilient resources. Notably in the discussion, the authors emphasized the importance of studying EF in the context of resilience and social-emotional and behavioral functioning (Tonks et al., 2011).

Similar to EF, resilience is a difficult construct to define with a wide range of definitions, conceptualizations, and differing opinions on how best to measure this construct. However, certain behaviors or traits seemed to appear more consistently in some capacity throughout much of the resiliency literature and might be summarized as being encompassed within a “wellness framework characteristic of positive adaptation” (Goldstein, 2008, p. 2). Some of the terms that appeared regularly included ability to flexibly adapt; flexible mechanism allowing for adaptive coping in the face of changing environmental demands; and positive adaptation to adversity with the takeaway being resiliency factors allowed one to better adapt and, therefore, have better outcomes (Block & Block, 1980; Eisenberg et al., 2003; Kent et al., 2015; Rutter, 1990).

As resilience research evolved, so did the vocabulary. Designed to better capture the phenomenon of resilience, verbiage moved away from simply reflecting threats to adaptation (e.g., risk, vulnerability) to an improved understanding of what assisted in adaptation (e.g., assets, protective factors; Rutter, 1990; Wright et al., 2013). As noted previously, these protective factors or assets involved both innate and external sources with resilient outcomes resulting in the interaction between multiple factors (i.e., biological, psychological, and social). In the research, protective factors were often classified by these domains that worked as interactive processes to promote resilient outcomes; commonly identified protective factors were competency, self-efficacy,
resourcefulness, self-regulation/emotional control, interconnectedness and social support, physical and mental health and wellness, intact cognitive abilities (including EF), temperament, and relation of the individual to the community (Bernard, 1995; Eisenberg et al., 2003; Goldstein, 2008; Prince-Embury, 2008; Rutter, 1990; Werner & Smith, 2001; Zahodne et al., 2015).

Resilience in the current study was evaluated through a self-report measure of wellness—the Journey to Wellness Scale (JWS; Copeland et al., 2010). Taking influence from the positive psychology movement and rooted in resilience theory, the JWS, formerly named the Child and Adolescent Wellness Scale (CAWS), was designed to evaluate strengths and competencies in students across a wide age range (Weller-Clarke, 2006). Results of the measure were intended to assist psychologists and educators in building resilience and social-emotional competence in their students (Copeland et al., 2010; Weller-Clarke, 2006). These strengths and competencies, reflective of identified correlates or protective factors in the resilience research, might serve to buffer the person from risks or adverse conditions, promoting greater likelihood of better outcomes.

Importantly, the protective factors, strengths, and competencies, including those identified by the JWS, are not sufficient evidence of resilience. Rather, they serve as mechanisms that promote positive outcomes in the face of risk or adversity (i.e., a dynamic process in response to the environment or situation that demonstrates resilience is activated; Bernard, 2004; Cicchetti, 2013). Such a perspective has been deemed phenomenological resilience, referring to resilience seen, observed, and measured (Bernard, 2004). Specifically, four separate overlapping strengths were proposed under
this model of phenomenological resilience: (a) social competence, (b) problem solving, (c) autonomy, and (d) sense of purpose (Bernard, 2004).

The above discussion served to highlight the complexity and evolving understanding of the how of resilience and the difficulty of measuring such a phenomenon in a valid way. As discussed, resilience is not something one simply has or does not have nor is it solely internal or external. Rather, current research promotes the idea of the interactive internal and external processes associated with resilience (Goldstein, 2008; Wright et al., 2013). Therefore, while there is no perfectly agreed upon definition of resilience, what much of the literature demonstrated, and for the purposes of the current study, was the notion of resilience processes involving innate resilience factors (e.g., buffering protective factors or assets) interacting with external factors or systems (e.g., positive interpersonal and family relationships, school/home/community environment; Bernard, 2004; Goldstein, 2008; Rutter, 1990; Werner & Smith, 2001; Wright et al., 2013). Collectively, these contributed to better than expected outcomes as they increased the chances of successful outcomes despite significant challenges/adversity.

Summary and Discussion

Luria (1966) believed higher cortical functions such as EF required both the interaction of normal neurological development and specific environmental stimulus of a cultural, historical, and social nature to develop. The result of an appropriate interaction of neurological development and appropriate environmental stimuli would be higher cortical functioning such as language, intention, memory, and EF. Similarly, resilience or the manifestation of resilience could be postulated as an adaptive interaction with
one’s environmental stimuli, particularly if such stimuli are threatening or averse to human functioning. Therefore, if EF has not developed appropriately due to poor interaction of neurological factors, a malnourishing environment, and resilience factors were deficient or under-sourced, one might conclude greater negative effects. Conversely, if the person’s resilience resources are intact, might they mitigate such negative outcomes? As was established with Tonks et al. (2011), EF as the mediator was able to offset negative associations between poor resilience resources and social-emotional behavioral functioning. Although evaluated through a clinical population or brain-injured participants, it was hypothesized resilience factors might mediate the effects of executive functioning impairment on behavioral and likely academic outcomes.

This research might be especially important given the dearth of literature regarding research that highlights outcomes of adolescents with EF difficulties and reflected in large part by the nature of the developmental time-period rather than the presence of a psychopathology. Although research demonstrated greater impairments with those with EF and psychopathology, namely ADHD, as well as depression and traumatic brain injury, there is essentially a void for which outcomes of adolescents (and even adults) with self-reported EF difficulties in the absence of a disability have been evaluated and reported. Continuing to evaluate non-impaired populations, as in the Rau et al. (2016) study, is important as it has the ability to elucidate nuanced differences in an otherwise healthy population. As Rau et al. noted, investigating differences in EF, in addition to personal difference factors that also contribute to overall health and wellbeing, have the potential to inform a wide-range of psychological disciplines.
Along this line of thinking, the current study of resilience factors in a non-clinical but EF affected population contributed to the current literature in which resilience, like EF, is often studied in the context of disability or psychopathology. Finally, while there is growing evidence to support interventions for EF development, research did not support one intervention approach over another nor did the research speak to how the interventions created the targeted response (Shonkoff et al., 2011). Therefore, it appeared useful to also evaluate how resilience contributed to outcomes in the context of poor EF with the idea that a dually targeted intervention might perhaps be most efficacious (e.g., executive functioning plus resilience-based interventions).
CHAPTER III

METHODOLOGY

This chapter provides operational definitions of the methodological constructs, participant information, data collection procedures, and information on the instruments utilized for data collection. Each research question and related hypothesis is presented as well as the method of analysis. The purpose of this study was to measure the correlation between self-reported resilience and academic outcomes and resilience and behavioral and adaptive outcomes in adolescent students with and without executive function impairments. A second goal for this study was to evaluate the potential mediating effects of self-reported resilience on executive functioning impairments on behavioral, academic and adaptive outcomes for adolescent students.

Participants

Participants in this study consisted of 86 late adolescent participants who were 18- and 19-years-old and enrolled in either high school or undergraduate settings. They represented a convenience sample as they were recruited through participant pools as well as personal connections at high schools and community colleges. Participants were either enrolled in a mid-size public university in the Rocky Mountain region, a community college that offered two-year and four-year degrees, also located in the Rocky Mountain region, and two high schools in the Rocky Mountain region. Participants were recruited in the fall of 2017 and spring of 2018. Participants completed on-line and paper
rating scales as well as a six-item demographic questionnaire; details of the three instruments and demographic survey are described below. Participants were entered to win one of two $50 Amazon.com gift cards as part of their voluntary participation.

Student participants who indicated co-occurring ADHD, learning disorders (e.g., dyslexia, dyscalculia, and dysgraphia), anxiety, and mood disorders were included in the study. To document the presence of a disability, students self-reported in the demographic survey the type of disability diagnosis. Acceptable documentation regarding current or prior history of co-occurring disability included knowledge of medical or clinical diagnosis, or the presence of a 504 and/or Individualized Educational Program at any time in kindergarten to 12th grade, or if currently receiving disability support services at their respective institutions.

**Instrumentation**

All participants completed three instruments as well as a brief demographic survey. Current research participants were asked to complete a brief six-item demographic survey for descriptive statistic purposes with select information used as part of the data analysis. Questions included gender identity, school of attendance, presence of an identified or suspected disability, SAT/ACT score, and parent education level (mother and father). Self-report surveys as well as the demographic survey were administered on-line using a secure and confidential testing platform and requiring administrator log-in.

**The Journey to Wellness Scale**

To measure factors that contribute to resilient outcomes, students completed the JWS (Copeland, Nelson, & Bardos al., 2016). The JWS is an adaptation of the Childhood and Adolescent Wellness Scale (CAWS) developed by Copeland and Nelson.
Both the CAWS and the more recent JWS were rooted in Seligman and Csikszentmihalyi’s (2014) positive psychology as well as prevention science and resilience theory (Weller-Clarke, 2006).

The original CAWS (Copeland & Nelson, 2004) contained 150 items within 10 dimensions; the adapted JWS retained the original 10 dimensions but with 80 items. A total score was derived; higher scores indicated greater or more intact resilience correlates (Copeland & Nelson, 2004; Weller-Clarke, 2006). This self-report assessment utilized a 4-point Likert-type scale response format that allowed respondents to select from the following options: Strongly disagree/Not at all like me (1 point), Disagree/Unlike me (2 points), Agree/Like Me (3 points), and Strongly Agree/Very much like me (4 points), thus making the score range for the JWS 80 to 320 with higher scores reflective of greater well-being and resilience.

The original items and dimensions were designed and selected based on research and theoretical findings related to psychological and social factors believed to buffer the onset of mental illness and enhance adolescent health and well-being (Weller-Clarke, 2006). Further, each of the following 10 dimensions closely aligned with Bernard’s (1995) profile of the resilient child (Weller-Clarke, 2006): adaptability, connectedness, conscientiousness, emotional self-regulation, empathy, initiative, mindfulness, optimism, self-efficacy and social-competence. The following index descriptions were derived from a review of the CAWS by Weller-Clarke (2006):

- Adaptable: The adaptability index was designed to measure respondents’ ability to navigate difficult situations as well as respondent’s preparedness for change.
• Connectedness: The connectedness index reflects the child’s perceptions of belonging and acceptance in school, their family, and the community.

• Conscientiousness: The conscientiousness index assesses children’s concerns with personal choices and taking responsibility for their actions.

• Emotional self-regulation: The emotional self-regulation index was designed to assess the complex construct of controlling one’s emotions.

• Empathy: The empathy index evaluates the level to which people employ empathy-related responding.

• Initiative: The initiative index evaluates the respondent’s ability to self-start, especially in the face of difficult situations.

• Mindfulness: The mindfulness index was designed to evaluate an individual’s perceptions related to his/her self-awareness and intuition as well as understanding of his/her personal strengths and weaknesses.

• Optimism: The optimism index evaluates the respondent’s hope and expectancies for the future and relates closely to the respondent’s personal explanations for daily life events.

• Self-efficacy: The self-efficacy index evaluates the extent to which people believe in their ability to invoke a wanted effect based on their own actions.

• Social-competence: The social-competence scale assesses skills corresponding to social-emotional learning including empathy, assertiveness, and the ability to resolve conflicts in a peaceful manner. It also reflects affective, behavioral and cognitive capacities.
To evaluate the validity and reliability of the 80-item CAWS (the JWS in current form), a pilot study was conducted involving 281 diverse middle and high school students (grades 6-12) in a K-12 charter school in the Rocky Mountain region of Colorado (Copeland et al., 2010). Internal consistency reliability was determined through the calculation of a coefficient alpha; each of the 10 subscales (with eight items each) had alpha coefficients > .74 and greater than .80 for six scales (Copeland et al., 2010). The overall reliability of the CAWS was .97. Criterion-related construct validity was evaluated by measuring the correlation of the total mean score on the CAWS with the total mean score on a similar measure—the Multidimensional Student Life Satisfaction Scale (MSLSS; Huebner, 2001). The means of the CAWS and MSLSS demonstrated a strong correlation at $r = .71$, $p < .001$. Additionally, regression analysis demonstrated a strong predictive relationship between the CAWS and MSLSS ($r = .71$, $p < .001$, $r^2 = .50$; Copeland et al., 2010, p. 33). Overall, the CAWS was found to demonstrate strong internal consistency of items as a one-factor structure and correlated strongly with another measure of subjective well-being (Copeland et al., 2010).

The Behavior Intervention Monitoring Assessment System

The Behavior Intervention Monitoring Assessment System (BIMAS2) is a brief, 34-item, broadband assessment designed to evaluate behavioral, emotional, academic, and adaptive functioning of children and adolescents ages 5 to 18 (McDougal, Bardos, & Meier, 2011). The original BIMAS was developed on the theoretical perspective that primary concerns experienced by children and adolescents are traditionally classified into three broad domains: behavioral, affective, and cognitive (McDougal et al., 2011). The 34 items on the BIMAS were developed from a series of research studies designed to
evaluate which traits, characteristics, or symptoms were most sensitive to identifiable change using pre and post intervention outcome measures (McDougal et al., 2011). For the purposes of the current research, participants completed the full 34-item self-report rating scale but with individual scale scores used in the research. The following scales from the BIMAS2 were used in the current research:

**Behavior concern scales.** These scales identified behaviors deemed to place a person at risk for academic, behavioral, and social difficulty. Higher $T$ scores indicated more concerns ($T$ scores $\geq 70 =$ High Risk; $T$ scores 60-69 = Some Risk; $T$ Scores $\leq 60 =$ Low Risk; McDougal et al., 2011). The conduct scale was used in the analysis of the second research question and the negative affect scale was used in analysis of the third research question.

**Conduct scale.** This nine-item scale encompassed behaviors such as impulsivity, fighting (physical aggression), lying or cheating, and fidgeting (McDougal et al., 2011).

**Negative affect scale.** This seven-item scale assessed internalizing problems such as anxiety and depression (McDougal et al., 2011).

**Adaptive scales.** These scales identified prosocial, strength behaviors in relation to academic and social functioning. Higher $T$ scores indicated a greater number of desirable/positive behaviors ($T$ scores $\geq 60 =$ Strength; $T$ scores 41-59 = Typical; $T$ scores $\leq 40 =$ Concern; McDougal et al., 2011). Both the social scale and the academic functioning scale were used in the analysis for the fourth and fifth research questions, respectively.

**Social scale.** This six-item scale identified strengths or weaknesses related to communication, friendship maintenance, and interpersonal skills (McDougal et al., 2011).
**Academic functioning scale.** This five-item scale evaluated the level of academic performance, attendance, and attitude in learning (McDougal et al., 2011).

Reliability of the BIMAS was evaluated through internal consistency, test-retest, and inter-rater scores. Cronbach’s alpha was used to determine internal consistency; internal consistency estimates were computed on a weighted sample comprised of 85% normative cases and 15% clinical cases to aid in maximum variability and to reflect real-world populations (McDougal et al., 2011). Pertinent to the current study, Cronbach’s alpha ranged from .75 to .88 on the self-report measure. Specifically, scales utilized in the current research demonstrated the following internal reliability: Conduct Scale ($\alpha = .88$); Negative Affect Scale ($\alpha = .85$); Social Functioning Scale ($\alpha = .83$); and Academic Scale ($\alpha = .75$).

In a test-retest reliability assessment, the BIMAS was administered twice in a two- to four-week period (in which no intervention occurred) with a diverse population that included teachers, students, and parents (McDougal et al., 2011). Pearson’s $r$ correlations ranged from .81 to .90 on the self-report with all correlations significant at $\alpha = .001$ level.

Finally, inter-rater reliability was used to assess consistency of the measure. Parent and teacher ratings were correlated with ratings from the self-reports taken from the larger sample of students who completed the self-report (McDougal et al., 2011). Pearson’s $r$ was calculated for comparison of all three pairs: teacher and self-ratings; parent and self-ratings; and teacher and parent ratings. Correlations between parent and self as well as teacher and self were moderate ($r = .59$ to .69 and $r = .54$ to .69, respectively).
To evaluate the validity of the BIMAS, a series of analyses were conducted to establish validity of the test items; validity of the scales through correlation to another established measure of behavior; emotional, social, and academic functioning; the ability of the BIMAS scores to validly classify and discriminate clinical from non-clinical populations; and finally, validly discriminate clinical groupings from each other (McDougal et al., 2011). Content or test-item validity was primarily evaluated through a series of confirmatory factor analyses with the normative sample. Results demonstrated adequate fit or approaching adequate fit for each model across all three forms.

To provide further content validity, each of the scales of the BIMAS was intercorrelated with data taken from the responses from the normative sample (McDougal et al., 2011). Results showed significant correlations (positive and negative where expected) across scales but not to the point of redundancy and indicated five related but unique constructs (conduct, negative affect, cognitive/attention, social, and academic functioning; McDougal et al., 2011).

The validity of the BIMAS was further evaluated by comparing the BIMAS to the Conners Comprehensive Behavior Ratings Scales (Conners CBRS; Conners, 2008). The Conners CBRS was utilized to evaluate a range of child and adolescent student concerns in behavioral, emotional, social, and academic domains (Conners, 2008). Ratings on both the BIMAS and Conners CBRS were collected from teachers, parents, and students in a non-clinical sample (McDougal et al., 2011). Total t-score means were similar on both measures (close to 50), which is considered average for both measures and would be expected for a non-clinical sample. Additionally, moderate to large correlations at a
significance level of $p < .01$ were found in each of the scale comparisons, demonstrating good criterion validity (McDougal et al., 2011).

Pertinent to the current study, McDougal et al. (2011) conducted analyses of the BIMAS to determine its validity as a screening tool for a clinical population. Two analyses were conducted to determine the following: (a) Ratings on the BIMAS could differentiate clinical (i.e., students with DBD, anxiety, depression, ADHD, and pervasive developmental disorder) from non-clinical group membership and (b) ratings on the BIMAS could differentiate between the various clinical groups. Self-report differences were found in mean scores between the clinical and non-clinical groups but to a lesser degree than the parent and teacher reports (McDougal et al., 2011).

Relative to the specific scales, means for each clinical group demonstrated expected scale-level differences with a moderate to large effect size (McDougal et al., 2011). The conduct scale discriminated most for disruptive behavior disorder with a large effect size ($d=1.5$), the negative affect scale discriminated most for both the depression and anxiety clinical groups with a large effect size ($d=1.1$ and $1.5$, respectively), and the social scale discriminated most for the pervasive developmental disability group with a large effect size ($d=-1.4$). The only clinical group whose mean was not at least 1 standard deviation above the normative group mean was the ADHD group; however, researchers still found a large effect size ($d=0.8$; McDougal et al., 2011). Discriminant function analyses were also conducted to determine the ability of the BIMAS’ scores to predict clinical or non-clinical group membership. The self-report ratings analyzed with discriminant function analyses found the BIMAS total score was able to correctly differentiate group membership with a rate of 71% accuracy (McDougal
et al., 2011). Importantly, the BIMAS2 was currently normed to students ages 17-11 so each of the students in the current research was treated as the same age (17-11) for evaluation purposes.

**Comprehensive Executive Function Inventory-Adult**

To evaluate EF, students completed the Comprehensive Executive Function Inventory-Adult (CEFI-Adult; Naglieri & Goldstein, 2014). Naglieri and Goldstein (2014) noted the content of the original CEFI was originally developed from an in-depth review of the literature on EF and their own clinical and research experiences. Through test development, Naglieri and Goldstein determined executive functioning should be viewed as a unidimensional construct rather than separate behaviors that contribute to executive functioning. To evaluate executive functioning as a unitary construct, the CEFI evaluates behaviors related to executive functioning as a means of evaluating how the child is likely to behave in his or her daily life (Naglieri & Goldstein, 2014).

The CEFI-Adult (Naglieri & Goldstein, 2014) uses an 80-item rating scale with items dedicated to evaluating the presence of EF strengths and difficulties (Fenwick & McCrimmon, 2015). The instrument evaluates EF behaviors in individuals aged 18 and older with observer and self-report measures available (Naglieri & Goldstein, 2014). For the current research, the CEFI-Adult self-report was utilized to establish the student’s level of EF strengths and weaknesses.

The CEFI is comprised of nine scales: attention, emotion regulation, flexibility, organization, planning, self-monitoring, initiation, working memory, and inhibitory control (Naglieri & Goldstein, 2013). The 80 items combine to yield a full-scale composite with the total score reflecting the individual’s behaviors in the natural
environment (Naglieri & Goldstein, 2014). Additionally, the full-scale score was found to be the most valid and reliable measure of EF (Naglieri & Goldstein, 2013). Higher scores on the full-scale composite and on the nine subscales indicated strengths with EF while lower scores were indicative of EF weaknesses (Naglieri & Goldstein, 2013).

The CEFI (Naglieri & Goldstein, 2013) has a mean of 100 and standard deviation of 15 with classifications in the average range (90-109), low average range (81-89), and below average (71-80). Any scores below 70 were considered well below average (Naglieri & Goldstein, 2013). For the purposes of the current research, scores of 89 and below were considered indicative of EF weakness.

Original CEFI (Naglieri & Goldstein, 2013) test items included those thought to capture key EF behaviors such as time management, working memory, decision-making, goal-directed behavior, planning, resistance to distraction, persistence, attention to detail, perspective taking, sustained attention, cueing, shifting, stopping and starting, motor inhibition, motivation, flexibility, regulation, and stress tolerance. The items were then normed on a large standardization sample representative of the U.S. population across a number of demographic variables (Fenwick & McCrimmon, 2015; Naglieri & Goldstein, 2014). The original CEFI was also normed using a clinical sample of 872 children with a wide-range of diagnoses (Naglieri & Goldstein, 2013).

To evaluate construct validity and determine final items of the rating scale, exploratory factor analysis was used and it was determined that a one-factor structure should be retained, reflecting a unidimensional measure of EF (Naglieri & Goldstein, 2014). The authors also ran a second factor analysis of the other half of the normed data, evaluating items by scale rather than at an item-level to determine if the nine CEFI scales
reflected one or multiple factors (Naglieri & Goldstein, 2014). The second analysis also indicated the CEFI scales were best described as one-factor. Finally, Naglieri and Goldstein (2014) conducted an exploratory factor analysis for each demographic group to aid in ascertaining whether the one-factor structure was consistent across the groups. Results found a high degree of consistency across all groups, supporting the conclusion of unidimensionality (Naglieri & Goldstein, 2014).

Criterion validity of the CEFI was examined through analyses of the scores from the general normed population and children from the clinical populations in addition to evaluating correlations between the CEFI and other measures of EF (Fenwick & McCrimmon, 2015; Naglieri & Goldstein, 2014). In evaluating differences between the normed and clinical groups, scores from each of the clinical populations were significantly lower across all raters compared to scores from their matched counterparts from the general population (Fenwick & McCrimmon, 2015; Naglieri & Goldstein, 2014). Additionally, full-scale standard scores across groups differed in the expected direction as well with moderate to large effect sizes across all forms for all three groups (Naglieri & Goldstein, 2014).

Further criterion validity was established by comparing ratings on the CEFI with the Behavior Rating Inventory of Executive Functioning (Goia, Isquith, Guy, & Kenworthy, 2000), a psychometrically established test of executive functioning (Fenwick & McCrimmon, 2015; Naglieri & Goldstein, 2014). Ratings on both measures were completed by parents and students aged 12- to 18-years-old with a clinical diagnosis ($n = 61$; Naglieri & Goldstein, 2014). Full-scale results across raters for each of the groups were all highly correlated (.64 to .85; Fenwick & McCrimmon, 2015).
To evaluate the reliability of the CEFI, internal consistency, test-retest, and interrater reliability were utilized (Fenwick & McCrimmon, 2015; Naglieri & Goldstein, 2013, 2014). Internal consistency was measured using Cronbach's alpha for parent, teacher, and self-ratings (Naglieri & Goldstein, 2014). Reliability coefficients for parent and teacher reports were strong on both the nine-scales and using the total score ($\alpha = .84$ to $\alpha = .93$ and $\alpha = .91$ to $.96$, respectively; Fenwick & McCrimmon, 2015). On the self-report, scale reliability coefficients ranged from $.79$ to $.86$ with a full-scale reliability coefficient of $.97$ (Fenwick & McCrimmon, 2015).

Internal reliability was also calculated for the clinically normed sample with similar findings of internal consistency for all three raters (Fenwick & McCrimmon, 2015). Relative to the current study, self-report coefficients ranged from $.70$ to $.86$ with a full-scale coefficient of $.97$ (Fenwick & McCrimmon, 2015). Further analysis of reliability was evaluated with test-retest reliability using Pearson’s product-moment correlation (Fenwick & McCrimmon, 2015). Across raters, correlations of test-retest reliability ranged from $.77$ to $.91$ at $p < .001$ for the full-scale and from $.74$ to $.91$ at $p < .001$ across the nine scales (Naglieri & Goldstein, 2013, 2014).

**Procedure**

As an initial step, an application for full review by the Institutional Review Board at the University of Northern Colorado was filed. Once this was approved (see Appendix A for approval and modification), the researcher recruited participants by advertising the study through the university psychology pool where students enrolled in an entry-level psychology course could sign up to participate. Institutional Review Board approval was also obtained through a community college and participants were recruited through
college contacts such as professors and disability support services personnel (see Appendix B). Finally, participants were recruited at two high schools in the Rocky Mountain Region by direct contact and approval from building school principals, school counselors, and the students’ teachers (see Appendix C).

Primary evaluations were conducted across two groups: (a) 18- and 19-year-old undergraduate and high school students with self-reported EF impairment as indicated by a CEFI-Adult composite score of 89 or below and those who indicated they had been identified with a learning disability, ADHD, or mood and/or anxiety disorder; and (b) 18- and 19-year-old undergraduate and high school students without executive functioning impairment (i.e., score of 90 or above on the CEFI and no identified disability).

Participant consents were obtained (see Appendices D and E); all subjects were informed of the purpose of the study, informed that participation was entirely voluntary, and there would be no negative effect on their grades if they did not complete the surveys.

During the data collection phase, participants completed each rating scale or survey (JWS [see Appendix F], BIMAS2 [see Appendix G], CEFI-Adult, and demographic survey [see Appendix H]) in person with the researcher or graduate assistants. To ensure anonymity of participants’ information, a number was written on the top of each questionnaire within a packet to ensure appropriate data were entered for each participant. Furthermore, survey responses were kept confidential by assigning numbers to participants and were secured in a locked university office accessible only by the researcher and research advisor. Further, no personally identifying information was marked on any of the questionnaires other than information related to the demographic survey.
Importantly, 86 participants were included in the study but four participants failed to complete the JWS portion of the data collection. This resulted in 82 participants for inclusion in the analysis when the JWS was utilized. All statistical analyses used an alpha level of .05 to determine significance. Initial data analysis involved evaluating the relationship between executive functioning as measured by the CEFI-Adult full scale score and resilience factors as measured by the JWS total score using a correlational analysis.

Primary data analyses to answer four primary research questions (Q2 to Q5) were completed through a mediation methodology originally proposed by Baron and Kenny (1986). However, it was decided to switch to the Hayes (2017) process model that tested the pre-requisite criterion for establishing mediation as proposed by Baron and Kenny but also helped to determine whether the tested mediator and not an unrelated effect accounted for the relationship between the predictor and the outcome variables (i.e., indirect effect; Preacher & Hayes, 2004).

Mediation and moderation were often addressed concurrently in the research with moderation analysis utilized to determine if the strength of the relationship between the causal variable (X) on the outcome variable (Y) changed with the addition of a moderator (Baron & Kenny, 1986). Whereas, mediation was identified by Baron and Kenny (1986) as being a stronger analysis than moderation given mediation is designed to help understand the reason for the change of the causal variable (X) on the outcome variable (Y).

Mediation is generally considered a four-step process with full mediation determined by a fifth step of the process, which assesses for the significance of the
indirect effect. Additionally, given that mediation uses a series of regression, assumptions for linear regressions were tested (i.e., linearity, independence, homoscedasticity, and normality). The following four initial steps were used in this study:

1. Confirm the significance of the relationship between the CEFI full scale score and the academic and behavioral outcomes as measured by BIMAS composite scaled scores (i.e., conduct, negative affect, academic, and social adaptive).

2. Confirm the significance of the relationship between the CEFI full scale score and the JWS total score (mediator).

3. Confirm the significance of the relationship between the JWS total (mediator) and the BIMAS composite scaled scores in the presence of the CEFI full scale score.

4. Confirm the insignificance (or the meaningful reduction in effect) of the relationship between the CEFI full scale score and the academic and behavioral outcomes as measured by BIMAS composite scaled scores in the presence of the JWS total score (mediator).

The steps above are typically demonstrated through a simple path graph as demonstrated by Figure 1.
Figure 1. Mediation path model representing steps for mediation. Path c is step 1 in the model and Path c’ is step four in the model and known as the direct effect. Path a is step 2 in the model and Path b is step 3 in the model, with paths 2 and 3 most important for determining mediation as the product of a and b is equal to the direct effect (Hayes, 2018).
CHAPTER IV

RESULTS

The purpose of this study was to examine the role of resilience factors as a mediator of executive functioning on academic and behavioral outcomes including adaptive behavior. A variable could be said to be a mediator if it could be found to be the explaining variable between the effect of a predictor variable (independent variable) on the outcome variable (dependent variable; Baron & Kenny, 1986). In this current study, wellness was considered a resilience factor and believed to be a mediator across two groups to determine if these factors accounted for differences in the outcomes identified above.

Primarily, this research was interested in evaluating the effect of resilience factors (mediator) on adolescent students with identified executive functioning impairment including those with disabilities in which EF is commonly identified as a co-morbid condition and academic and behavioral outcomes. The rationale for such research was if such an effect was found, it might contribute to understanding the effect of resilience factors as a buffering mechanism and offer another type of early intervention programming to address EF deficits in clinical, school, and home-based settings.

To evaluate EF in the present study, the CEFI-Adult full scale score was used (Naglieri & Goldstein, 2014). Wellness or resilience factors were evaluated using the JWS (Copeland et al., 2016) while academic and behavioral outcomes were quantified.
using select subscales from the BIMAS2 (McDougal et al., 2011). In addition to formal self-report survey measures, participants were also asked to complete a six-question demographic survey to aid in further analysis regarding differences between groups as related both to their executive functioning and resilience identification (see Appendix 1).

In this chapter, a discussion of the results includes a description of the sample participants, the research questions, and the results of the data analysis.

**Description of Participants**

The demographic survey and three self-report measures were originally completed by 83 participants at the university level. However, of the 83 participants, only 68 met the age requirements with 14 participants aged 20-years-old or older. Of those 14 participants, four were 20-years-old, and 10 were 21 and older with two participants aged 36-years-old. Additionally, keeping in line with a currently accepted standard age range of 12 to 19 as being the age of adolescence, participants who did not meet this criterion were not used in the current study. The total sample of university participants resulted with an \( n = 68 \). The participant pool was expanded to also include high school seniors aged 18-years-old. Including the university sample pool of 18- and 19-year-old students, the total sample size resulted with an \( n = 86 \): 68 college-level and 18 high school students.

As this research sought to identify differences between groups based on average executive functioning and those with reported difficulties in addition to completion of the CEFI-Adult (Naglieri & Goldstein, 2014), participants were also asked to provide disability identification or suspected disability along with their specific diagnosis(es). Participants were included in the sample if they identified with a disability in which a co-
morbid feature was EF impairment (i.e., learning disability, ADHD, anxiety and/or mood disorder). Those who identified with a disability or suspected disability were included in the mediation analysis along with participants with a full scale CEFI-Adult score of 89 or less. Of the total sample of 86, 53 participants identified with no disability (64%) and 33 self-identified with a known or suspected diagnosis (36%).

The total sample included 79 participants who were 18-years-old and seven participants who were 19-years-old. Of those 79, 31 identified as male and 55 were female. The majority of participants were obtained from the four-year university (62) with just six participants attending a community college. Additionally, 18 participants attended high school with 11 attending a traditional high school and seven attending an alternative high school. Demographic differences between the two primary groups of interest--low average CEFI-Adult full scale plus/or presence of a disability (Group 1) and average CEFI-Adult full scale plus no disability (Group 2)--are presented in Table 1.

Table 1

*Demographics by Group 1 and Group 2*

<table>
<thead>
<tr>
<th>Group 1</th>
<th>n</th>
<th>%</th>
<th>Group 2</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>15</td>
<td>39.5</td>
<td>Males</td>
<td>16</td>
<td>33.3</td>
</tr>
<tr>
<td>Females</td>
<td>23</td>
<td>60.5</td>
<td>Females</td>
<td>32</td>
<td>66.7</td>
</tr>
<tr>
<td>High School</td>
<td>13</td>
<td>34.2</td>
<td>High School</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>College</td>
<td>25</td>
<td>65.8</td>
<td>College</td>
<td>43</td>
<td>89.6</td>
</tr>
<tr>
<td>Identified Disability</td>
<td>33</td>
<td>86.8</td>
<td>Identified Disability</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No Disability</td>
<td>5</td>
<td>13.2</td>
<td>No Disability</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* Group 1 total = 38; Group 2 total = 48
Research Questions and Analyses

The remaining section is organized according to the outlined analysis with the initial analysis conducted to determine the relationship between the CEFI-Adult and the JWS.

Research Question 1

Q1 What is the relationship between psychological wellness as measured by the Journey to Wellness Scale (JWS) and executive functioning, as measured on the Comprehensive Executive Functioning Inventory For Adults (CEFI-Adult)?

Correlational analysis. To answer the research question regarding the relationship between the JWS and EF as measured on the CEFI-Adult, a Pearson product moment correlation was run for the two scales. Results indicated a statistically significant positive correlation of .68 at the \( p < .001 \) level. Given the high correlation of measures, the variance of inflation factor (VIF) was evaluated to check for multicollinearity. The VIF of 1.92 indicated low multicollinearity with acceptable VIF commonly identified within the literature as less than 5 and not greater than 10 (Menard, 1995). Further, Cronbach’s alpha on the total score of the JWS (80 items) was measured at \( \alpha = .93 \), suggesting it had good internal consistency with this population.

Mediation analysis. The process model of mediation developed by Hayes (2017) was utilized to answer primary research questions 2, 3, 4, and 5. This model was selected as a more robust mediation analysis as it tested for statistical significance of the indirect effect while also completing regression analysis to answer the four criteria for mediation as proposed by the Baron and Kenny (1986) model (Preacher & Hayes, 2004). The indirect effect was proposed as a necessary final step in the mediation analysis to evaluate whether full mediation had occurred, i.e., the mediator is said to significantly reduce the
effect of the predictor on the outcome or fully explain the relationship of the predictor on the criterion (Preacher & Hayes, 2004). Further, evaluating the significance of an indirect effect decreases the likelihood of making a Type I error (rejecting a true null hypothesis) and Type II error (retaining a false null hypothesis; Preacher & Hayes, 2004).

Although the Sobel test has previously been identified as a primary means of testing the indirect effect, it has been rarely done in practice (MacKinnon, Fairchild, & Fritz, 2007). Preacher and Hayes (2004) proposed two possible reasons for this. The first reason was the statistical significance of the indirect effect was not formally stated by Baron and Kenny (1986) as a requirement for mediation and commonly used programs such as SPSS or SAS do not conduct a test to measure the indirect effect. Second, while SPSS and SAS provided the means for the researcher to conduct the Sobel test, manual computation was required and researchers might not engage in this final, work-intensive process.

Therefore, the more current process approach was selected as it used the mediation model advocated by Baron and Kenny (1986) and directly tested the significance of the indirect effect; importantly, it estimated the indirect effect under normality. The latter was accomplished through the use of a bootstrap approach wherein the sample was resampled with replacement and from each of these samples, a standard error and confidence interval was generated. The current analyses used a bootstrap estimation approach with 5,000 samples as proposed by Hayes (2017). This meant the current sample size of 86 was replaced and resampled for a total of 5,000 iterations or simulated datasets. Distributions and tests of significance were run with each of the
resampled iterations to allow for analysis that approximated true population data that followed a normal distribution (Mackinnon, 2015).

**Research Question 2**

Q2 Does psychological wellness mediate externalizing behavioral outcomes (Conduct Related Behaviors) (as measured by the Behavior Intervention Monitoring Assessment System [BIMAS2]) of students with and without executive functioning impairment?

The first step in the analysis was to run the mediation analysis with the low average executive functioning sample (i.e., CEFI-Adult full scale of 89 or lower) +/or disability (Group 1) and with the average executive functioning sample + no disability group (Group 2). To run mediation analysis, SPSS (Version 24) was utilized. To conduct mediation analysis, a series of linear regressions were run to investigate a mediation effect, i.e., the mediator was said to significantly reduce the effect of the predictor on the outcome or fully explain the relationship of the predictor on the criterion (Hayes, 2018). In other words, is there a meaningful reduction in the effect between the independent variable (CEFI-Adult full scale) and the dependent variable (BIMAS2 subscale, i.e., conduct, negative affect, academic functioning, and social) in the presence of the mediator (JWS total)? For the purposes of this research, the mediator for each research question was the JWS total score with the research questions proposing to determine if resilience factors (as identified by the JWS Total score) mediated the effect of the full scale score of the CEFI-A on BIMAS2 academic and behavioral outcomes.

**Group 1: Low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.** In this mediation analysis of BIMAS2 conduct for the low average EF plus/or disability group, the assumptions were tested and met per established assumptions checks in the research literature (Casson & Farmer,
A nonparametric test (one sample K-S test) and histogram of the regression standardized residuals found the data to be normally distributed (see Figure 2). Additionally, a normal probability plot of residuals was approximately linear, supporting the condition that the error terms were normally distributed with no appreciable heteroskedasticity (see Figure 3). The plot was a check on normality as the plotted points should follow the straight line. The P-P plot compared the observed cumulative distribution function (CDF) of the standardized residual to the expected CDF of the normal distribution. Importantly, this test tested the normality of the residuals and not predictors. Serious departures would suggest normality assumption was not met; however, this was not the case with this sample. Figure 4 also displays the linearity of residuals, indicating the assumption of linearity was met. To test for autocorrelation or independence, the Durbin-Watson $d$-test was utilized. The Durbin-Watson statistic yields values between 0 and 4. A value of 2 means there is no autocorrelation in the sample; values approaching 0 indicate positive autocorrelation and values toward 4 indicate negative autocorrelation. With the current sample, the Durbin-Watson test was $d = 2.16$, indicating no autocorrelation. Additionally, the variance inflation factor was 1.52 and as noted, lower scores were generally accepted as reflecting low to no multicollinearity.
Figure 2. Histogram of Behavior Intervention Monitoring Assessment System conduct regression standardized residuals low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.

Figure 3. Observed cumulative distribution function of the Behavior Intervention Monitoring Assessment System conduct standardized residual to the expected cumulative distribution function of the normal distribution for low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.
Figure 4. Scatterplot of standardized residual and standardized predicted f values
Behavior Intervention Monitoring Assessment System conduct to assess linearity and heteroscedasticity for low Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.

With this sample, the independent variable (CEFI full scale score) was a significant predictor for JWS ($p < .001$; path a), and the mediator (JWS total score) was significant on the dependent variable (BIMAS2 conduct score) in the presence of the independent variable (CEFI full scale score; $\alpha = .05$; path b). This resulted in a significant indirect effect, indicating the hypothesis that psychological wellness and resilience (as measured by the JWS) mediated the effect of EF on externalizing behavioral outcomes (conduct-related behaviors) was confirmed. The indirect effect was found to be significant given it was significantly greater from zero (see Table 2). The significance of the indirect effect indicated a reduction in the effect of executive functioning on BIMAS2 conduct in the presence of the mediator (JWS).
Table 2

*Mediation Analysis of Low Average Comprehensive Executive Functioning Inventory for Adults Full Scale Plus/or Disability Group and Behavior Intervention Monitoring Assessment System Conduct*

<table>
<thead>
<tr>
<th>Conduct</th>
<th>b</th>
<th>p</th>
<th>Bootstrap Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>-.08</td>
<td>.270</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.87</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>-.16</td>
<td>.007*</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct effect)</td>
<td>.05</td>
<td>.501</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect (a*b) = c-c'</td>
<td>-.14</td>
<td></td>
<td>(-0.264, -0.052)**</td>
</tr>
</tbody>
</table>

*Note.* For a significant indirect effect or total mediation, the Bootstrap confidence interval (CI) should not include zero. **Indicates significant indirect effect and mediation effect. *p < .05.

**Group 2: Average executive functioning plus no disability group.** In this mediation analysis, the assumptions were tested and met using a similar process as outlined for Group 1 (Casson & Farmer, 2014; Nau, n.d.). A nonparametric test (one sample K-S test) and histogram of the regression standardized residuals found the data to be normally distributed (see Figure 5). Additionally, a normal probability plot of residuals was approximately linear, supporting the condition that the error terms were normally distributed with no heteroskedasticity (see Figure 6). Figure 7 also displays the linearity of residuals, indicating the assumption of linearity and no heteroscedasticity was met. To test for autocorrelation or independence, the Durbin-Watson $d$-test was utilized. With this sample, the Durbin-Watson test was $d = 1.95$, indicating no autocorrelation. Additionally, a variance inflation factor of 1.93 indicated no multicollinearity.
Figure 5. Histogram of the Behavior Intervention Monitoring Assessment System conduct regression standardized residuals for average executive functioning plus no disability group.

Figure 6. Observed cumulative distribution function of the Behavior Intervention Monitoring Assessment System conduct standardized residual to the expected cumulative distribution function of the normal distribution for average executive functioning plus no disability group.
Figure 7. Scatterplot of Behavior Intervention Monitoring Assessment System conduct standardized residual and standardized predicted $r$ values of Behavior Intervention Monitoring Assessment System conduct to assess linearity and heteroscedasticity for average executive functioning plus/or no disability group.

With this population, the independent variable (CEFI-Adult full scale score) was a significant predictor for JWS ($p < .001$; path a) and the Mediator (JWS total score) was significant on the dependent variable (BIMAS2 conduct score) in the presence of the independent variable (CEFI-Adult full scale score; $\alpha = .05$; path b). This resulted in a significant indirect effect, indicating the hypothesis that psychological wellness and resilience (as measured by the JWS) mediated the effect of EF on externalizing behavioral outcomes (conduct-related behaviors) was confirmed. The indirect effect was found to be significant given it was significantly greater from zero (see Table 3).
Table 3

Mediation Analysis of Average Comprehensive Executive Functioning Inventory for Adults Full Scale Plus No Disability and Behavior Intervention Monitoring Assessment System Conduct

<table>
<thead>
<tr>
<th>Conduct</th>
<th>b</th>
<th>p</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>-.03</td>
<td>.609</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.93</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>.14</td>
<td>.025*</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct effect)</td>
<td>-.16</td>
<td>.052</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect (a*b) = c-c'</td>
<td>.13</td>
<td>(0.002, 0.251)**</td>
<td></td>
</tr>
</tbody>
</table>

Note. For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. **Indicates significant indirect effect and mediation effect. *p < .05.

Research Question 3

Q3 Does psychological wellness mediate internalizing behavioral outcomes (Negative Affect) (as measured by the BIMAS2) of students with and without executive functioning impairment?

Group 1: Low average Comprehensive Executive Functioning Inventory for Adults full scale plus or disability group. The assumptions were again tested and met for this sample (Casson & Farmer, 2014; Nau, n.d.). A nonparametric test (one sample K-S test) and histogram of the regression standardized residuals found the data to be normally distributed (see Figure 8). Additionally, a normal probability plot of residuals was approximately linear, supporting the condition that the error terms were normally distributed with no heteroscedasticity (see Figure 9). Figure 10 also displays the linearity of residuals, indicating the assumption of linearity and no heteroscedasticity was met. To test for autocorrelation or independence, the Durbin-Watson d-test was utilized. With the
current sample, the Durbin-Watson test was $d=1.81$, indicating no autocorrelation. Additionally, a variance inflation factor of 1.53 indicated no multicollinearity.

**Figure 8.** Histogram of the Behavior Intervention Monitoring Assessment System negative affect regression standardized residuals low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.
Figure 9. Observed cumulative distribution function of the Behavior Intervention Monitoring Assessment System negative affect standardized residual to the expected cumulative distribution function of the normal distribution for low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.

Figure 10. Scatterplot of standardized residual and standardized predicted f values or Behavior Intervention Monitoring Assessment System negative affect to assess linearity and heteroscedasticity for low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.
Similar to conduct with this population, the independent variable (CEFI-Adult full scale score) was a significant predictor for JWS ($p < .001$; path a) and the mediator (JWS total score) was significant on the dependent variable (BIMAS2 negative affect score) in the presence of the independent variable (CEFI-Adult full scale score; $\alpha = .05$; path b). This resulted in a significant indirect effect, indicating the hypothesis that psychological wellness and resilience (as measured by the JWS) mediated the effect of EF on internalizing behavioral outcomes (negative affect) was confirmed. The indirect effect was found to be significant given it was significantly greater from zero. The significance of the indirect effect indicated a reduction in the effect of executive functioning on the BIMAS2 negative affect in the presence of the JWS mediator (see Table 4).

Table 4

Mediation Analysis of Low Average Comprehensive Executive Functioning Inventory for Adults Full Scale Plus/or Disability Group and Behavior Intervention Monitoring Assessment System Negative Affect

<table>
<thead>
<tr>
<th>Negative Affect</th>
<th>$b$</th>
<th>$p$</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>-.11</td>
<td>.393</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.87</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>-.29</td>
<td>.005*</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct Effect)</td>
<td>.14</td>
<td>.319</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect ($a*b$) = $c-c'$</td>
<td>-.25</td>
<td></td>
<td>(-0.459, -0.073)**</td>
</tr>
</tbody>
</table>

*Note.* For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. **Indicates significant indirect effect and mediation effect. $*p < .05.$
**Group 2: Average executive functioning plus no disability group.** With the average executive functioning plus no disability group, no mediation effect was found nor was there a significant indirect effect as the indirect effect (confidence interval) included zero (see Table 5).

Table 5

*Mediation Analysis of Average Comprehensive Executive Functioning Inventory for Adults Full Scale Plus/or No Disability Behavior Intervention Monitoring Assessment System Negative Affect*

<table>
<thead>
<tr>
<th>Negative Affect</th>
<th>$b$</th>
<th>$p$</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path $c$ (Total Effect)</td>
<td>-.10</td>
<td>.291</td>
<td></td>
</tr>
<tr>
<td>Path $a$</td>
<td>.93</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path $b$</td>
<td>.04</td>
<td>.690</td>
<td></td>
</tr>
<tr>
<td>Path $c'$ (Direct effect)</td>
<td>-.13</td>
<td>.304</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect ($a*b = c-c'$)</td>
<td>.03</td>
<td></td>
<td>(-0.297, 0.294)</td>
</tr>
</tbody>
</table>

*Note.* For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. *$p < .05$.*

**Research Question 4**

Q4 Does psychological wellness mediate academic outcomes (as measured by the BIMAS2) of students with and without executive functioning impairment?

**Group 1: Low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group.** With the low average executive functioning group plus/or disability group, no mediation effect was found nor was there a significant indirect effect as the indirect effect (confidence interval) included zero (see Table 6).
Table 6

*Mediation Analysis of Low Average Comprehensive Executive Functioning Inventory for Adults Full Scale Plus/or Disability Group and Behavior Intervention Monitoring Assessment System Academic*

<table>
<thead>
<tr>
<th>Academic</th>
<th>b</th>
<th>p</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>.28</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.87</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>-.07</td>
<td>.207</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct Effect)</td>
<td>.34</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect (a*b) = c-c'</td>
<td>-.06</td>
<td></td>
<td>(-0.132, 0.008)</td>
</tr>
</tbody>
</table>

*Note.* For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. *p < .05.

**Group 2: Average executive functioning plus no disability group.** With the average executive functioning plus no disability group, no mediation effect was found; nor was there a significant indirect effect as the indirect effect (confidence interval) included zero (see Table 7).
Table 7

Mediation Analysis of Average Executive Functioning Plus No Disability Group
Behavior Intervention Monitoring Assessment System Academic

<table>
<thead>
<tr>
<th>Academic</th>
<th>$b$</th>
<th>$p$</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>.22</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.94</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>.03</td>
<td>.685</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct effect)</td>
<td>.20</td>
<td>.046*</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect (a*b) = c-c'</td>
<td>.03</td>
<td></td>
<td>(-0.127, 0.170)</td>
</tr>
</tbody>
</table>

Note. For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. *$p < .05$.

Research Question 5

Q5 Does psychological wellness mediate social adaptive skills (Social Functioning) as measured on the BIMAS2 Social Functioning Scale for students with and without executive functioning impairment?

Group 1: Low average Comprehensive Executive Functioning Inventory for Adults full scale plus/or disability group. With this population, partial mediation occurred in which there was a reduction of the effect of executive functioning on adaptive functioning (BIMAS2 Social) in the presence of the JWS mediator (c-path, $b = .34$; c’-path, $b = .23$). However, there was no significant nor meaningful reduction. This was evidenced by the direct effect (path c’) remaining significant ($p < .001$), which was a violation of mediation as the direct effect should no longer be significant with the addition of the mediator. Additionally, full mediation did not occur as the confidence interval of the indirect effect included zero (Hayes, 2018). Further, the regression of the JWS in the presence of EF on social functioning was not significant (see Table 8).
Table 8

Mediation Analysis of Low Average Comprehensive Executive Functioning Inventory for Adults Full Scale Plus/or Disability Group Behavior Intervention Monitoring Assessment System Social

<table>
<thead>
<tr>
<th>Social</th>
<th>b</th>
<th>p</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>.34</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.87</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>.12</td>
<td>.054</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct effect)</td>
<td>.23</td>
<td>&lt;0.017</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect (a*b) = c-c'</td>
<td>.11</td>
<td>(-0.002, 0.263)</td>
<td></td>
</tr>
</tbody>
</table>

Note. For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. *p < .05.

Group 2: Average executive functioning plus no disability group. With the average executive functioning plus no disability group, no mediation effect was found. Nor was there a significant indirect effect as the indirect effect (confidence interval) included zero (see Table 9).

Table 9

Mediation Analysis of Average Executive Functioning Plus No Disability Group and Behavior Intervention Monitoring Assessment System Social

<table>
<thead>
<tr>
<th>Social</th>
<th>b</th>
<th>p</th>
<th>Bootstrap CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path c (Total Effect)</td>
<td>.036</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path a</td>
<td>.934</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>Path b</td>
<td>.095</td>
<td>.174</td>
<td></td>
</tr>
<tr>
<td>Path c' (Direct effect)</td>
<td>.269</td>
<td>.006*</td>
<td></td>
</tr>
<tr>
<td>Indirect Effect (a*b) = c-c'</td>
<td>.089</td>
<td>(-0.040, 0.227)</td>
<td></td>
</tr>
</tbody>
</table>

Note. For a significant indirect effect or total mediation, the Bootstrap CI should not include zero. *p < .05.
Demographic Survey and Group Differences

To determine if a participant’s reported score could provide additional data regarding observed outcomes on the mediation analysis, students were asked to provide their ACT or SAT score on the demographic survey. The majority of students \((n = 76)\) initially provided the ACT with only 18 providing the SAT score. Therefore, using a widely used on-line conversion tool (https://www.princetonreview.com/college-advice/act-to-sat-conversion), the SAT scores were converted to ACT scores. Notably, while the JWS and the CEFI-Adult full scale scores were significantly correlated with each other (as discussed earlier) using a Pearson’s product momentary correlation, the ACT score was not significantly correlated with either the CEFI-Adult full scale score \((p = .22)\) or the JWS total score \((p = .11)\).

The primary mediation analysis was interested in differences between average EF plus no disability population and those with low EF and/or a disability. While gender, school of attendance, and parent education levels were not considered in the mediation analysis, the demographic survey was used to explore the question of whether there would be differences depending on the presence of a disability, gender, parent education level, and school of attendance. The analyses were conducted to identify if differences between groups in the current sample were consistent with previous research on resilience and executive functioning. All statistical analyses used an alpha level of .05 to determine significance. To evaluate group differences, a series of independent sample \(t\)-tests and an ANOVA were run. On each of the independent \(t\)-tests, Levene’s test for equality of variance was utilized to test for equality of variance with each of the \(t\)-tests demonstrating equality of variance.
The first group difference to be evaluated was the difference in mean JWS scores of the group with a CEFI-Adult full scale score of 89 plus/or an identified/suspected disability (Group 1) or participants and those with no disability and a CEFI-Adult full scale score of 90 or above (Group 2). An initial independence sample t-test evaluated differences of groups on the JWS and the CEFI-Adult full scale. Results indicated the two groups had significantly different means for the JWS total score and CEFI-Adult full scale score as shown in Tables 10 and 11, respectively. Additionally, effect sizes were medium to large for each of the respective differences; JWS $d = .70$, CEFI-Adult full scale $d = .83$. Table 12 displays the differences in means between the two groups on each of the BIMAS2 scales with significant differences found on academic functioning and negative affect. Medium effect sizes were found in differences on the academic functioning and negative affect scales, $d = .60$, $d = .47$, respectively.

Table 10

*Differences between Group 1 and Group 2 on the Journey to Wellness Scale*

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>M (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>37</td>
<td>236.00 (18.11)</td>
<td>-3.16</td>
<td>80*</td>
<td>.002*</td>
</tr>
<tr>
<td>Group 2</td>
<td>45</td>
<td>248.42 (17.35)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. * $p < .05.$
Table 11

*Differences Between Group 1 and Group 2 on the Comprehensive Executive Functioning Inventory for Adults*

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>M (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38</td>
<td>98.47 (12.35)</td>
<td>-3.83</td>
<td>84*</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>109.06 (13.02)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. *p < .05.

Table 12

*Differences Between Group 1 and Group 2 on Behavior Intervention Monitoring Assessment System Scales*

<table>
<thead>
<tr>
<th>Groups (BIMAS2 Scale)</th>
<th>n</th>
<th>M (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (Conduct)</td>
<td>38</td>
<td>47.11 (5.51)</td>
<td>1.50</td>
<td>84</td>
<td>.138</td>
</tr>
<tr>
<td>Group 2 (Conduct)</td>
<td>48</td>
<td>45.38 (5.19)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1 (Neg. Aff.)</td>
<td>38</td>
<td>57.32 (9.17)</td>
<td>2.18</td>
<td>84*</td>
<td>.032</td>
</tr>
<tr>
<td>Group 2 (Neg. Aff.)</td>
<td>48</td>
<td>54.35 (7.71)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1 (Social)</td>
<td>38</td>
<td>41.95 (7.28)</td>
<td>-1.31</td>
<td>84</td>
<td>.195</td>
</tr>
<tr>
<td>Group 2 (Social)</td>
<td>48</td>
<td>44.02 (7.33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 1 (Academic)</td>
<td>38</td>
<td>49.13 (5.67)</td>
<td>-2.58</td>
<td>84*</td>
<td>.012</td>
</tr>
<tr>
<td>Group 2 (Academic)</td>
<td>48</td>
<td>52.52 (6.32)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


An independent-samples *t*-test was also conducted to compare the total JWS means between men and women. There was a significant difference in the scores for males and females on the JWS with a medium effect size of *d* = .50. In contrast, there was no significance in difference between the mean scores on the CEFI-Adult full scale for men and women (see Table 13). Descriptive analysis indicated 19 women (35%) endorsed having a disability while 12 males (48%) identified as having a disability.
Of the women participants with identified or suspected disabilities, 13 (68%) endorsed a mood or anxiety disorder of all disabilities identified, three (15%) indicated the presence of a learning disability while one endorsed ADHD-I, one indicated multiple (i.e., anxiety, depression and LD), and one indicated impaired hearing. Conversely, men had a more even distribution by disability type including learning disabilities ($n = 4, 33\%$), anxiety or a mood disorder ($n = 3, 25\%$), ADHD ($n = 3, 25\%$) and multiple disabilities ($n = 2, 16.7\%$).

### Table 13

*Group Differences Between Males and Females on the Journey to Wellness Scale and Comprehensive Executive Functioning Inventory for Adults*

<table>
<thead>
<tr>
<th>Groups</th>
<th>$n$</th>
<th>$M$ (SD)</th>
<th>$t$</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>JWS Male</td>
<td>30</td>
<td>239.64 (17.34)</td>
<td>-2.13</td>
<td>79*</td>
<td>.036</td>
</tr>
<tr>
<td>JWS Female</td>
<td>51</td>
<td>248.63 (18.85)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEFI Male</td>
<td>30</td>
<td>105.96 (14.69)</td>
<td>-.77</td>
<td>83</td>
<td>.443</td>
</tr>
<tr>
<td>CEFI Female</td>
<td>55</td>
<td>103.55 (13.34)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* $*p < .05.$

To evaluate differences in means between school category (i.e., college and high school), an independent $t$-test was run. Results indicated significant differences in means between the two groups on the CEFI-Adult full scale but not on the JWS total score (see Table 14) with a medium effect size of $d = .67$ for the difference on the CEFI-Adult full scale.
Table 14

*Group Differences by High School and College on Journey to Wellness Scale and Comprehensive Executive Functioning Inventory for Adults Full Scale*

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>M (SD)</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>JWS College</td>
<td>65</td>
<td>243.89 (18.89)</td>
<td>1.02</td>
<td>80</td>
<td>.31</td>
</tr>
<tr>
<td>JWS HS</td>
<td>17</td>
<td>238.71 (17.64)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEFI College</td>
<td>67</td>
<td>106.30 (13.57)</td>
<td>2.51</td>
<td>84</td>
<td>.014*</td>
</tr>
<tr>
<td>CEFI HS</td>
<td>19</td>
<td>97.63 (12.25)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* *p* < .05.

Descriptive statistics were run to evaluate the means of all schools on their performance on the JWS and CEFI-Adult (Tables 15 and 16, respectively). These were not evaluated using test statistics due to the low numbers from the community college and the alternative high school.

Table 15

*Means and Standard Deviations of Journal to Wellness Scale by School*

<table>
<thead>
<tr>
<th>School of Attendance</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Year University</td>
<td>60</td>
<td>244.45</td>
<td>18.47</td>
</tr>
<tr>
<td>Community College</td>
<td>5</td>
<td>237.20</td>
<td>24.78</td>
</tr>
<tr>
<td>Traditional High School</td>
<td>11</td>
<td>241.64</td>
<td>18.70</td>
</tr>
<tr>
<td>Alternative High School</td>
<td>6</td>
<td>233.33</td>
<td>15.56</td>
</tr>
</tbody>
</table>
Table 16

*Means and Standard Deviations of Comprehensive Executive Functioning Inventory for Adults Full Scale by School*

<table>
<thead>
<tr>
<th>School of Attendance</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Year University</td>
<td>62</td>
<td>106.42</td>
<td>13.52</td>
</tr>
<tr>
<td>Community College</td>
<td>5</td>
<td>104.80</td>
<td>15.80</td>
</tr>
<tr>
<td>Traditional High School</td>
<td>11</td>
<td>98.27</td>
<td>12.92</td>
</tr>
<tr>
<td>Alternative High School</td>
<td>8</td>
<td>96.75</td>
<td>12.08</td>
</tr>
</tbody>
</table>

Lastly, to evaluate differences in means between parent education, one-way ANOVA tests were conducted. The ANOVA found significant differences between groups on father’s education level on the JWS total score but not on the CEFI-Adult full scale score (see Tables 17 to 19). Table 18 contains data for Fisher’s least significant difference post hoc test. The least significant difference post hoc was run to determine the respective significant difference. A statistically significant difference was found between the Some College Group and all other groups (i.e., some high school, high school diploma, and bachelor’s degree or higher). No statistically significant differences were found between maternal education level on either test (see Tables 20 and 21).
Table 17

*One-Way Analysis of Variance: Are There Differences Between Journey to Wellness Scale Total Scores of Participants Based on Father’s Education Level?*

<table>
<thead>
<tr>
<th>Education Level</th>
<th>n</th>
<th>M (SD)</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some HS</td>
<td>19</td>
<td>233.53 (15.91)</td>
<td>Between groups</td>
<td>3</td>
<td>4306.46</td>
<td>1435.49</td>
<td>4.58</td>
<td>.005</td>
</tr>
<tr>
<td>HS Grad</td>
<td>16</td>
<td>241.90 (13.34)</td>
<td>Within groups</td>
<td>76</td>
<td>23814.93</td>
<td>313.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>18</td>
<td>254.90 (18.87)</td>
<td>Total</td>
<td>79</td>
<td>28121.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Grad</td>
<td>27</td>
<td>241.78 (20.13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. HS = High School; College Grad indicates a bachelor’s degree or higher.*

Table 18

*Fisher’s Least Significant Differences Post Hoc Test*

<table>
<thead>
<tr>
<th>Father Education Level</th>
<th>Some HS</th>
<th>HS Grad</th>
<th>Some College</th>
<th>College Grad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some High School</td>
<td>-</td>
<td>-8.35*</td>
<td>-21.36*</td>
<td>-8.25</td>
</tr>
<tr>
<td>High School Grad</td>
<td>8.35</td>
<td>-</td>
<td>-13.01*</td>
<td>0.10</td>
</tr>
<tr>
<td>Some College</td>
<td>21.36*</td>
<td>13.01*</td>
<td>-</td>
<td>13.11*</td>
</tr>
<tr>
<td>College Grad</td>
<td>8.25</td>
<td>-0.10</td>
<td>-13.11*</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note. HS = High School; College Grad indicates a bachelor’s degree or higher. *p < .05 level.*
Table 19

One-Way Analysis of Variance: Are There Differences Between Comprehensive Executive Functioning Inventory for Adults Full Scale of Participants Based on Father’s Education Level?

<table>
<thead>
<tr>
<th>Education Level</th>
<th>n</th>
<th>M (SD)</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some HS</td>
<td>21</td>
<td>99.29 (13.63)</td>
<td>Between groups</td>
<td>3</td>
<td>1387.31</td>
<td>462.44</td>
<td>2.60</td>
<td>.058</td>
</tr>
<tr>
<td>HS Grad</td>
<td>18</td>
<td>102.89 (11.74)</td>
<td>Within groups</td>
<td>80</td>
<td>14237.97</td>
<td>177.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>18</td>
<td>110.86 (11.55)</td>
<td>Total</td>
<td>83</td>
<td>15625.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Grad</td>
<td>27</td>
<td>104.64 (15.08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. HS = High School; College Grad indicates a bachelor’s degree or higher.

Table 20

One-Way Analysis of Variance: Are There Differences Between Journey to Wellness Scale Total of Participants Based on Maternal Education Level?

<table>
<thead>
<tr>
<th>Education Level</th>
<th>n</th>
<th>M (SD)</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some HS</td>
<td>19</td>
<td>235.79 (17.19)</td>
<td>Between groups</td>
<td>3</td>
<td>1272.65</td>
<td>424.22</td>
<td>1.20</td>
<td>.315</td>
</tr>
<tr>
<td>HS Grad</td>
<td>13</td>
<td>246.69 (13.40)</td>
<td>Within groups</td>
<td>76</td>
<td>26848.74</td>
<td>353.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>13</td>
<td>244.08 (19.83)</td>
<td>Total</td>
<td>79</td>
<td>28121.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Grad</td>
<td>35</td>
<td>244.66 (20.76)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. HS = High School; College Grad indicates a bachelor’s degree or higher.
Table 21

One-Way Analysis of Variance: Are There Differences Between Comprehensive Executive Functioning Inventory for Adults Full Score of Participants Based on Maternal Education Level?

<table>
<thead>
<tr>
<th>Education Level</th>
<th>n</th>
<th>M (SD)</th>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some HS</td>
<td>21</td>
<td>99.67 (13.32)</td>
<td>Between groups</td>
<td>3</td>
<td>940.51</td>
<td>313.50</td>
<td>1.71</td>
<td>.172</td>
</tr>
<tr>
<td>HS Grad</td>
<td>14</td>
<td>103.00 (11.26)</td>
<td>Within groups</td>
<td>80</td>
<td>14684.78</td>
<td>183.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>14</td>
<td>108.86 (13.89)</td>
<td>Total</td>
<td>83</td>
<td>15625.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Grad</td>
<td>35</td>
<td>104.64 (13.72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. HS = High School; College Grad indicates a bachelor’s degree or higher.

Lastly, a series of chi-square tests of independence were run to determine if there was an association between performance (based on self-report) on select BIMAS2 scales (negative affect, academic functioning, social, and conduct) and performance on the CEFI-Adult as identified by the full scale score. Specifically, chi-square tests were run to determine associations between categories of groups: at-risk and average performance on the BIMAS2 scales in relation to low and average performance based on the CEFI-Adult full scale. Currently, no association was found between CEFI-Adult full scale performance and performance on the negative affect or academic scale; whereas, there was an association between CEFI-Adult full scale and social scale score and CEFI-Adult full scale and conduct scale (see Tables 22 and 23).

On the chi-square test, the relation between the CEFI-Adult full scale score and social scale score was statistically significant. For this chi-square, each of the assumptions was met (i.e., two categorical variables, two or more groups for each variable, independence of observations, and expected frequencies). The CEFI-Adult full scale score and conduct scale score chi-square test also indicated a significant
association. However, the conduct chi-square test violated the assumption of expected frequencies per cell; only half the cells met the expected count of five and only one person in the current sample had a score in the at-risk range (i.e., ≥60).

Table 22

Chi-Square Test for Behavior Intervention Monitoring Assessment System Social and Comprehensive Executive Functioning Inventory for Adults High or Low

<table>
<thead>
<tr>
<th>BIMAS2 Social</th>
<th>CEFI-Adult FS ≤89</th>
<th>CEFI FS ≥90</th>
<th>%</th>
<th>X²</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤40</td>
<td>9</td>
<td>21</td>
<td>34.9</td>
<td>9.88*</td>
</tr>
<tr>
<td>≥41</td>
<td>3</td>
<td>53</td>
<td>65.1</td>
<td></td>
</tr>
</tbody>
</table>

Note. BIMAS2 Social ≤40 indicates Below Average or At-Risk self-reported rating; BIMAS2 Social ≥41 indicates Average or Above Average self-reported rating. CEFI Full Scale ≤89 indicates Below Average to Low Self-Reported Executive Functioning; CEFI ≥90 indicates Average to Above Average self-reported Executive Functioning. *p < .05.

Table 23

Chi-Square Test for Behavior Intervention Monitoring Assessment System Conduct and Comprehensive Executive Functioning Inventory for Adults High or Low

<table>
<thead>
<tr>
<th>BIMAS Conduct</th>
<th>CEFI FS ≤89</th>
<th>CEFI FS ≥90</th>
<th>%</th>
<th>X²</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤59</td>
<td>11</td>
<td>74</td>
<td>98.8</td>
<td>6.24*</td>
</tr>
<tr>
<td>≥60</td>
<td>1</td>
<td>0</td>
<td>1.2</td>
<td></td>
</tr>
</tbody>
</table>

Note. BIMAS2 Conduct ≤59 Average self-reported rating; BIMAS2 Conduct ≥60 indicates Below Average or At-Risk self-reported rating. CEFI FULL SCALE ≤89 indicates Below Average to Low Self-Reported Executive Functioning; CEFI ≥90 indicates Average to Above Average self-reported Executive Functioning. *p < .05.
Tables 24 and 25 show the groupings for academic and negative affect; however, as observed, the results were insignificant. Importantly, group mean differences on independent $t$-tests between the low EF group ($n = 12$) and average EF group ($n = 74$) on each of the BIMAS2 scales (e.g., conduct, negative affect, academic functioning, social) were not significant for any of the scales.

Table 24

*Chi-Square Test on Behavior Intervention Monitoring Assessment System Negative Affect and Comprehensive Executive Functioning Inventory for Adults High or Low*

<table>
<thead>
<tr>
<th>BIMAS Negative Affect</th>
<th>CEFI FS $\leq 89$</th>
<th>CEFI FS $&gt; 90$</th>
<th>$%$</th>
<th>$X^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq 59$</td>
<td>8</td>
<td>48</td>
<td>65.1</td>
<td>.015</td>
</tr>
<tr>
<td>$\geq 60$</td>
<td>4</td>
<td>26</td>
<td>34.9</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* BIMAS2 Negative Affect $\leq 59$ indicates Average self-reported rating; BIMAS2 Negative Affect $\geq 60$ indicates Below Average or At-Risk self-reported rating. CEFI Full Scale $\leq 89$ indicates Below Average to Low Self-Reported Executive Functioning; CEFI $> 90$ indicates Average to Above Average self-reported Executive Functioning.

Table 25

*Chi-square Test Behavior Intervention Monitoring Assessment System Academic and Comprehensive Executive Functioning Inventory for Adults High or Low*

<table>
<thead>
<tr>
<th>BIMAS Academic</th>
<th>CEFI FS $\leq 89$</th>
<th>CEFI FS $&gt; 90$</th>
<th>$%$</th>
<th>$X^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq 40$</td>
<td>2</td>
<td>3</td>
<td>5.8</td>
<td>3.00</td>
</tr>
<tr>
<td>$\geq 41$</td>
<td>10</td>
<td>71</td>
<td>94.2</td>
<td></td>
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</tbody>
</table>

*Note.* BIMAS2 Academic $\leq 40$ indicates Below Average or At-Risk self-reported rating; BIMAS2 Academic $\geq 41$ indicates Average or Above Average self-reported rating. CEFI Full Scale $\leq 89$ indicates Below Average to Low Self-Reported Executive Functioning; CEFI $\geq 90$ indicates Average to Above Average self-reported Executive Functioning.
CHAPTER V

DISCUSSION

Executive functioning (EF) and resilience are two topics that have increasingly become the focus of psychological interest given the implications of both as contributory factors to educational success or failure (Allan, McKenna, & Dominey, 2014; Prince-Embry, 2008; Samuels, Tournaki, Blackman, & Zilinski, 2016). Efficient EF allows students to engage with their environments in intentional, goal-oriented ways, increasing the likelihood their objectives are met (Barkley & Murphy, 2011; Blair & Diamond, 2008; Diamond, 2013). Conversely, when children and adolescents display poor EF, it is often most evident within the school environment and, in particular, in the classroom with consequences ranging from low grades, poor interpersonal relationships, and difficulties regulating behavioral or emotional responses (Barkley, 1997; Knouse, Feldman, & Blevins, 2014; Langberg, Dvorksy, & Evans, 2013; Luciana & Collins, 2012).

Similarly, just as EF is linked to certain outcomes, resilience is implicated in how well a person is predicted to function in the face of adversity. Not unexpectedly, people with a higher fund of resilience--marked as an interaction of protective factors (e.g., community involvement, positive parent-child interaction, supportive family structure) and intact internal factors such as self-regulation and problem solving--are likely to have better outcomes than their non-resilient peers (Center on the Developing Child, 2015;
Newland, 2014). As such, this study was particularly interested in evaluating whether self-reported resilience factors could mediate certain behavioral and academic outcomes for adolescents—a primary age at which executive functioning capacity is evolving through the process of neural plasticity (i.e., pruning; Guare et al., 2012; Sisk & Zehr, 2005; Urošević, Collins, Muetzel, Lim, & Luciana, 2012). Specifically, this study set to determine whether endorsement of resilience factors mediated or intervened on academically relevant outcomes such as behavior (internalizing and externalizing), adaptive behavior, and academic functioning.

To answer the latter question and the main questions in this research, mediation analysis was utilized as the primary form of analysis using three self-report measures to capture the constructs under review (i.e., EF, resilience, and behavioral and academic outcomes). Executive functioning is commonly evaluated both as embodying multiple constructs (i.e., working memory, organization, planning, inhibition/regulation) and as a unitary construct used as an umbrella term to capture intentional, goal-directed behavior (Riggs et al., 2006). There has been no consensus as to whether one holds greater validity than the other and EF is often evaluated in different ways depending on the question being asked (Barkley, 2012). For the current research, EF was evaluated as a unitary construct (Naglieri & Goldstein, 2014).

Resilience was evaluated using the JWS as it was theoretically designed to capture internal and external factors important to the construct of resilience or factors that might buffer against adverse outcomes and promote health and wellness (Copeland et al., 2010; Weller-Clarke, 2006). As expected, EF and indicators of resilience were found to be significantly correlated in this study.
Mediation Analysis

The purpose of mediation analysis was to determine whether the relationship between EF and outcome factors from the BIMAS could be better explained through the introduction of a third variable (the mediator), i.e., through the introduction of the mediator, there is a meaningful reduction in the effect between the independent variable and dependent variable.

For the purposes of the current research, the primary interest was in determining if resilience could be determined to be a mediator in the relationship between EF and academic and behavioral outcomes in two different groups (one with lower EF or a disability and one group without). In other words, did resilience factors introduced as the mediator JWS total score account for academic and behavioral relationships between EF and such outcomes in two distinct groups in terms of their EF and self-reported wellness or resilience? To assess behavioral and academic outcomes, the BIMAS2 was utilized. Specific subscales from this instrument were used in the study given the evaluation of distinct outcomes (i.e., externalizing behavior (conduct), internalizing behavior (negative affect), adaptive behavior (social), and academic performance (academic functioning).

Mediation Results

In the current study, mediation effects were found in externalizing behavior outcomes and internalizing behavior outcomes. With the low EF plus or disability group, the mediator was significant in predicting externalizing (conduct) and internalizing behavior outcomes (negative affect) in the presence of the predictor (EF) given the finding of a significant indirect effect. The significance of the indirect effect indicated a reduction in the effect of executive functioning on BIMAS conduct and BIMAS negative
affect in the presence of the mediator (JWS) in the expected direction. Stated differently, individuals reported fewer conduct and less internalizing problems when resilience was added to the model and by a greater amount than when only EF was in the model.

The magnitude of the indirect effect implies how much mediation had occurred through the defined mediator--essentially the size of the mediated effect (Edwards, n.d.; Kline, 2015; Pearl, 2014). In the case of the externalizing behavior outcome (BIMAS conduct), for every one unit increase in the JWS total score, conduct decreased by .14. In applied terms, this indicated resilience factors could account for the scores of the population of the low EF plus disability group in that resilience was mediating or intervening with executive functioning for better conduct (externalizing behavioral) outcomes. Related to internalizing behavior, for every one unit increase in the JWS total score, the negative affect score decreased by .25. These findings supported longitudinal research by identifying that children with lower reports of self-competence, including social competence and a factor associated with resilience, tended to exhibit greater externalizing and internalizing behaviors in adolescence (Bornstein, Hahn, & Haynes, 2010).

In an interesting finding, resilience also mediated or intervened in the relationship in the non-disabled group but in the opposite direction. In other words, EF affected conduct outcomes in the presence of resilience as the mediator increased the externalizing score. Importantly, mediation analysis is a complex analysis that does not always provide outcomes in line with what would be expected due to a variety of factors, i.e., the chance of the analysis methods being flawed due to the inconsistencies of application of assumptions put forth by various researchers, the tendency to overgeneralize the methods
for estimating mediation, as well as an overreliance on the use of statistical significance for decision criteria (Kline, 2015; MacKinnon et al., 2007; Pearl, 2014). This sentiment was further captured by MacKinnon et al. (2007):

The challenging task of research is to infer the true state of mediation from observations. There are qualifications even to this simple dichotomy, and in general, it will take a program of research to justify concluding that a third variable is a mediating variable. (p. 596)

For these particular reasons, this might be why resilience factors as reported on the JWS total were not found to have a significant mediating effect for academic or social adaptive outcomes among either of the groups despite the literature supporting this relationship. But what could be concluded from the current mediation analysis was that related to specific outcomes, resilience as a mediator appeared to play a role in affecting behavioral and affective outcomes on students with lower EF and/or a disability.

**Demographic Outcomes and Group Differences**

Group differences across a number of groups in addition to the low average EF plus/or disability group and the average EF plus no disability group were conducted to add greater understanding to expected and unexpected differences found in the current analyses. Not unexpectedly, there were significant differences in the means between the low average EF plus/or disability group (Group 1) and average EF plus no disability group (Group 2) on both the total score of the Journey to Wellness Scale (JWS) and the full scale score of the Comprehensive Executive Functioning Inventory (CEFI-Adult).

Currently, the Average No Disability group had higher means on both the JWS and the CEFI-Adult. Of course, given the low average EF plus/or disability group contained 12
members with a CEFI-Adult full scale score lower than 89, it would be expected for the group mean on the CEFI-Adult full scale to be lower but importantly these means were found to be statistically significantly different. This group was also statistically significantly different on the JWS.

The current data spoke to the research that indicated people with the types of disabilities (including those in this study) were more likely to have executive functioning weaknesses due to the neurobiological nature of the disability (Jarrett, 2016; Luciana, 2016; Sommerfeldt et al., 2016; Visu-Petra, Miclea, & Visu-Petra, 2013). Further, people with identified disabilities were likely to have EF weaknesses; while a separate and unique construct, specific facets of EF were identified in the research as contributing to resilient outcomes (Greenberg, 2006; Martel et al., 2007). Therefore, it was not unexpected to find differences in the groups on tests of EF and resilience. As noted in the mediation analysis, mediation effects were found more so with the low average EF plus/or disability group. Importantly, it was difficult to fully explain the reason as mediation infers causation but as with all statistical analysis, causation can never be claimed.

Group differences were also evaluated on the BIMAS2 outcomes between the low average EF plus/or disability group and the average EF plus no disability group. Significant differences were found between the groups on the negative affect and academic scales but no other scales. However, the groups had differences in means in the expected direction. For example, the low average EF plus/or disability group had higher means on the each of the behavior scales (conduct, negative affect) and lower means on the adaptive scales--academic functioning and social.
In evaluating differences in performance on the CEFI and the JWS by men and women, significant differences were found on the JWS but not the CEFI; men reported lower JWS total scores than women. Given the current sample men on average endorsed higher proportion of disabilities might speak to lower endorsement of resilience factors. Counterintuitively and while not statistically significant, men on average reported a greater frequency of disabilities and had higher CEFI full scale scores than women. However, it was difficult to ascertain differences theoretically without knowing important distinguishing variables such as SES, parent education, validity of responses on the JWS, etc.

Differences between school groups on the JWS and CEFI were not currently evaluated using statistical tests of significance given the low numbers of community college and alternative school participants. Therefore, the differences were observed through descriptive statistics; differences in means were found to be as expected given EF was correlated to academic outcomes. For example, both the community college and the alternative high school had lower means than their comparative respective institutions on both the CEFI-Adult full scale and the JWS total scores.

It was beyond the scope of the current research to speak to the numerous factors why certain students attended community colleges or alternative schools but primary factors included academic and/or behavioral needs for alternative school attendees and academic and/or financial limitations for community college attendees (Fike & Fike, 2008; Olive, 2003). The latter reflected facets of EF and/or resilience; financial limitations were loosely linked to low SES, which was also implicated in the
development of resilience and EF (Bradley & Corwyn, 2002; Center on the Developing Child, 2012; Fitzpatrick, McKinnon, Blair, & Willoughby, 2014).

While statistical significance was not calculated for the difference in means between each of the schools, mean group differences between the college group and high school group on the JWS total score and the CEFI-Adult full scale were evaluated using tests of significance. No significant differences were found in means between the two groups on the JWS; however, statistically significant differences were found on the CEFI-Adult full scale with the high school students having statistically lower CEFI-Adult full scale scores than their college counterparts. The current study did not differentiate the high school students further; students were classified as college-bound or would be seeking an alternate path. As such, it was difficult to speak to differences regarding EF other than in-tact EF was linked to better academic outcomes; to attend college, including a two-year college, one was presumed to have completed a number of prerequisite tasks reflective of EF skills to aid them in college acceptance.

Lastly, group differences on the JWS and CEFI-Adult related to parent level of education were evaluated through tests of ANOVA. Surprisingly, no significant differences were found by maternal education level, which has historically been predictive in educational attainment and linked to factors of resilience and executive functioning as discussed (Ardila, Rosselli, Matute, & Guajardo, 2005; Zhang, Hsu, Kwok, Benz, & Bowman-Perrott, 2011). Conversely, father’s level of education (specifically, some college) was found to be significantly different for the total JWS score. No significance was found between means on the CEFI-Adult full scale based on father’s level of education.
The latter results were also surprising given resilience research gave credence to the notion of the importance of a consistent, responsive caregiver being a primary factor in helping children develop resilience (Center on the Developing Child, 2015). This was contextualized in a study conducted by Guryan, Hurst and Kearney (2008) who found mothers reporting to have a college degree or higher spent on average 4.5 hours more a week providing child care compared to their non-college educated peer group. Further, higher educational levels were correlated with SES and lower SES was one factor attributed to a higher likelihood of exposure to adverse life experiences as well as being implicated in underdevelopment of resiliency factors or process and poorer executive functioning (Bradley & Corwyn, 2002; Center on the Developing Child, 2012; Fitzpatrick et al., 2014; Letourneau, Duffett-Leger, Levac, Watson, & Young-Morris, 2013). Importantly, however, the majority of scores \((n = 76)\) on the CEFI-Adult full scale were within the average range across the total population and the JWS, as used currently, did not classify students into high or low groups. If more cases of low EF could have been used in the current study and if JWS was classified into high or low groups, differences by parental level of education might have been more likely.

Chi-square tests of independence were also run to evaluate predicted associations between classification of groups (e.g., high and low executive functioning full scale score and high and low BIMAS2 scale scores). Currently, only the relationship between the CEFI-Adult full scale performance and the BIMAS2 social performance was significant and met the assumptions for chi-square analysis. Given that chi-square analysis is designed to test whether a found output is dependent on a suspected variable, the results were somewhat unusual. For example, it would have been expected that classification of
negative affect into high or low (at risk) would be associated with a high or low CEFI-Adult full scale score given that as noted, low EF is associated with internalizing disorders (Jarrett, 2016; Luciana, 2016; Sommerfeldt et al., 2016).

Similarly, the CEFI-Adult full scale did not demonstrate significance in classifying people into high or low BIMAS2 academic categories, which was also unexpected based on research that supported the link between EF and academic outcomes (Visu-Petra, Cheie, Benga, & Miclea, 2011). While the conduct scale chi-square analysis was significant and expected due to the noted relationship between externalizing, conduct type behaviors captured on the BIMAS2 (e.g., aggression, anger, impulsivity and fidgeting) and EF did not meet the assumptions due to just one person endorsing being at risk for conduct problems as tested on the BIMAS2 (Barkley, 1997; Sisk & Zehr, 2005). Importantly, the sample size for low EF was small (n=12); chi-square analysis is best conducted with a large sample size to avoid violating the test assumptions of having an expected cell count of at least five in 80% of the cells and no cell should have an expected count of less than one (McHugh, 2013).

Limitations

A primary limitation in the current study was the small number of included participants with low EF. Currently, only 14% of the total population (n=12) reported a CEFI-Adult full scale score of 89 or lower. Given this small number, this group was not evaluated as a separate group, thus limiting the generalization of findings that resilience contributes to better outcomes with this specific population using a self-report measure of EF. However, as noted, this group was grouped with those identifying with a disability; while the mean of this group on the CEFI-Adult full scale was (98.47) and did not fall
within the low range as a collective group, significant differences were found and
differences in specific mediation analysis were found. While research has implicated EF
in psychopathology (e.g., mood disorders, anxiety), learning disabilities, and
externalizing disorders, and perhaps a reason for the currently observed phenomena,
additional numbers would need to be included for greater substantiality of results.

Further, as identified in the delimitations, the sample was taken from a
convenience sample with the majority of the participants enrolled in a university or
community college. As such, by nature of being higher-education students, there was a
higher likelihood of sampling participants with average or above executive functioning
and higher than their non-college-attending counterparts. While high school participants
were also included in the current study and reported statistically lower EF, the means of
both groups related to EF fell within the average range. Sub-scale scores from the CEFI-
Adult were not utilized in the current research but descriptive analysis indicated that if
students could have been identified as having an executive functioning weakness based
on one or more sub-scales within the low-average range, the number of participants
included in the “low EF group” would have jumped to 45, approximately half the total
population of current participants.

Additionally, the primary methodology utilized in the current study (self-report
surveys) presented a number of limitations. The nature of self-report surveys requires
two important features for validity: honesty of responsiveness and the capacity of self-
awareness. These two features are connected given that self-reporting requires a person
to have awareness of their strengths and difficulties and to be able to report on them
honestly. On a measure such as the JWS that seeks to identify a person’s strengths, a
person might be more inclined to answer in the positive for one or both previously stated reasons (e.g., to exaggerate their positive features or they might be less aware of their faults).

Related to the CEFI, a person with low EF by nature of having poor EF might have difficulty with self-evaluation and might, therefore, underreport an area of weakness unless it is a salient area of difficulty. The latter point speaks to a bigger issue related to EF, which begs the question of how best to evaluate EF. As noted in Chapter I, there is debate within the psychological literature on whether self-report, ecological observation, or formal neuropsychological testing are most valid at capturing the essential features of EF; no agreed upon “protocol” has been currently identified in the research.

An additional limitation was only select subscales from the BIMAS2 were utilized to measure specific outcomes. The few items in each of the scales--conduct, negative affect, academic functioning, and social (9, 7, 5 and 6, respectively)--might have been too narrow in capturing the intended construct (e.g., externalizing behavior, internalizing behavior, etc.). Adding additional questions from established questionnaires might have provided richer outcomes. While the JWS was a much longer scale, due to the difficulty of capturing the construct of resiliency, adding measures of resilience such as the Adverse Child Experiences questionnaire and the Connor-Davidson (2003) Resilience scale could have added meaningful data to the current research and enhanced findings (Centers for Disease Control and Prevention, 2016)

**Conclusion and Implications**

A primary goal of this study was to evaluate the role self-reported resilience factors have in affecting behavioral and academic outcomes in the presence of executive
functioning impairment. The current research elucidated some interesting facts, namely, self-reported resilience factors were shown to account for outcomes in certain instances. This provided growing support for targeting resilience-promoting activities as being a meaningful and worthwhile endeavor and, importantly, one that did not always require significant amounts of intervention (Center on the Developing Child, 2015; Rau et al., 2016). The current research also identified a phenomenon that should be studied further with a larger sample and, importantly, a sample that is only low executive functioning as identified not only through a self-report survey but observational or secondary reporters given the noted flaws in survey instrumentation.

To be able to conduct research with a population with truly identifiable low EF through previously identified means could contribute to the research by identifying what specific factors in the presence of low EF were contributing to certain outcomes. This type of research would be a welcome addition given that one limitation of the study was the difficulty in fully parsing apart EF from resilience given EF is often considered as part of classifying a person as resilient and vice versa, which exists in a symbiotic relationship (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Greenberg, 2006).

The latter sentiment was captured in an article published by the Center on the Developing Child (2012) in which researchers espoused resilient capacities could be improved through the introduction of developmentally appropriate, health-building activities including providing programming to strengthen executive function skills. Greenberg (2006) also addressed the importance of targeting both with the notion of by improving EF, a natural consequence was increased resilience. This research enhanced that notion with the recognition that to increase adaptive outcomes for at-risk children
and adolescents, it is necessary to target both the promotion of resilience factors and executive functioning skills (Center on the Developing Child, 2012; Greenberg, 2006; Piehler et al., 2014).

Importantly, schools might be the perfect environment to take on this meaningful task and many schools are already moving in that direction through implementation of social-emotional curricula that specifically target resilience and correlates of EF such as problem-solving and emotional and behavioral regulation (Doll, 2013; Mallin, Walker, & Levin, 2013). Additionally, schools are poised to be able to provide the intervention needed, starting with a key factor that contributes to meaningful differences in the creation and building of resilience: a consistent, stable relationship with a supportive caregiver or adult (Center on the Developing Child, 2015). Similarly, Goldstein, Brooks, and DeVries (2013) indicated resilience building activities could be implemented through small changes in the mindset and behaviors of adults responsible for encouraging resilience including being mindful of one’s empathy, employing active listening, validating and encouraging children, helping them identify their unique strengths and areas of competence, and encouragement in the face of failure among others.

The latter collectively captured the key factor in promoting resilience--provision of positive and caring relationships with adults--and spoke to the notion that schools have the prerequisite tools and structure to promote both resilience and EF skills (Sapienza, Julianna, & Masten, 2011). While much of the research focused on the enhancement of resilience by targeting EF, teachers, parents, and caregivers might actually find that by implementing resilience-based strategies, such as those put forward by Goldstein et al. (2013), a natural consequence would be an increase in students’ feelings of competence,
self-efficacy, and engagement with and willingness to undertake EF skill-building and ultimately find success (Saeki & Quirk, 2015).
REFERENCES


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doi:10.1177/1063426611421007


APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL
AND AMENDMENT LETTERS
Institutional Review Board

DATE:

TO: FROM:

PROJECT TITLE: SUBMISSION TYPE:

ACTION: DECISION DATE: EXPIRATION DATE:

June 12, 2017

Bronwyn Lehman, Ed.S
University of Northern Colorado (UNCO) IRB

[1080403-2] Resilience as a Mediating Factor for Behavioral and Academic Outcomes for Adolescents with Executive Functioning Impairments

New Project

APPROVAL/VERIFICATION OF EXEMPT STATUS June 12, 2017
June 12, 2021

Thank you for your submission of New Project materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Hello Bronwyn,

Thanks for the updates and explanations. Everything looks great and your IRB application is approved. Good luck with this important research.

Sincerely,

Nancy White, PhD, IRB Co-Chair

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.
DATE:

TO: FROM:

PROJECT TITLE: SUBMISSION TYPE:

ACTION: DECISION DATE: EXPIRATION DATE:

April 26, 2018

Bronwyn Lehman, Ed.S
University of Northern Colorado (UNCO) IRB

[1080403-3] Resilience as a Mediating Factor for Behavioral and Academic Outcomes for Adolescents with Executive Functioning Impairments

Amendment/Modification

APPROVAL/VERIFICATION OF EXEMPT STATUS April 26, 2018
June 12, 2021

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Thank you for the thorough amendments to your IRB application. Materials and protocols are verified/approved exempt.

Best wishes with your research.

Sincerely,

Dr. Megan Stellino, UNC IRB Co-Chair

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.
APPENDIX B

COLORADO MOUNTAIN COLLEGE INSTITUTIONAL REVIEW BOARD APPROVAL LETTER
To: Bronwyn Lehman

From: Veneeya Kinion

Date: July 11, 2017

Subject: Status of Application for Approval to Utilize Human Subjects in Research

After a review of your proposed research project titled, “Resilience As a Mediating Factor on Academic and Behavioral Outcomes for Adolescents with Exec. Functioning Impairments” it appears that your research involves activities that do not require full review by the Institutional Review Board according to federal guidelines.

According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review. Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that your research is exempt from IRB approval. You may proceed with the proposed research.

Sincerely,

Veneeya Kinion
Compliance Officer
Institutional Review Board
APPENDIX C

APPROVALS FROM BUILDING SCHOOL PRINCIPALS, SCHOOLCOUNSELORS, AND STUDENTS’ TEACHERS
From: TROY DUDLEY <troy.dudley@eagleschools.net>
Sent: Friday, January 5, 2018 9:11:57 AM
To: Bronwyn
Subject: Re: seeking permission to conduct dissertation research with students

Sounds good to me. Look forward to hearing our results.

T

Troy Dudley
Principal Red Canyon H.S.
Director World Academy Online Learning

Office 970-328-2859
Fax 970-328-2855

NOTICE TO RECIPIENT: THIS MESSAGE AND ANY RESPONSE TO IT MAY CONSTITUTE A PUBLIC RECORD AND, THEREFORE, MAY BE AVAILABLE UPON REQUEST IN ACCORDANCE WITH COLORADO OPEN RECORDS LAW.

On Thu, Jan 4, 2018 at 10:40 AM, Bronwyn <bronwyn@mybrightfuture.org> wrote:
Hi Troy,

I hope you are having a restful winter break! I have reached out to Krista about collecting research for my dissertation and she has agreed to help. However, in order to conduct research in the school, I need permission from the building principal.

A little about my dissertation:

- I am evaluating the effects of executive functioning (e.g., organization, planning, impulse control, memory) on resilient or positive adaptive outcomes for 18-year-old students (e.g., school performance, behavior, and social-emotional functioning).
- My data collection involves having students complete an 80 item Executive functioning self-report assessment measure, 30 item resilient self-report measure, and a 34 item behavior assessment.
- The total time for each student is approximately 30 minutes.
The students would provide permission to participate as they are 18 years old.

If you allow me to conduct my research in the school, I will work with Krista and the teachers to identify eligible and interested students and to determine the best times to work with the students.

Please let me know if you have any questions, and I am happy to provide you with any additional information.

Thank you for your time,

Bronwyn
Hey Bronwyn,

Green light. No prob to work with Ali's and Sage's students as long as they are ok with it as well.
A heads up that our kids and teachers have been taking lots of surveys this year, so be sure to let everyone know that it's voluntary, and that it's not the expectation of the school/admin that they have to participate.
Rob

Robert Parish
Battle Mountain High School Principal
Head Track and Cross Country Coach

On Thu, Jan 4, 2018 at 10:38 AM, Bronwyn <brwnyn@mybrightfuture.org> wrote:
Hi Rob,

I hope you are having a restful winter break! I have reached out to Sage about collecting research for my dissertation and she has agreed to help. However, in order to conduct research in the school, I need permission from the building principal.

A little about my dissertation:

- I am evaluating the effects of executive functioning (e.g., organization, planning, impulse control, memory) on resilient or positive adaptive outcomes for 18-year-old students (e.g., school performance, behavior, and social-emotional functioning).
- My data collection involves having students complete an 80 item Executive functioning self-report assessment measure, 30 item resilient self-report measure, and a 34 item behavior assessment.
- The total time for each student is approximately 30 minutes.
- The students would provide permission to participate as they are 18 years old.

If you allow me to conduct my research in the school, I am planning on primarily working with Sage and Ali's students, but would like to reach out to gen. ed teachers to gauge interest as well. I will then work with the teachers to determine the best times to work with the students.

Please let me know if you have any questions, and I am happy to provide you with any additional information.

Thank you for your time,

Bronwyn
APPENDIX D

CONSENT FORM FOR HUMAN PARTICIPANTS
IN RESEARCH
Executive Functioning (EF), which refers to goal-directed behavior, is essential to successful or efficient human functioning, (i.e., success in school and work, managing daily life decisions, social and psychological development and mental and physical health). When EF is intact, it enables the necessary foundation for cognitive, behavioral, and social development. Conversely, poor executive functioning often interferes with a person’s ability to interact with the environment in a strategic manner. This is particularly true for the educational environment, with impairments in the academic setting often evident by the student, teachers and peers given observable impulsive behavior, poor attentional control, disorganized work and lack of work completion, and failing or poor grades, etc. Further, the presence of such difficulties makes it difficult to adapt to difficult or stressful situations, as it is thought that this adaptive control begins and ends with recruiting EF-based resources.

Currently, much of the focus on school-based mental health interventions centers on the problem, with few interventions currently available to examine the positive components of the individual. However, this type of intervention is critical as schools move from problem-focused to a more resiliency-based approach. One area of particular interest is how resilience factors can contribute to prevention and be integrated as part of mental health interventions in the school setting. This type of intervention may be particularly beneficial for students with identified executive functioning impairment. This is especially important, as EF is important for successful engagement and/or response to traditional treatments that target many of these problems. Therefore, when EF is impaired, it potentially limits the success of the behavioral change intervention. The purpose of this study, therefore, is to evaluate resilience factors as a mediator on
behavioral and academic outcomes among older adolescent students with self-reported intact executive functioning and those with self-identified executive functioning impairments.

In order to begin exploring this theory, it is the purpose of this project to assess executive functioning, as well as behavioral, academic and adaptive abilities of adolescents enrolled in a university or community college setting. Results will be evaluated in conjunction with self-reported resilience factors to determine the role, if any, resilience plays in countering the negative effects of executive functioning impairment. Three different measures will be utilized as a means of identifying this information: The Comprehensive Executive Functioning Inventory Adult (CEFI-Adult), the Journey to Wellness Scale (JWS) and the Behavior Intervention Monitoring Assessment System, second edition (BIMAS-2). The measures have been selected as each assesses a student’s ability from a unique developmental perspective. Participants will also be asked to complete a six-question demographic survey to aid in evaluating differences across groups.

Participation in this study is voluntary, but to be eligible, you must be at least 18 years of age. Should you decide to help with the study by becoming a participant, we will ask several things of you and have you complete three different types of tests and a demographic survey. It is important that you keep in mind that all information we collect will be regarded as confidential, as each participant will be provided with a number that corresponds to the data collected. No information will be shared with anyone other than the researchers in the study. At the conclusion of the study and full acceptance of the research by the graduate school, participants may request a copy of the research. Participants may also request a copy of personal results of each of the assessments.

Participation in our study will entail the following, with total participation time expected to last no longer than 35 minutes:

1. Collection of demographic information, such gender, college or university of attendance, parent education and ACT/SAT scores
2. Participant completion of the Comprehensive Executive Functioning Inventory, Adult, an 80-item questionnaire that evaluates level of executive functioning
3. Participant completion of the Journey to Wellness Scale, an 80-item questionnaire designed to explore adolescent wellness and resilience factors

There are no inherent risks about participation in this study. Your experience should be no different than taking a class quiz or test. You may also find that by participating you learn more about your own executive functioning and resilience. Additionally, due to the nature of the proposed research, there are no foreseen physical risks to the participants in the study. The potential emotional risks encountered by each
participant will be in proportion to the amount of distress each is currently experiencing or may experience having to answer personal questions about their current thoughts, feelings and behaviors. Should participation in this study cause you to have feelings, thoughts or emotions that interfere with your day to day activities, we are happy to provide you with resources and school staff who will happy to help you manage these feelings, thoughts and/or emotions you are experiencing.

Upon completion, you will be entered to win one of two 50-dollar Amazon.com gift certificates. Again, please remember that participation is voluntary. You may decide not to participate in this study and if you begin participation you may still choose to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to hold onto for your own records if you so request. If you have any questions or concerns about your participation in this research, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910

I agree that I am at least 18 years of age, and I voluntarily agree to participate in this research:

Participant Signature ___________________________________ Date: _____________

Researcher’s Signature _________________________________ Date: _____________
APPENDIX E

HIGH SCHOOL CONSENT FORM
Executive Functioning (EF), which refers to goal-directed behavior, is essential to successful or efficient human functioning, (i.e., success in school and work, managing daily life decisions, social and psychological development and mental and physical health). When EF is intact, it enables the necessary foundation for cognitive, behavioral, and social development. Conversely, poor executive functioning often interferes with a person’s ability to interact with the environment in a strategic manner. This is particularly true for the educational environment, with impairments in the academic setting often evident by the student, teachers and peers given observable impulsive behavior, poor attentional control, disorganized work and lack of work completion, and failing or poor grades, etc. Further, the presence of such difficulties make it difficult to adapt to difficult or stressful situations, as it is thought that this adaptive control begins and ends with recruiting EF-based resources.

Currently, much of the focus on school-based mental health interventions centers on the problem, with few interventions currently available to examine the positive components of the individual. However, this type of intervention is critical as schools move from problem-focused to a more resiliency-based approach. One area of particular interest is how resilience factors can contribute to prevention and be integrated as part of mental health interventions in the school setting. This type of intervention may be particularly beneficial for students with identified executive functioning impairment. This is especially important, as EF is important for successful engagement and/or response to traditional treatments that target many of these problems. Therefore, when EF is impaired, it potentially limits the success of the behavioral change intervention. The purpose of this study, therefore, is to evaluate resilience factors as a mediator on
behavioral and academic outcomes among adolescent students with self-reported intact executive functioning and those with self-identified executive functioning impairments.

In order to begin exploring this theory, it is the purpose of this project to assess executive functioning, as well as behavioral, academic and adaptive abilities of adolescents enrolled in a university, community college or high school setting. Results will be evaluated in conjunction with self-reported resilience factors to determine the role, if any, resilience plays in countering the negative effects of executive functioning impairment. Three different measures will be utilized as a means of identifying this information: the Comprehensive Executive Functioning Inventory Adult (CEFI-Adult), the Journey to Wellness Scale (JWS) and the Behavior Intervention Monitoring Assessment System, second edition (BIMAS-2). The measures have been selected as each assesses a student’s ability from a unique developmental perspective. Participants will also be asked to complete a six-question demographic survey to aid in evaluating differences across groups.

Participation in this study is voluntary, but to be eligible, you must be 18 years of age. Should you decide to help with the study by becoming a participant, we will ask several things of you and have you complete three different types of tests and a demographic survey. It is important that you keep in mind that all information we collect will be regarded as confidential, as each participant will be provided with a number that corresponds to the data collected. No information will be shared with anyone other than the researchers in the study. At the conclusion of the study and full acceptance of the research by the graduate school, participants may request a copy of the research. Participants may also request a copy of personal results of each of the assessments.

Participation in our study will entail the following, with total participation time expected to last no longer than 35 minutes:

1. Collection of demographic information, such as gender, college or university of attendance, parent education and ACT/SAT scores
2. Participant completion of the Comprehensive Executive Functioning Inventory, Adult, an 80-item questionnaire that evaluates level of executive functioning
3. Participant completion of the Journey to Wellness Scale, an 80-item questionnaire designed to explore adolescent wellness and resilience factors

There are no inherent risks about participation in this study. Your experience should be no different than taking a class quiz or test. You may also find that by participating you learn more about your own executive functioning and resilience. Additionally, due to the nature of the proposed research, there are no foreseen physical risks to the participants in the study. The potential emotional risks encountered by each participant will be in proportion to the amount of distress each is currently experiencing.
or may experience having to answer personal questions about their current thoughts, feelings and behaviors. Should participation in this study cause you to have feelings, thoughts or emotions that interfere with your day to day activities, we are happy to provide you with resources and school staff who will happy to help you manage these feelings, thoughts and/or emotions you are experiencing.

Upon completion, you will be entered to win one of two 50-dollar Amazon.com gift certificates. Again, please remember that participation is voluntary. You may decide not to participate in this study and if you begin participation you may still choose to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to hold onto for your own records if you so request.

I agree that I am 18 years of age, and I voluntarily agree to participate in this research:

Participant Signature ___________________________________ Date: ______________

Researcher’s Signature ________________________________ Date: ______________
APPENDIX F

JOURNEY TO WELLNESS SCALE

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INSTRUCTION: Please rate how much you agree with the following statements (SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree)

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. I am open minded.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>2. I belong.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>3. I blame other people for my problems. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>4. I can stop myself when I am going to say something I will regret.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>5. All people have value.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>6. I am not engaged in life. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>7. I know what I am good at and not good at.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>8. My problems seem to be never ending. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>9. I give up easily on difficult tasks. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>10. I am respectful of others.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>11. After an event, I typically find ways to do better</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>12. I am cared for and loved.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>13. I care about my health.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>14. After leaving a heated argument, I can return and talk to the person I am mad at.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>15. I am grateful for what I have.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>16. I know what I want and how to get it.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>17. I sense what to do next.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>18. I often feel hopeless. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>19. Sometimes it helps to have another’s opinion.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>20. I often sense what others are feeling.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>21. If I can’t do something one-way, I’ll do it another way.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>22. I feel like I belong at school.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>23. I am dependable.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>24. I can remove myself from a frustrating situation.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>25. I enjoy differences in people.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>26. I am not afraid to take a risk when it comes to starting a project.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>27. I have learned a great deal from past experiences.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>28. I keep on trying, as I know I will get there.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>29. I take pride in my accomplishments.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>30. Listening is a very important skill.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>31. It’s important to be flexible.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>32. I do not get support from friends and the community. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>33. I exercise regularly.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>34. I value feedback from people about how I handle different tense situations.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
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<tr>
<td>35. I can see things through other peoples’ eyes.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>36. I set challenging goals.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>37. I know what I am feeling at the moment.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>38. I often think life is meaningless. (R)</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>39. Learning new things is fun.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
</tbody>
</table>
40. I enjoy participating in activities with others.  SA  A  D  SD
41. I am prepared for change.  SA  A  D  SD
42. I am close to one or both of my parents.  SA  A  D  SD
43. I am responsible for my actions.  SA  A  D  SD
44. I don’t let little things upset me.  SA  A  D  SD
45. I cannot accept another’s point of view. (R)  SA  A  D  SD
46. I am passionate about what I do.  SA  A  D  SD
47. I am aware of how I make other people feel.  SA  A  D  SD
48. I have hope for the future.  SA  A  D  SD
49. I feel organized in most aspects of my school life.  SA  A  D  SD
50. I am easy to be with.  SA  A  D  SD
51. I try to find new ways of looking at things.  SA  A  D  SD
52. I feel supported and listened to in my life.  SA  A  D  SD
53. I finish what I start.  SA  A  D  SD
54. I feel in control of my emotions.  SA  A  D  SD
55. I have concern for the welfare of others.  SA  A  D  SD
56. I am not easily discouraged from something I want.  SA  A  D  SD
57. Criticism is hard to take, but it makes me stronger.  SA  A  D  SD
58. It’s important to see the humor in things.  SA  A  D  SD
59. I am confident and self-assured.  SA  A  D  SD
60. I am not comfortable sharing my feelings. (R)  SA  A  D  SD
61. I am agreeable.  SA  A  D  SD
62. In my family, nobody listens to one another. (R)  SA  A  D  SD
63. The choices I make are thoughtful ones.  SA  A  D  SD
64. I get upset when others don’t see things my way. (R)  SA  A  D  SD
65. I stand up for people who cannot stand up for themselves.  SA  A  D  SD
66. I envision what I want, and make a plan on how to get it.  SA  A  D  SD
67. I lack confidence in my abilities. (R)  SA  A  D  SD
68. I have positive expectations of others.  SA  A  D  SD
69. I find ways to accomplish difficult tasks.  SA  A  D  SD
70. People say that I am thoughtful.  SA  A  D  SD
71. I need to be perfect. (R)  SA  A  D  SD
72. My friends are very supportive.  SA  A  D  SD
73. I can admit to mistakes I make.  SA  A  D  SD
74. When I am angry or disappointed with someone I talk to them about it.  SA  A  D  SD
75. It’s important to forgive each other.  SA  A  D  SD
76. I have lots of ideas.  SA  A  D  SD
77. I am realistic about what I can and cannot do.  SA  A  D  SD
78. I believe the world holds great promise.  SA  A  D  SD
79. I really enjoy being into what I’m doing.  SA  A  D  SD
80. I have meaningful relationships.  SA  A  D  SD

(R) = Reversed Scored
APPENDIX G

BEHAVIOR INTERVENTION MONITORING ASSESSMENT SYSTEM SUBSCALE ITEMS

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INSTRUCTIONS: Please rate how often each of the following behaviors occurred during the past week. For each item, ask yourself "How often did this behavior occur to me in the past week?" Never (0 times); Rarely (Occurred 1-2 times or to a minimal extent); Sometimes (Occurred 3-4 times or to a moderate extent); Often (Occurred 5-6 times or to a significant extent); Very Often (Occurred 7 or more times or to an extreme extent). Please provide only one answer for each item. It is important to respond to every item. For items that you find difficult to answer, please give your best guess.

<table>
<thead>
<tr>
<th>SUBSCALE/ITEMS</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
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<tbody>
<tr>
<td><strong>CONDUCT (9 items)</strong></td>
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<tr>
<td>1. Was angry</td>
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<tr>
<td>2. Engaged in risk-taking behavior</td>
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<td>3. Fought with others (verbally, physically or both)</td>
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<tr>
<td>4. Lied or cheated</td>
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<td>5. Lost my temper</td>
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<td>6. Was aggressive (threatened or bullied others)</td>
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<td>7. Used alcohol and/or drugs</td>
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<td>8. Was sent to an authority for discipline</td>
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<td>9. Smoked or chewed tobacco</td>
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<td><strong>NEGATIVE AFFECT (7 items)</strong></td>
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<tr>
<td>1. Was sleepy or tired</td>
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<td>2. Was depressed</td>
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<td>3. Was sad or withdrawn</td>
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<td>4. Was easily embarrassed or ashamed</td>
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<td>5. Was anxious</td>
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<td>6. Had thoughts of hurting myself</td>
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<td>7. Was emotional or upset</td>
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<td><strong>SOCIAL (5 items)</strong></td>
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<tr>
<td>1. Shared what I was thinking</td>
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<td>2. Spoke Clearly with others</td>
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<tr>
<td>3. Maintained friendships</td>
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<tr>
<td>4. Was comfortable when relating to others</td>
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<tr>
<td>5. Was friendly with others</td>
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<tr>
<td>6. Worked out problems with others</td>
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<tr>
<td><strong>ACADEMIC FUNCTIONING (5 items)</strong></td>
<td></td>
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</tr>
<tr>
<td>1. Followed Directions</td>
<td></td>
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<tr>
<td>2. Received failing grades at schools</td>
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<tr>
<td>3. Worked up to my academic potential</td>
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<tr>
<td>4. Came prepared for class</td>
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<tr>
<td>5. Was absent from school</td>
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<tr>
<td>COGNITIVE ATTENTION (7 items)</td>
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<tr>
<td>-------------------------------</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>1. Had trouble paying attention</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
<tr>
<td><strong>2. Was impulsive</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
<tr>
<td><strong>3. Had problems staying on task</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
<tr>
<td><strong>4. Acted without thinking</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
<tr>
<td><strong>5. Had trouble remembering</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
<tr>
<td><strong>6. Had trouble with organizing and planning</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
<tr>
<td><strong>7. Fidgeted</strong></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very Often</td>
</tr>
</tbody>
</table>

**Note:** *Students answered all 34 questions, but responses from the Cognitive Attention Subscale were not currently included in the current study*
APPENDIX H

DEMOGRAPHIC SURVEY
| UNIVERSITY, COLLEGE OR HIGH SCHOOL OF ATTENDANCE | • CMC  
|                                                  | • UNCO  
|                                                  | • HIGH SCHOOL: PLEASE LIST  
| GENDER | • MALE  
|        | • FEMALE  
|        | • TRANSGENDER  
|        | • OTHER/CHOOSE NOT TO ANSWER  
| ACT OR SAT SCORE (ESTIMATE TO THE BEST OF YOUR KNOWLEDGE) | • ACT SCORE  
|                                                      | • SAT SCORE  
|                                                      | • DO NOT KNOW (NOT EVEN A GOOD ESTIMATE)  
| DIAGNOSED DISABILITY. EXAMPLES INCLUDE: LEARNING DISABILITY, ADHD, MOOD DISORDER (DEPRESSION), ANXIETY, ETC. | • YES, PLEASE LIST  
|                                                      | • NO  
|                                                      | • SUSPECTED BUT NEVER DIAGNOSED. PLEASE LIST  
| MOTHER HIGHEST LEVEL OF EDUCATION | • SOME HIGH SCHOOL/GED  
|                                   | • HIGH SCHOOL DEGREE  
|                                   | • SOME COLLEGE  
|                                   | • COLLEGE DEGREE (BACHELOR’S OR ABOVE)  
| FATHER HIGHEST LEVEL OF EDUCATION | • SOME HIGH SCHOOL/GED  
|                                   | • HIGH SCHOOL DEGREE  
|                                   | • SOME COLLEGE  
|                                   | • COLLEGE DEGREE (BACHELOR’S OR ABOVE)  