3-10-2021

The Role of Protective Factors in Relation to Attentional Abilities in Emerging Adults

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By

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A Dissertation
Submitted to the Faculty of Graduate Studies
through the Department of Psychology
in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy
at the University of Windsor

Windsor, Ontario, Canada

2021

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ABSTRACT

Attention is a multifaceted concept, broadly defined as prioritizing and selective focusing on specific facets of incoming information. Research on abilities across the attentional spectrum has been limited from a clinical perspective, with the largest body of research on attention and the functional consequences of attentional problems focused on attention-deficit/hyperactivity disorder (ADHD). Using ADHD as a framework for understanding attentional abilities across a wide spectrum, the current set of three studies aimed to explore the functional consequences associated with lower levels of attention ability, as well as factors that could protect against poorer outcomes. These variables were examined within the context of emerging adulthood (ages 18-29) in higher education settings, and University of Windsor and Ryerson University undergraduate students were recruited to serve as participants for all three studies. Data was collected via surveys and analyzed using multiple regression analysis.

Study 1 examined the relation between attentional abilities and academic performance in emerging adults. Hypotheses included: (1) there would be a negative relation between level of inattention and academic performance, and (2) the use of academic supports, social supports, and wellness practices would moderate that relation. The results showed that higher levels of inattention predicted lower grade point averages (GPA). Goal efficacy emerged as a protective factor and mediated the relation between level of inattention and GPA across all levels of attentional ability.

Study 2 examined the relation between attentional abilities and social functioning. Hypotheses included: (1) there would be a negative relation between level of inattention and social functioning, and (2) higher levels of self-esteem, structured style, and emotional stability would moderate the relation between level of inattention and social

functioning. The results showed that higher levels of inattention predicted lower levels of social functioning. Goal efficacy again emerged as a protective factor, as did prioritizing and planning behaviour. Both factors buffered against the effects of inattention on social functioning across all levels of attentional ability.

Study 3 examined the relation between attentional abilities and legal outcomes. Hypotheses included: (1) there would be a positive relation between level of inattention and level of engagement in unlawful activity; (2) increased levels of agreeableness and conscientiousness would moderate the relation between level of inattention and level of engagement in unlawful activity; and, (3) use of wellness practices would moderate the relation between level of inattention and level of engagement in unlawful activity. The results showed that higher levels of inattention were related to greater involvement in criminal activity. Agreeableness emerged as a protective factor, with higher levels buffering against criminal involvement for individuals with higher levels of inattention. Finally, an overall score relating to engagement in wellness practices protected against criminal involvement for individuals with higher levels of inattention.

Overall, modifiable protective factors, namely self-efficacy, aspects of executive functioning, agreeableness, and wellness practices, emerged across all three studies. The results suggest that emerging adults across the spectrum of attentional abilities could benefit from the development and fostering of factors such as self-efficacy, which may buffer against the poor outcomes related to higher levels of inattention.

Keywords: attentional ability, attention, inattention, self-efficacy, goal efficacy, self-esteem, protective factors

ACKNOWLEDGEMENTS

Thank you to all of the participants that completed this study. It has been a great privilege to learn from you. Your data has allowed me to learn more about emerging adults and attentional abilities across the spectrum, and I am looking forward to sharing this information with our scientific and clinical community. Thank you for your contribution.

Over the course of my life, I have been blessed with wonderful mentors who continue to support my education to this day. To my supervisor, Dr. Carlin Miller, I cannot thank you enough for the guidance and support you have provided to me over the course of my doctoral studies. I am so lucky to call you my mentor and my friend.

To my dissertation committee: you have been incredibly generous with your time, your guidance, and your mentorship throughout the duration of this project. I am so grateful for your questions, your thoughts, and your advice. I know that my work is stronger because of you. Although this project was run primarily out of the University of Windsor, I was again afforded the opportunity to collect data at Ryerson University. To Dr. Tisha Ornstein: you have been a wonderful mentor to me, and I will always be grateful for your contributions to my education.

To my parents: thank you for supporting my dream. I would not be here without you. Finally, I have no words to describe the love I have for the family I have created here in Windsor. Thank you.

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Chapter 1

Literature Review

Attention, broadly defined as the prioritizing and selective focusing on specific facets of incoming information, is a multifaceted concept comprising several cognitive processes, the involvement of several neurological pathways, and resulting in several behavioural or functional effects. Although it has been studied since before the 1950s, attention remains a somewhat slippery concept and difficult to define, likely due to its multifaceted nature. Desimone and Duncan (1995) originally asserted that the human brain has a limited capacity for processing information, and that only a small amount of incoming information can be processed. This is one of the few assertions about attention that has not been debated in the literature. One popular metaphor for attention among cognitive psychologists is that of a spotlight: like a spotlight, attention can be moved around, but it is limited to a specific facet of the environment. Therein lies the most basic characteristic of attention: it is, by nature, limited.

The ability to control attention, usually involving selective attention and inhibition, is complex and closely related to working memory and other executive functions (Posner & Peterson, 1990). Older research on attention made a distinction between automatic and controlled tasks, but later research showed that even automatic tasks, such as reading, require some degree of attentional control (although less control than required for controlled, non-automatic tasks; Cohen et al., 1990), suggesting that the ability to shift and selectively attend is likely involved in all areas of functioning. Given the inherent limits of attention, attentional lapses, mind wandering/daydreaming, and

distractibility are relatively common in the general population. Although the divide of the literature between neurotypical and clinical populations may imply that attention is dichotomous, research on attentional lapses and distractibility, as well as on the variability of attention across the general population, suggests that attentional processes likely exist along a spectrum ranging from strong attentional abilities to limited attentional abilities.

Despite the ubiquity of attentional lapses and distractibility in the general population, research in this area has largely focused on the concept of attention from a cognitive psychology perspective, in continued efforts to understand the neurocognitive processes underlying attention. Research on abilities across the attentional spectrum and individual differences in attention is limited from a clinical perspective. Specifically, the functional consequences of decreased levels of attention (which may be due to several contextual factors) have been understudied in the general population. The largest body of research with regard to attention and functional consequences in the general population has been on driving and driver inattention (e.g., Ledesma et al., 2015; Perlman et al., 2019).

However, the largest body of research on attention and the functional consequences of attentional problems focuses on attention-deficit/hyperactivity disorder (ADHD). At the far end of the spectrum of attentional abilities, ADHD is a neurodevelopmental disorder characterized by developmentally inappropriate levels of inattention, hyperactivity, and/or impulsivity (APA, 2013). Prevalence of ADHD in childhood is estimated to be approximately 5% (APA, 2013; Hauck et al., 2017), making

it one of the most common childhood psychiatric diagnoses, and it remains relatively common in adulthood with prevalence estimates ranging from 2% to 5% (APA, 2013; Faraone & Biederman, 2005; Vitola et al., 2017). Previous research has found a dimensional rather than categorical structure to ADHD (Marcus et al., 2012), with evidence suggesting individuals with a diagnosis of ADHD have a greater degree of symptoms, but do not differ in the kind of symptoms experienced by those with subclinical ADHD or otherwise reduced attentional abilities (Carragher et al., 2014).

Using ADHD as a framework to understand attentional lapses and distractibility in the general population allows for the continued study of functional consequences related to distractibility, especially if there is an opportunity to examine subclinical symptoms of ADHD (i.e., symptoms of ADHD that do not meet the number required for diagnosis but represent less than optimal functioning). Including participants from the entire spectrum of attentional abilities also allows for the examination of attentional issues that may be attributed to factors other than ADHD, such as depression, anxiety, medical illnesses, and life stressors. This dissertation focuses on attentional abilities across the spectrum, using ADHD as a framework for understanding functional difficulties associated with more limited attentional abilities in emerging adulthood.

Current Theories on ADHD

Understanding the theoretical underpinnings of ADHD can provide insight into the neuropsychology of attention. Several theories and models of ADHD have been proposed, all of which describe ADHD as having a primarily neurological basis, although psychosocial factors may influence the expression or mitigation of some symptoms.

There is not clear agreement among scientists and clinicians about these theories, and many posit that ADHD is a heterogeneous disorder that is unlikely to explained by a unifying theory.

Executive dysfunction model. In his model, Barkley (1997) theorizes that symptoms of ADHD are caused by a central deficit in behavioural inhibition. Specifically, Barkley suggests that the disruption in behavioural inhibition limits the effective use of four executive abilities: working memory, self-regulation of affect/motivation/arousal, internalization of speech, and reconstitution. In turn, these four executive abilities affect motor control, fluency, and syntax (Barkley, 1997). Barkley's (1997) model indicates that deficits in each of the four executive functions underlie ADHD symptoms (or decreased attentional abilities), and have a significant effect on functioning. Limited working memory, or the ability to hold and use information in mind, results in limited ability to use plan behaviour or estimate time. Limited self-regulation results in increased emotionality, difficulty delaying emotional responses, and difficulty with motivation, particularly as related to goal-directed behaviour. Limited ability to internalize speech results not only in increased (external) speech, but also decreased ability to reflect prior to acting, which, in turn, results in decreased self-control. Deficits in reconstitution, which refers to the ability to mentally disassemble an event prior to responding, results in difficulty analyzing events and in the preparation of responses to those events. The model further includes the effect of executive dysfunction on motor control, relating to the hyperactivity and motor impulsivity experienced by those with ADHD (Barkley, 1997).

Other researchers have argued that Barkley's (1997) executive dysfunction model of ADHD does not fully explain the breadth of decreased attentional abilities and cognitive sequelae. For example, a meta-analysis of 83 studies (Willcutt et al., 2005) found that while executive dysfunction is certainly associated with decreased attention and increased hyperactivity, not all individuals with ADHD present with executive functioning deficits, and executive functioning cognitive measures show only moderate discriminability between individuals with and without ADHD. Thus, executive dysfunction may not have the specificity required to be considered the defining deficit underlying ADHD.

Cognitive-energetic model. In contrast to Barkley's (1997) model, Sergeant (2000) theorized that because lack of inhibitory control was not solely associated with ADHD, disinhibition was unlikely to be the main deficit underlying ADHD. Instead, he proposed that ADHD symptoms are the result of an inefficient information processing system, comprising the interplay between three levels of processes: (1) process (computational) mechanisms of attention, including encoding, search, and decision and motor organization; (2) state factors (or "energetic pools"; Sergeant, 2000, p. 8), specifically comprising effort, arousal, and activation; and, (3) the management or evaluation mechanism, related to planning, monitoring, and detection and correction of errors (i.e., executive functioning; EF). The model encompasses both top-down and bottom-up processes (Sergeant, 2000, 2004).

Sergeant (2000, 2004) suggests that ADHD is affected by disruptions at all three levels of the cognitive-energetic model, and not solely due to dysfunctional inhibitory

processes, as suggested by Barkley (1997). The energetic pools, in particular, appear to have a significant impact on symptoms of ADHD. Arousal, associated with the mesencephalic reticular formation and the amygdala, has been found to be influenced by signal intensity and novelty (Sergeant, 2004). Activation, associated with physiologic readiness to respond, and the basal ganglia and striatum, is influenced by factors such as alertness, amount of time spent on the task, preparation, and time of day. Interestingly, effort, associated with the hippocampus, has both excitatory and inhibitory effects on arousal and activation (Sergeant, 2004).

Dual-pathway model. At a time when the executive dysfunction model was regarded as the dominant theoretical explanation for ADHD, Sonuga-Barke (2003) proposed a dual-pathway model, wherein ADHD is the result of two separate pathways: (1) a pathway related to executive dysfunction and associated with cognitive deficits; and/or (2) a pathway related to delay aversion, associated with a disrupted motivational style. The executive dysfunction component of the model was first outlined by Barkley (1997), who proposed that inhibitory deficits led to more general executive functioning impairment individuals with ADHD (see ‘Executive dysfunction model’ section for more information). The delay aversion hypothesis suggests that children with ADHD have higher levels of delayed reward discounting (i.e., how quickly a reward loses its value based on how delayed it is), which results in them trying to escape or avoid delay (Sonuga-Barke, 2003). When children with ADHD cannot escape or avoid delay, the hypothesis suggests that they will give their attentional resources to parts of the environment that can help pass time quickly, so that they can avoid the subjective

experience of the delay (Sonuga-Barke et al., 2008). Functionally, this means that children with ADHD exhibit more symptoms of hyperactivity and inattention during periods of delay (Sonuga-Barke, 2003).

Although the executive dysfunction model and the delay aversion hypothesis were presented as competing accounts in the literature at the time, Sonuga-Barke (2003) asserted that both could be reconciled within a neurobiological framework. According to this model, ADHD may develop due to a disruption in one of the two circuits, or as a result of an interaction between them (Sonuga-Barke, 2003). Two brain circuits were presented: (1) the executive circuit, which involves excitatory inputs from the prefrontal cortex to the dorsal neostriatum (and preferentially to the caudate nucleus), with reciprocal excitatory impulses back to the cortical regions; and, (2) the reward circuit, which involves excitatory inputs from frontal areas (particularly the anterior cingulate and orbitofrontal cortex) to the ventral striatum (and preferentially to the nucleus accumbens), again with reciprocal excitatory impulses back to the cortical regions. While both circuits are functionally distinct, they share common neuroanatomical and neurochemical factors (Sonuga-Barke, 2003), increasing the likelihood of an interaction. Dopamine, especially, was identified as a significant neuromodulator of both the executive and reward circuits.

Integrated cognitive and affective model. In a similar effort to integrate the multiple pathways implicated in the development of ADHD, Nigg and Casey (2005) proposed the joint dysfunction of cognitive control (also known as behavioural regulation, experienced as *voluntary*) and affective response systems (experienced as

relatively *involuntary*) as the underlying aetiology of ADHD, which they characterize as a disorder of impulse control or regulation. They hypothesized that decreased attentional abilities are likely caused by the disruption of one of three possible different neural circuits: (1) the frontostriatal circuit, which supports predicting *what* may occur; (2) the frontocerebellar circuit, which supports predicting *when* something may occur; and, (3) the frontolimbic circuit, which underlies the approach-avoidance behaviour related to the detection and assessment of the emotional significance of a particular situation (Nigg & Casey, 2005).

The researchers suggest that the frontostriatal and frontocerebellar circuits (of which many parts work in tandem) may allow a child to detect violations in their predictions of what or when something may occur, before sending that information to the prefrontal cortex to be integrated with the child's goals. This results in top-down regulation (i.e., suppression of inappropriate thoughts and behaviour), and disruption of these circuits may interrupt the process of self-regulation, resulting in the behavioural symptoms of ADHD (Nigg & Casey, 2005).

The frontolimbic circuit, as mentioned, relates to the expectation of reward (resulting in *approach*) or the expectation of non-reward (resulting in *avoidance*). Both pathways are integral in behavioural and affective regulation, particularly within the context of incentives (Nigg & Casey, 2005). Specifically, the researchers outlined that signals from the ventral striatum to the prefrontal cortex increase the likelihood of *approaching* rewarding (or reinforcing) stimuli, while signals from the ventral amygdala to the prefrontal cortex increase the likelihood of *avoiding* non-rewarding (or non-

reinforcing) stimuli. At the prefrontal cortex, the signals integrate with the child's goals, again resulting in top-down regulation the effects of affective information (e.g., whether a stimulus would be rewarding or non-rewarding) on behaviour (Nigg & Casey, 2005). Disruption of this circuit may result in difficulty approaching a rewarded behaviour, or failure to avoid a non-reward or punishment, which may present as impulsive behaviour in a child with ADHD.

Neurodevelopmental model. Attempting to elucidate the possible pathophysiology of ADHD, Halperin and Schulz (2006) used neuroanatomical and neuropsychological findings to develop the neurodevelopmental model of ADHD. This model rests on the rapid and uneven development of the prefrontal cortex over the course of childhood and adolescence, as well as findings that most children (as opposed to adults) with damage to the frontal lobe do not show impaired attentional abilities. Thus, Halperin and Schulz (2006) hypothesize that the prefrontal cortex is not involved in the *cause* of ADHD, but in the *recovery* from ADHD. More specifically, the researchers posit that the symptoms of ADHD are caused by "noncortical neural dysfunction" (Halperin & Schulz, 2006), which remains static across the lifespan. They suggest that the development of the prefrontal cortex (and related pathways or systems), however, is able to compensate for that dysfunction through 'top-down' regulation, which may explain the remission of some symptoms of ADHD in adolescence and adulthood.

Neuroanatomical Correlates of ADHD

Neurobiological models of ADHD have typically focused on the frontal lobe and its connections to subcortical structures, influencing symptoms of executive dysfunction

and emotional and attentional regulation (Rosch et al., 2018). Magnetic resonance imaging (MRI) and voxel-based morphometry (VBM) studies have shown reduced total cerebral volume in children with ADHD, particularly in the right hemisphere (Castellanos et al., 2002; Carmona et al., 2005). The caudate nucleus has been implicated in ADHD research (Carrey et al., 2012). The caudate nucleus plays an important role in the intermediary pathway between the association cortices and the prefrontal cortex and has been found to modulate activity level and impulsivity (Semrud-Clikeman et al., 2017). Moreover, children with the combined subtype of ADHD have been found to have smaller volumes of the caudate and anterior cingulate cortex bilaterally, compared to both neurotypical controls and children with the predominantly inattentive subtype of ADHD (Semrud-Clikeman et al., 2017).

Similarly, a meta-analysis of studies between 2001 and 2011 reported that ADHD patients across studies had global reductions in grey matter volumes, localized in the right lentiform nucleus and caudate nucleus (Nakao et al., 2011). Increasing age and percentage of patients taking stimulant medication were each associated with more normal values in both regions, suggesting that some ADHD patients might ‘catch up’ with their developmental delay with advancing age, and that stimulant medication might be associated with normalization of structural abnormalities in ADHD (Nakao et al., 2011), with other protective factors possibly playing a role as well. Later studies confirmed these findings (Carrey et al., 2012; Shaw et al., 2014), and found that the reduced area of the caudate was not progressive throughout adolescence (Shaw et al., 2015).

Emerging Adulthood

Arnett (2000) originally proposed that individuals undergo a period of significant development between ages 18-25, which he labelled as 'emerging adulthood'. The theory of emerging adulthood was later revised to comprise ages 18-29 to reflect the North American cultural shift to a longer transition from adolescence to adulthood (Arnett et al., 2014). Emerging adulthood is considered a sensitive transitional period involving uncertainty about the future, increased executive functioning demands (i.e., delaying immediate gratification while directing oneself towards long-term goals), and increased self-sufficiency (Newcomb-Anjo et al., 2017). During this time, individuals experience a variety of life changes, usually including shifts in their living situations (e.g., residing with roommates instead of parents), and the pursuit of some type of education or vocational training (Sussman & Arnett, 2014). Present-day emerging adults are more flexible in terms of beginning their careers, and tend to delay marriage and child rearing, effectively spending more time exploring before 'settling down' (Arnett, 2004). Because of the uncertainty and the variety of choices available, emerging adults also experience a high degree of instability in their lives (Sussman & Arnett, 2014). This high degree of instability may be a particular vulnerability for the development of mental health concerns in emerging adults (Newcomb-Anjo et al., 2017).

Emerging Adults with ADHD. Estimates of ADHD persistence into adulthood are mixed, with reported persistence ranging from 30% to 85% of individuals diagnosed with ADHD (Biederman at al., 1996; Holbrook et al., 2016). Emerging adults are faced with new challenges, including enhanced expectations in the transition to higher

education, entering the workforce, and living independently. Emerging adults with ADHD may continue to have the same decreased attentional abilities, possibly resulting in disorganization and daydreaming. More specifically, they may describe difficulty sustaining attention while reading or during conversations, trouble meeting deadlines, and forgetfulness. They may have difficulty paying bills on time or may frequently lose their keys or cell phones (APA, 2013).

However, emerging adults with ADHD are less likely to have symptoms of motor hyperactivity and are more likely to report subjective feelings of restlessness (APA, 2013) and impulsive actions (e.g., risky sexual behaviour; Abecassis et al., 2017). Prior research has also found that young adults with ADHD often report symptoms and behaviours separate from those outlined in the DSM-5, including driving vehicles too fast, cognitive inflexibility, and emotional dysregulation (Cavelti et al., 2017; Fedele et al., 2010; Merkel et al., 2016). These symptoms are associated with occupational difficulties, academic difficulties, and poorer interpersonal functioning. Adding to their difficulties, emerging adults with ADHD also have higher rates of comorbid depression, anxiety disorders, and conduct disorder (Abecassis et al., 2017).

A qualitative examination of symptom manifestation of ADHD found that college and university students reported nuanced facets of ADHD symptoms, which are not clearly reflected in the DSM-5 (Gray et al., 2016). For example, students reported difficulty with overactive mentation (e.g., “feels like my mind is racing and can’t stop thinking”; p. 624), missing regular obligations (e.g., “I forgot about a lecture yesterday that I have every week”; p. 624), forgetting to use learned coping strategies (e.g., “I

always put things in my iPhone, but every so often I will forget and without the reminder I won't show up for things, even weekly classes"; p. 624), and increased anxiety in the absence of physical activity (e.g., "If I don't go to the gym I feel anxious"; p. 624).

As mentioned, emerging adulthood is a sensitive transitional period that likely involves a variety of life changes. The poor outcomes associated with untreated ADHD are likely to manifest during late adolescence and emerging adulthood due to the expectations of the age (e.g., driving, occupations, etc.). A longitudinal study found that when compared to neurotypical controls, males with ADHD were at higher risk for delinquency, regardless of oppositional defiant disorder or conduct disorder comorbidity status (Sibley et al., 2011). Similarly, males with a childhood history of ADHD were found to be more likely to be verbally aggressive or violent with romantic partners, even if they did not have a history of conduct disorder, compared to controls without a childhood history of ADHD (Wymbs et al., 2012). Other work showed that individuals with a childhood history of ADHD were less likely to enrol in four-year colleges (as opposed to junior or vocational colleges), and were more likely to engage in skilled manual trade occupations (as opposed to jobs in a professional category), compared to controls without a childhood history of ADHD (Kuriyan et al., 2013).

In another longitudinal study, females with a childhood history of ADHD were more likely to attain lower levels of education, have unplanned pregnancies, and have a higher body mass index, regardless of whether or not their symptoms had persisted over time (Owens et al., 2017). Those with persistent symptoms (comprising 74% of the 123 females in the final sample) were more likely to have even poorer educational outcomes,

more internalizing and externalizing problems, and lower levels of productivity or work quality (rated by parents or clinicians). Interestingly, Owens and colleagues (2017) did not find an association between ADHD symptoms and either driving, substance use, or social relationships in adulthood, in this all-female sample. Although they used a cross-sectional design, Vingilis and colleagues (2015) found, in contrast, that women's symptoms of ADHD were associated with higher levels of distress, cocaine use, anti-anxiety, antidepressant, and pain medication use, and with higher numbers of motor vehicle collisions in the prior year. Symptoms of ADHD in men were also associated with higher levels of distress, antisocial symptoms, cocaine use, anti-anxiety and antidepressant medication use, and a higher number of criminal offence arrests (Vingilis et al., 2015).

In an attempt to better understand the often-reported association between ADHD symptoms and criminal behaviour (Vingilis et al., 2015; Wymbs et al., 2012), van der Maas and colleagues (2018) used a cross-sectional design and surveyed a large, representative sample of adults from Canada (N=5,376). The researchers found that individuals who screened positive for current ADHD were more likely to have a past arrest record, as were those individuals who reported using medications for ADHD in the past (van der Maas et al., 2018). Interestingly, these relations were no longer significant after the researchers statistically controlled for strength of social bonds. In fact, van der Maas and colleagues (2018) found that arrest history was associated most with strength of social bonds, which may be affected by current or history of symptoms of ADHD. The researchers suggest that criminality may be more associated with the substance use and

lower levels of education related to ADHD, rather than related to ADHD directly (van der Maas et al., 2018).

Subclinical ADHD in Emerging Adults. Symptoms of ADHD that are not significant enough to meet diagnostic criteria can still be problematic for overall functioning. Because attentional abilities are understood to lie on a spectrum, decreased (but not clinically impaired) attentional abilities are likely to be more common in the general population, and less functionally impairing, but may still cause difficulty. This cluster of milder symptoms can be classified as *subclinical ADHD*. Individuals with decreased attentional abilities may not meet DSM-5 criteria for ADHD, but may be at risk for developing ADHD, and/or may benefit from intervention targeted towards symptoms of ADHD. Although research is somewhat limited in the examination of subclinical ADHD in adults, previous work with children with subclinical ADHD has reported a wide range of prevalence estimates, ranging from 1% to 23% (see Balázs & Keresztény, 2014, for a review). While one study showed that children with subclinical ADHD had higher achievement scores than their peers with ADHD (August et al., 1992), others showed that children with subclinical ADHD had more difficulty in school and were less likely to graduate, as compared to neurotypical controls (Bussing et al., 2010, 2012). In their study, Rielly and colleagues (2006) found that children with subclinical ADHD had fewer friends, more difficulty with social interactions, and lower levels of friendship quality than neurotypical controls. Scahill and colleagues (1999) reported that children with subclinical ADHD showed greater overall levels of impairment than neurotypical controls, albeit significantly lower levels of impairment than their peers with

ADHD. These results were replicated in Hong and colleagues' (2011) work, which found that subclinical ADHD was a significantly impairing condition, but much milder than ADHD. In their work involving adult participants, Overbey and colleagues (2011) examined ADHD symptoms on a continuum, and found that university students with lower levels of ADHD symptoms (which were below DSM-5's diagnostic cut-off) had lower levels of stress and used more adaptive coping strategies than those with higher levels of ADHD symptoms.

ADHD and Higher Education

Higher education (e.g., college, university, etc.) can be particularly difficult to manage for individuals with decreased attentional abilities, whether those are attributed to ADHD or other factors (e.g., depression, anxiety). Emerging adults with ADHD experience impairments across several areas, including with regard to occupation, substance use, relationships, and driving. Previous research has documented particular impairment within the educational domain for emerging adults. First, individuals with ADHD have been found to be less likely to enrol in higher education than those without ADHD, and fewer still graduate (Kuriyan et al., 2013). Those who do enrol in post-secondary education also report more academic difficulties and higher levels of depression than students without ADHD (Rabiner et al., 2008). However, the subset of emerging adults with ADHD who attend post-secondary education may inherently have better coping skills and higher levels of cognitive functioning than peers with ADHD who do not attend post-secondary education (Green & Rabiner, 2012), perhaps explaining their self-selection into post-secondary education. Nevertheless, emerging

adults with ADHD face increased challenges and demands as part of higher education. There have been mixed findings in research, with some studies showing that students with ADHD do underperform as compared to their peers without ADHD (e.g., Advokat et al., 2011; Gropper & Tannock, 2009), while others showing no difference (e.g., Sparks et al., 2004) or average, expected performance (e.g., Gray et al., 2016). This discrepancy may be a result of methodological differences, or differences in accommodations, supports, or interventions received by subsets of study participants.

A significant proportion of requirements in higher education settings require organization, planning, cognitive flexibility, time management, and working memory, which may be particularly difficult for students with ADHD (Barkley & Murphy, 2011; Reaser et al., 2007). Whether or not students with ADHD underperform in terms of academic achievement, they often report struggling to meet demands of post-secondary education, and they perceive having to work harder than their peers in order to perform well (Gray et al., 2016). This is consistent with the idea that, rather than inattention and/or hyperactivity-impulsivity, executive functioning deficits or difficulties with self-regulation (e.g., manifesting as difficulty with organization, procrastination, and effectively planning workloads, etc.) may be the underlying mechanisms modulating academic achievement in students with ADHD.

ADHD and Social Functioning

Emerging adults are presented with new social challenges, which are often somewhat distinct from those of adolescence (Arnett, 2004), such as successfully initiating romantic relationships and friendships outside of school, managing conflict at

the workplace, and compromising with roommates. Those with ADHD, especially, might have difficulty meeting those challenges, as individuals with ADHD have been found to have impairments in social functioning in general relative to neurotypical controls across the lifespan (Ray et al., 2017; Ros & Graziano, 2018; Sacchetti & Lefler, 2017). Adults with ADHD have been found to be less liked and accepted by others, have fewer friends and more conflicts with peers, and have increased issues related to intimate partner violence (Michielsen et al., 2015; Sacchetti & Lefler, 2017; Wymbs et al., 2012; Wymbs et al., 2016). Difficulties faced during emerging adulthood may significantly affect pre-existing impairment of social functioning (Ryan et al., 2016).

Still, there have been contradictory findings on social functioning in adults with ADHD. While one study found no difference in difficulties related to social functioning between university students with and without ADHD (Weyandt et al., 2013), another study found that adults with childhood symptoms of ADHD (specifically hyperactivity) reported poorer relationship quality, fewer closer friends, difficulty maintaining friendships, and more arguments with friends (Fischer & Barkley, 2006). A more recent study on young adult females found that those with persistent symptoms of ADHD since childhood showed significant impairment in social functioning in adulthood, but those who no longer met criteria for ADHD in adulthood were no different from neurotypical controls in terms of social functioning (Owen et al., 2017). Regarding intimate partner violence, young adult males with a history of childhood ADHD reported using verbal aggression and violence with romantic partners more frequently than their age- and gender-matched neurotypical peers (Wymbs et al., 2012). More recent research, however,

found that there was no relation between ADHD symptoms and satisfaction or violence in the romantic relationships of university students (Sacchetti & Lefler, 2017). Emotional dysregulation, identified as a hallmark symptom of ADHD (Hirsch et al., 2018), may contribute significant difficulty in social functioning in individuals with ADHD (Bodalski, Knouse, & Kovalev, 2018; Bunford, Evans, Becker, & Langberg, 2015; Lopes et al., 2005), although findings are mixed (Ryan et al., 2016).

ADHD and Legal Outcomes

Emerging adults typically face a significant increase in expectations related to independent living, the pressure to gain financial independence, and transitions to higher education or entering the workforce. Statistics Canada reported that emerging adults had the highest rate of delinquency and criminal behaviour of any age group (Allen, 2014), perhaps due to the pressure of these expectations. Studies of long-term outcomes in adolescents and adults with ADHD have found that they are at higher risk of engaging in delinquency (Barkley et al., 2004; Langley et al., 2010), likely due to a combination of several factors, including symptoms of impulsivity, fewer social supports (Hoza, 2007), difficulty in school (Watts, 2018), and the possible presence of common comorbid conditions, such as oppositional defiant disorder (ODD) and conduct disorder (CD; Ayaz et al., 2015; Dalsgaard et al., 2013). The pressure of expectations associated with emerging adulthood may leave individuals with ADHD particularly vulnerable to poor outcomes (e.g., Diggs & Neppl, 2018).

Although the literature on long-term legal outcomes of individuals with ADHD is relatively sparse and confounded by varied methodological practices, past research

largely suggests that individuals with a history of childhood ADHD are significantly more likely to be involved in criminal activity, measured by number of arrests, convictions, and incarcerations, as compared to neurotypical controls (Dalsgaard et al., 2013; Mannuzza et al., 2008; Sattefield et al., 2007). However, as compared to serious, violent crime, the current literature suggests that symptoms of ADHD may contribute more to petty, non-violent crime, as well as drug-related and traffic crimes (Barkley et al., 2004; Fontaine et al., 2008; Sourander et al., 2006). While some minor delinquency is considered somewhat normative and transient during adolescence, a meta-analysis found that ADHD was a risk factor for persistent delinquency into adulthood (Pratt et al., 2002), which was validated by later research (Sibley et al., 2011; van der Put et al., 2016). However, this research is controversial; other studies have found no relation between ADHD and delinquency after controlling for comorbid externalizing conditions (Mordre et al., 2011; Gudjonsson et al., 2014; Satterfield et al., 2007; Young et al., 2016). Aside from the potential contributions of comorbid conditions, such as ODD and CD, few mediators or moderators have been examined as contributors to the relation between ADHD and delinquency.

Enhancing Positive Outcomes for Students with Decreased Attentional Abilities

There is some debate in the literature regarding the definition of *resilience* (Modesto-Lowe et al., 2011). Broadly, resilience is conceptualized as a process of positive adjustment in the context of risk or adversity (Wilmshurst et al., 2011), reflecting the relative ratio of adaption to risk (Modesto-Lowe et al., 2011), although this construct may be even more broadly defined within the positive psychology literature. This process

is usually dependent on individual and/or environmental characteristics that contribute to adaptive behaviour and/or act as shields or buffers from adversity, known as promotive (i.e., beneficial for individuals at low or high levels of risk) or protective factors (i.e., especially helpful for those at high levels of risk; Schei et al., 2018). These promotive or protective factors may also contribute to coping or adjustment subsequent to adverse life events (Schei et al., 2015).

As opposed to promotive factors, which are beneficial for everyone regardless of risk factors (or level of risk), the concept of *protective* factors depends on the presence of risk. As mentioned, symptoms of ADHD put emerging adults at risk for occupational difficulties, academic difficulties, and poorer interpersonal functioning (Roberts et al., 2015). Prior research has identified some protective (individual, family-level, and social-community-level; Dvorsky & Langberg, 2016) factors that may buffer against these risks, contributing to resilience in some emerging adults with ADHD.

Individual protective factors. Personal competence refers broadly to individual factors such as self-esteem, structured style, and social competence, among others, all of which refer to the ability to understand one's skills and execute them effectively. Typically, these factors are measured in terms of *perceived* competence. Personal competence, including scholastic competence (i.e., the individual's perception of their ability to do schoolwork), was found to protect against the development of depression (Dvorsky & Langberg, 2016), and promoted overall quality of life (Schei et al., 2015) in adolescents with ADHD.

Self-esteem, perhaps the most salient component of personal competence, is related to believing oneself to be capable in various aspects of one's life (e.g., in academic settings, in social settings, etc.; (Schei et al., 2018). After experiencing early scholastic difficulty, an individual with ADHD may develop and maintain negative beliefs (e.g., "I am too stupid to do this"), struggle to deal with stressful life events (e.g., an upcoming assignment), and resort to maladaptive coping strategies (e.g., procrastination; Newark et al., 2016). For this reason, adults with ADHD tend to have lower levels of self-esteem and self-efficacy (Newark et al., 2016), both core elements of self-esteem (Schei et al., 2018). Other research, however, has also suggested the presence of a positive illusory bias in children and adolescents with ADHD, usually presenting as the tendency to overestimate their competence in certain areas (as compared to parent-report; Volz-Sidiropoulou et al., 2016). This potential inaccuracy in judgment could confound any analysis examining self-esteem in individuals with ADHD. In one study, higher levels of self-esteem in adolescents with ADHD was found to predict better psychosocial functioning and fewer depressive disorders three years later (Schei et al., 2018), suggesting that higher levels of self-esteem may be a protective factor for emerging adults with ADHD.

Structured style is a term referring to skills related to executive functioning, including planning, organization, and orientation towards goals (Schei et al., 2015). Because a more structured style has been associated with better long-term psychosocial functioning, it has been identified as a protective individual factor for emerging adults with ADHD (Schei et al., 2018). Indeed, organizational skills in college students with

ADHD predicted academic functioning and overall levels of ADHD-related impairment (Dvorsky & Langberg, 2014).

Social competence refers to having skills and behaviours that allow for successful social interactions (i.e., prosocial skills or behaviour; Schei et al., 2018). Typically, social competence is measured by specific social skills, such as initiating activities or conversation, being supportive and assertive, and the ability to self-disclose, among others (e.g., Valkenburg & Peter, 2014). While prior work has found that social competence buffered against depressive symptoms in adolescent girls with ADHD (Mikami & Hinshaw, 2006), this work has not been replicated in emerging adults. However, social competence has identified as a protective factor for adolescents with ADHD, buffering later experiences of anxiety in emerging adulthood (Schei et al., 2018).

Family-level protective factors. Broadly, family environment factors, including levels of family cohesion and support, have been found to promote resilience in adolescents with and without ADHD (Schei et al., 2015; Theule et al., 2011). More specifically, *positive parenting*, a phrase encompassing positive attitudes in parenting, positive parenting behaviours, emotional support, intellectual stimulation, and affection, has been identified as a family-level protective factor for children with ADHD (Dvorsky & Langberg, 2016). One previous study has shown that positive parenting with children with ADHD protected against the development of comorbid conduct-related issues over the course of eight years, into the children's adolescent years (Chronis et al., 2007). Other studies have shown that positive parenting promotes resilience for all children, regardless of ADHD (Dvorsky & Langberg, 2016). Based on the long-lasting consequences of some

childhood experiences (including parenting; Connolly & McMahon, 2014), it is possible that positive parenting could remain a protective factor for emerging adults with ADHD.

Social-community-level protective factors. In Schei and colleagues' (2015) work on protective factors in individuals with ADHD, social acceptance (i.e., feeling accepted by one's peers) was defined as a social-community-level protective factor when that social acceptance was assessed by more than the individual's self-ratings. It may, however, also be considered an individual protective factor when considering only the individual's self-ratings. In an 18-month longitudinal study, Dvorsky and colleagues (2016) found that adolescents' self-ratings and their parents' ratings of social acceptance moderated the relation between their inattention severity and their grades, such that those with higher levels of self-acceptance were less likely to have poor grades. In general, social resources have been found to predict quality of life in adolescents with ADHD, suggesting a potential for promotive or protective effects (Schei et al., 2015). Although there have been mixed findings in this area (e.g., Mikami & Hinshaw, 2006), this may be due to methodological variations across studies. For example, while some studies used self- or informant-rated questionnaires to determine level of social support or acceptance, others used peer nomination methods or naturalistic observation. Nevertheless, given the demonstrated importance of social support in adolescent outcome in general (Heerde & Hemphill, 2018), examining its value as a protective factor in emerging adults across the spectrum of attentional abilities is warranted.

Current Investigation

Attention is a multifaceted concept and comprises several cognitive processes, which present variably across the general population and across the lifespan. Given the potential impact of decreased attentional abilities on daily functioning, the goal of the present study is to investigate factors that may serve to buffer or protect against the poor outcomes associated with having less than optimal attentional levels, including poor academic performance (Advokat et al, 2011), poorer interpersonal functioning, and higher rates of comorbid internalizing and externalizing disorders (Abecassis et al., 2017). The present investigation, comprising three studies, will be the first to examine protective factors against various outcomes in a sample of emerging adults in the context of decreased attentional abilities. The first study will examine the relation between attentional abilities and academic functioning, as well as the potential protective effects (i.e., moderators) of social acceptance, the use of student support services, and engagement in wellness practices. The second study will examine the relation between attentional abilities and social functioning, as well as the potential protective effects of self-esteem and self-efficacy, structured style, and emotional stability. Finally, the third study will examine the relation between attentional abilities and legal outcomes, as well as the potential protective effects of conscientiousness, agreeableness, and engagement in wellness practices.

As mentioned above, this dissertation comprises three related studies, which will be detailed in separate chapters (see Chapters 3, 4, and 5). Chapter 2 is an overview of the study procedures shared by the three studies. One recruitment protocol was used to collect data for all three studies. Chapters pertaining to each study will have methods and

statistical analyses sections unique to each study's aims and hypotheses. The chapters pertaining to each study are intended to be stand-alone manuscripts to be submitted for publication.

Chapter 2

Methods

This dissertation includes three interrelated studies examining the role of moderators in the relation between attentional abilities and functional outcomes, including academic, social, and legal outcomes. Data for all three studies was collected as part of one large investigation, with separate hypotheses and data analyses. This chapter provides detailed information on the common methods and procedures that was used for data collection for the entire project. Subsequent chapters will contain information on the methods and data analyses specific to each smaller study's aims and hypotheses.

Participants

Participants with a range of attentional abilities were recruited for all three studies, ranging from neurotypical individuals with normal attentional lapses to individuals with subclinical-to-clinical levels of ADHD symptoms. Undergraduate psychology students were recruited from the Psychology Participant Pools at the University of Windsor and Ryerson University. Although I attempted to recruit participants from the Student Accessibility Services at the University of Windsor and Ryerson University, only one individual receiving those services participated in this study.

Exclusionary criteria for all participants included a lack of English literacy or comprehension, as well as a self-reported diagnostic history of traumatic brain injury with loss of consciousness and/or symptoms that lasted more than one week, and current diagnoses of depression, bipolar depressive disorders, schizophrenia, psychotic episodes,

and autism spectrum disorder. A preliminary power analysis (based on an anticipated small-to-medium effect size, the use of hierarchical regression analyses, and a maximum of five predictors per statistical analysis), as well as a survey of the literature, suggested the recruitment of 239 participants. To compensate for any spoiled or incomplete data, as well as to account for attrition, data from 330 participants was collected.

Table 1

Demographic Information

Variables		N	%
Gender	Male	58	17.6
	Female	268	81.2
	Non-binary	2	.6
	Trans	1	.3
	Other	0	0
Age	17	20	6.1
	18	82	24.8
	19	67	20.3
	20	70	21.2
	21	32	9.7
	22	23	7.0
	23	12	3.6
	24	5	1.5
	25	2	.6
	26	1	.3
	27	0	.9
	28	3	.9
	29	1	.3
	30-55	11	3.3
Education	High school diploma or equivalent	298	90.3
	College degree	14	4.2
	Bachelor's degree	17	5.2
	Master's or Professional Degree	1	.3
Year of Study	Year 1	126	38.2
	Year 2	63	19.1
	Year 3	77	23.3
	Year 4	46	13.9
	Year 5+	16	4.8
Marital Status	Single	214	64.8
	In a romantic relationship (non-cohabitating)	104	31.5
	Married or domestic partnership	11	3.3
Ethnicity	White	119	36.1
	Hispanic or Latinx	9	2.7
	Black	39	11.8

	Asian/Pacific Islander	42	12.7
	South Asian	52	15.8
	Middle Eastern	48	14.5
	Mixed	14	4.2
	Other	2	.6
Previous diagnoses	None	267	80.9
	ADHD	16	4.8
	History of depression	7	2.1
	History of anxiety	21	6.4
	History of bipolar disorder	1	.3
	Autism	1	.3
	History of reading LD	2	.6
	History of math LD	2	.6
	History of writing LD	0	0
	History of other LD	18	5.5
	History of seizure disorder	3	.9
	History of traumatic brain injury	12	3.6
	History of multiple diagnoses	28	8.5
Number of students receiving academic accommodations (self-reported)	Yes	24	7.3
	No	302	91.5
	Prefer not to say	1	.3

Note. Based on complete sample of 330 participants. ADHD: Attention/deficit-hyperactivity disorder; LD: Learning disorder.

Data collection took 1.5 hours for each participant to complete in person. The single participant who was not registered in a research pool received a $50 gift card. The remainder of participants participated through the Psychology Participant Pools and received 2 bonus marks at the University of Windsor and 1.5 bonus marks at Ryerson University in exchange for their participation.

Procedures

Phase I. Undergraduate students attending the University of Windsor and Ryerson University were invited to participate in the proposed project. Prior to officially signing up for the studies, a screening questionnaire was used to determine eligibility for participation based on the exclusionary criteria, either administered online for Psychology Participant Pool participants, or over the phone for other participants. Once officially enrolled in the project, each participant was booked for a 1.5-hour appointment with the primary investigator or a trained research assistant. Participants were advised to check their GPAs prior to their appointment and bring eyeglasses should they be needed for reading.

Phase II. At their appointments, the participants were provided with a detailed explanation of the studies, including the purpose of this research, risks and benefits associated with participation, limits of confidentiality, and information on how their data will be collected, used, and stored. They were given the opportunity to ask questions and were informed that should they choose to provide consent and continue with their participation, consent could also be withdrawn at any time with no penalty. They were informed that should they choose to withdraw their consent after their data has been collected, they could contact the primary investigator within two months and ask for their data to be destroyed with no penalty. Participants who consented to participating in the project signed a consent form and were provided with a copy.

Upon completion of the informed consent process, participants were asked to complete a series of questionnaires (see 'Measures' section), which were presented in a counterbalanced order.

Measures

Participants completed the study in the presence of a research assistant of the experimenter. The measures (please see Appendices A-J) are described in detail here and will be listed briefly in subsequent chapters.

Barkley Adult ADHD Rating Scale—IV (BAARS-IV; Barkley, 2011a). The BAARS-IV is a valid and reliable ($\alpha = .92$) self-report symptom checklist designed to detect the presence of 18 symptoms of ADHD, corresponding with those described in the DSM-IV-TR (APA, 2000). Each symptom is rated on a four-point Likert scale (0=never or rarely; 1=sometimes; 2=often; 3=very often) for frequency of symptom occurrence. Responses to the items on the BAARS-IV yield an overall score for inattention level, an overall score for hyperactivity level, and a total score combining both. In general, higher scores on this measure indicate more difficulty with inattention and hyperactive/impulsive behaviour. Those with a total symptom count at or above the 93rd percentile are identified as having clinically significant symptoms of ADHD (Barkley, 2011a).

Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). As symptoms related to ADHD (i.e., inattention, impulsivity, etc.) may be either caused by or co-occur with symptoms of depression and anxiety, the DASS will be used to screen and control for comorbid symptoms that may be contributing to each participant's

presentation. The DASS is a valid and reliable (Lovibond & Lovibond, 1995), 42-item self-report measure consisting of three subscales related to symptoms of depression (α = .91), anxiety (α = .81), and stress (α = .89), respectively, with each item rated on a 4-point Likert scale (0=did not apply to me at all; 1=applied to me to some degree, or some of the time; 2=applied to me a considerable degree, or a good part of the time; 3=applied to me very much, or most of the time) for applicability of symptom or frequency of symptom occurrence. Although there is no official cut-off for clinically significant symptoms, the authors indicate that subscale total scores of ≥14, ≥10, and ≥17 represent 'extremely severe' symptoms of depression, anxiety, and stress, respectively (Lovibond & Lovibond, 1995). In the current study, all three subscales had good internal consistency (depression: α = .90; anxiety: α = .81; stress: α = .86).

Barkley Deficits in Executive Functioning Scale (BDEFS; Barkley, 2011b). The BDEFS, a valid and reliable (α = .84; Barkley, 2011b) self-report measure, is used to evaluate several dimensions of executive functioning in adults, including planning and organization, self-motivation, problem-solving, and emotional regulation. The short form of the scale is comprised of 20 items rated on a four-point Likert scale (ranging from 1=never/rarely to 4=very often). Individuals at or above the 75th percentile are considered to be in the clinically impaired range.

The Scale of Protective Factors (SPF-24; Ponce-Garcia et al., 2015). The SPF is a valid and reliable (Madewell & Ponce-Garcia, 2016) measure of protective factors, specifically shown by previous research to be predictors of resilience (Ponce-Garcia et al., 2015). The scale consists of 24 items divided into four factors: social support, social

skills, prioritizing and planning behaviour, and goal efficacy. Each item is rated on a 7-point Likert scale (ranging from 1=disagree completely to 7=completely agree). The use of four subscales allows for scores on each subscale to provide a better indication of where exactly an individual may be lacking protective factors. An item related to sleep quality from the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989; "During the past month, how would you rate your sleep quality overall?", on a scale from 0=very good to 3=very bad) was added to the SPF-24. In the current study, the prioritizing and planning behaviour subscale correlated moderately with the BDEFS (reverse-scored), $r(328) = .43$, $p < .001$. Similarly, the goal efficacy subscale correlated moderately with the RSES, $r(328) = .59$, $p < .001$. The lower correlations may be because the SPF-24 subscales measure very specific facets of executive functioning and self-esteem, respectively, while the BDEFS and RSES are global measures of each.

The Social Adaptation Self-Evaluation Scale (SASS; Bosc et al., 1997). The SASS is a valid and reliable ($\alpha = .80$) outcome measure of social functioning. It consists of 21 items rated on a 4-point Likert scale, with lower scores related to lower levels of social functioning, and higher scores related to higher levels of social functioning.

The Simple Lifestyle Indicator Questionnaire (SLIQ; Godwin et al., 2008). The SLIQ is a valid and generally reliable 12-item questionnaire tapping five main categories of lifestyle characteristics: diet ($\alpha = .58$), physical activity ($\alpha = .60$), smoking, alcohol use, and self-reported levels of stress. The overall total score comprises the total scores for each characteristic subscale, with higher scores indicating healthier lifestyle

habits. Two items related to the practice of mindfulness will be added to this scale ("Do you practice in mindfulness meditation? If so, how frequently?")

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES is a widely used, valid and reliable ($\alpha = .77$), unidimensional scale of global self-esteem. The ten items are related to both positive and negative feelings about the self, and are rated on a 4-point Likert scale (ranging from strongly agree to strongly disagree).

The Big Five Inventory (BFI; John et al., 1991; John et al., 2008). The BFI is a widely used, reliable, and validated measure of the five dimensions of personality (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience; average $\alpha = .85$; Rammstedt & John, 2007) originally described by Goldberg (1995). The inventory consists of 44 items rated on a 5-point Likert scale (ranging from 1=disagree strongly to 5=agree strongly), which contribute to the scores of five subscales corresponding to each personality dimension. In the current study, four of the five factors were of acceptable internal consistency (extraversion: $\alpha = .84$; agreeableness: $\alpha = .76$; conscientiousness: $\alpha = .76$; neuroticism: $\alpha = .81$), whereas openness to experience was less reliable than the rest (openness to experience: $\alpha = .68$).

The General Crime Scale (GCS; Evans et al., 1997). The GCS, comprising seven reliable subscales, was originally developed for researchers evaluating the general theory of crime introduced by Gottfredson and Hirschi (1990). The scale contains questions about levels of self-control, general criminal activity (e.g., stealing, property damage, assault, etc.), substance use, values regarding criminal activity, and quality of

social bonds. The subscales reflecting general criminal activity (α = .60) and analogous behaviours (including substance use; α = .65) were included for analysis in this study.

Table 2

Specific measures used for each study

	Relation being examined	Measures (Possible covariates)	Measures (Predictors)	Measures (Moderators)	Measures (Outcomes)
Study 1	Attentional abilities and academic outcomes	DASS	BAARS-IV	SPF-24 SLIQ SASS	GPA
Study 2	Attentional abilities and social outcomes	DASS	BAARS-IV	SPF-24 BFI-N RSES BDEFS	SASS
Study 3	Attentional abilities and legal issues	DASS	BAARS-IV	SPF-24 BFI-A BFI-C	GCS

Note. DASS = Depression Anxiety Stress Scales; BAARS-IV = Barkley Adult ADHD Rating Scale, Fourth Edition; SPF-24 = Scale of Protective Factors; SLIQ = Simple Lifestyle Indicator Questionnaire; SASS = Social Adaptation Self-Evaluation Scale; GPA = Grade Point Average; BFI-N = Big Five Inventory – Neuroticism factor; BFI-A = Big Five Inventory – Agreeableness factor; BFI-C = Big Five Inventory – Conscientiousness factor; RSES = Rosenberg Self-Esteem Scale; GCS = General Crime Scale.

Data Storage, Entry, and Cleaning

Data was de-identified and stored in a locked filing cabinet in Dr. Carlin Miller's laboratory at the University of Windsor and in Dr. Tisha Ornstein's laboratory at Ryerson University, depending on where each participant completed the study. Data was entered by research assistants into a database created by the examiner, using the Statistical Package for the Social Sciences (SPSS) software, and stored on a single, password-protected and locked computer. One back-up copy of the database was stored on a password-protected server. The database was stored according to the Tri-Agency Research Data Management Policy.

Data Analysis

The data were analyzed using the Statistical Package for Social Science (SPSS) for Mac OS X, version 21. Hierarchical regression analysis was used for all three studies to examine the unique contributions of the hypothesized protective factors.

Data Cleaning. After completing data entry, the accuracy of the entered data was examined through visual inspection and the use of descriptive statistics on all relevant variables. The data was evaluated for univariate outliers using a standardized residual cut-off of |3.29|, and for multivariate outliers using the Mahalanobis D^2 chi-squared test (Tabachnick & Fidell, 2013). Missing data was evaluated using Little's MCAR test. The handling of missing data was dependent on the results of Little's MCAR test.

Assumptions Testing for Multiple Regression Analysis. Multiple regression analysis assumes adequate sample size, independence of observations, normality of residuals, linearity, homoscedasticity, and non-multicollinearity.

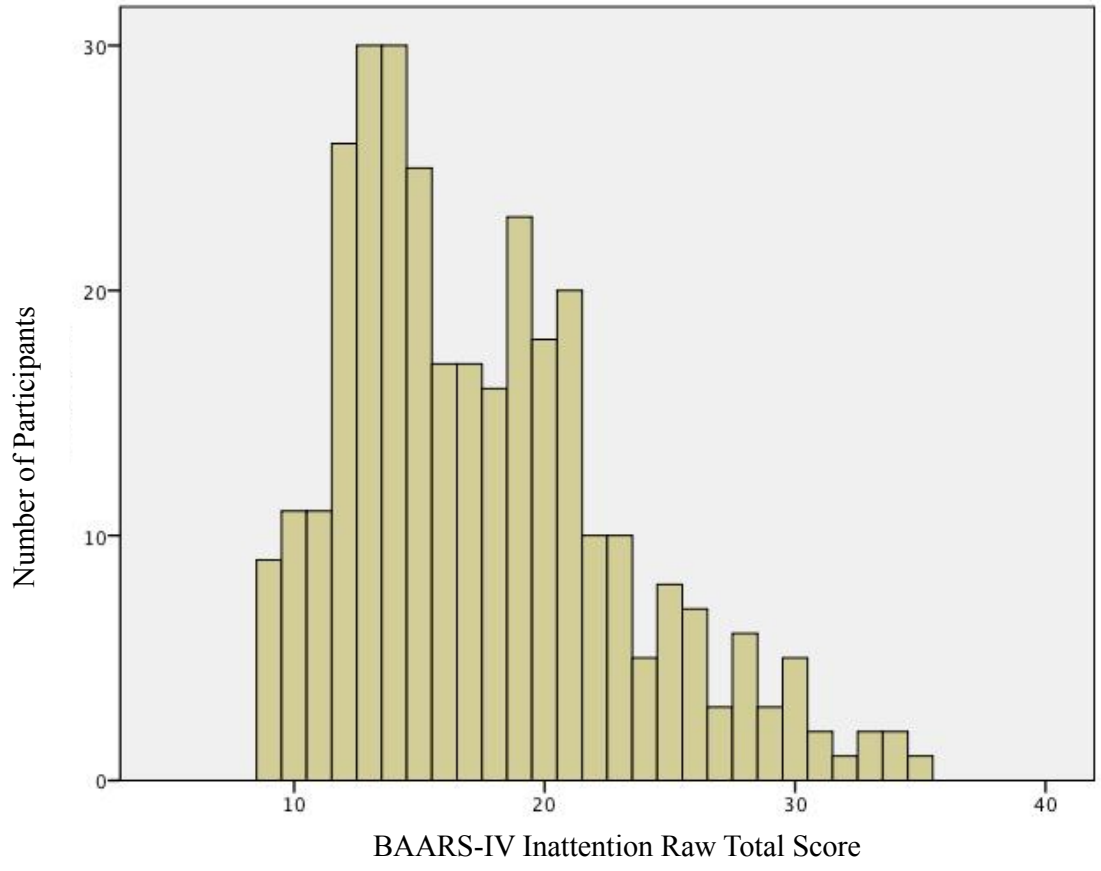
In order to meet the assumption of adequate sample size, an a priori power analysis was conducted. Assuming a small-to-medium effect size (f^2=0.085) and accounting for a maximum of five predictors in a hierarchical regression model required a sample of 239 participants. To compensate for any spoiled or incomplete data, as well as to account for attrition, a total sample of 330 participants were collected. Data was collected with each participant at a single time point, ensuring independence of observations. The assumptions of normally distributed errors, linearity, and homoscedasticity were assessed via inspection of histograms. In all three studies, the assumption of normally distributed errors had been violated, and required the removal of a number of outliers (described further in each chapter). The linearity assumption was met for all three studies, as was the homoscedasticity assumption, which were further assessed using scatterplots of standardized predicted values. Bivariate correlations, tolerance values, and VIF values were used to assess the level of multicollinearity between variables. Although bivariate correlations varied, all tolerance values were above 0.1, and all VIF values were <10 in each study. Durbin-Watson statistic of 1.52 was used to support the assumption of independence of residuals.

Main Analyses. In order to examine the effects of the hypothesized protective factors, multiple regression analysis was conducted. In the following three studies, GPA, a measure of social functioning, and a measure of delinquency served as the dependent variables, respectively. The BAARS-IV inattention score was entered as the predictor variable (see Figure 1 for the distribution of inattention scores). Potential psychological correlates (e.g., depression, anxiety, and/or stress) were entered into the model in order to

control for their effects on the examined relation, and the proposed moderating variables were entered into a separate block. The interaction terms between the moderating variables and the BAARS-IV inattention score were entered last. Specific statistical results for all three studies are described in the following three chapters.

Figure 1

Distribution of inattention total raw scores on the BAARS-IV



Note. This graph represents all participants across all three studies, including outliers. The distribution may be slightly different due to missing data in each study.

Chapter 3

Study I: Factors that moderate the relation between attentional abilities and academic performance in emerging adults

The ability to focus one's attention ranges over time and across individuals. At the far end of the spectrum of attentional abilities, ADHD is a neurodevelopmental condition characterized by developmentally inappropriate levels of inattention, hyperactivity, and/or impulsivity, usually causing significant functional impairment in two or more settings (APA, 2013). ADHD has been found to persist into adulthood for a subset of individuals, ranging from about 30% to 85% of children diagnosed with ADHD (Biederman at al., 1996; Holbrook et al., 2016; Sibley et al., 2017). Prevalence estimates of ADHD in adulthood are between 2-5% (APA, 2013; Faraone & Biederman, 2005; Vitola et al., 2017), and 2-8% in university students, specifically (see DuPaul et al., 2009, for prevalence estimates). ADHD is often used as a model when considering less than optimal attentional abilities.

Emerging adulthood, a period of significant development between ages 18-25 (Arnett, 2000), is considered a sensitive transitional period involving increased self-sufficiency, uncertainty about the future, and increased demands on executive functioning (Newcomb-Anjo et al., 2017). Like their younger selves, emerging adults with ADHD may continue to have varying levels of attention, including daydreaming and disorganization. University students with ADHD may have significant difficulty focusing during lectures, sustaining attention while reading, meeting deadlines, and organizing their workspaces (APA, 2013). As they develop and grow from adolescents to adults,

individuals with ADHD are likely to have fewer difficulties related to physical or motor hyperactivity, and may instead experience subjective feelings of restlessness (APA, 2013) and behavioural impulsivity (e.g., risky sexual behaviour; Abecassis et al., 2017). Furthermore, college and university students with ADHD have reported experiencing nuanced facets of ADHD symptoms that are likely specific to their developmental stage, and which are not clearly reflected in the DSM-5, including missing regular obligations, overactive mentation (i.e., racing thoughts), forgetting to use coping strategies, and increased anxious rumination, particularly in the absence of physical activity (Gray et al., 2016).

Post-secondary education typically involves a significant increase in expectations and demands as compared to secondary school, and that can be particularly difficult to manage for individuals with ADHD. Individuals with ADHD are less likely to enrol in post-secondary education, and only a subset of those that enrol are likely to graduate (Kuriyan et al., 2013). There have been inconsistent findings regarding differences in academic achievement, with some studies showing that students with ADHD do underperform as compared to their peers without ADHD (e.g., Advokat et al., 2011; Blase et al., 2009; Gropper & Tannock, 2009), while others show no difference (e.g., Sparks et al., 2004) or average, expected performance (e.g., Gray et al., 2016). This discrepancy may be a result of accommodations, supports, or interventions differentially received by some study participants. In general, university students with ADHD may have difficulty with tasks involving organization, planning, cognitive flexibility, time management, and working memory (Barkley & Murphy, 2011; Reaser et al., 2007).

These skill deficits are particularly problematic because they underlie a significant proportion of requirements in higher education settings. Regardless of whether or not students with ADHD underperform in terms of academic achievement, they often report struggling to meet demands of post-secondary education, and they perceive having to work harder than their peers in order to perform well (Gray et al., 2016). This is consistent with previous neurophysiological findings that showed that students with ADHD exert more effort in allocating attentional resources to tasks in order to perform at the same level as their peers without ADHD (Woltering et al., 2013).

Subclinical ADHD in Higher Education

Some adults have attentional abilities that are more limited, but less severe or frequent than required for a diagnosis of ADHD by DSM-5 criteria. With more limited attentional abilities, these adults may still experience significant functional impairment (Biederman et al., 2000; Faraone et al., 2006). Post-secondary students may have attentional difficulties that are attributable to ADHD or to a variety of other mental health conditions, including depression and anxiety (APA, 2013). Furthermore, reduced attentional abilities in otherwise neurotypical individuals may be caused by reduced or restricted sleep (Whiting & Murdock, 2016; Witkowski et al., 2015), a nutritionally deficient diet (Burrows et al., 2017; George et al., 2008; Wenger et al., 2017), and reduced physical activity (Gapin et al., 2015; Hsieh et al., 2016).

Norwalk and colleagues (2009) found that university students with subclinical levels of ADHD symptoms had lower grade point averages (GPA), less effective study skills, and greater difficulty coping with academic stressors. Pope (2010) corroborated

these findings with undergraduate students from the United Kingdom, noting, in particular, that students with higher scores on the inattention subscale of the CAARS (considered 'at-risk' but not at clinically significant levels) were significantly less likely to graduate than those with lower scores. Similarly, these subclinical levels of ADHD symptoms have been found to be positively correlated with stress levels and negatively correlated with the use of adaptive strategies in university students (Overbey et al., 2011). Overall, while research on emerging adults and/or university students with subclinical ADHD has been limited, the potential costs to education and future employment make it a particularly important area of future research.

Protective Factors

Protective factors are individual and/or environmental characteristics that contribute to adaptive behaviour and/or act as buffers against adversity for those at high levels of risk, such as individuals with ADHD, subclinical or otherwise. Issues with inattention, in general, have been found to be a significant risk factor for poor academic outcomes (Gray et al., 2014; Pingault et al., 2011). The field has only recently began to examine factors that may buffer against poor academic outcomes for individuals with ADHD, and much of that literature has focused on young children and adolescents (e.g., Arnold et al., 2012; Biederman et al., 1998; Dvorsky et al., 2016; Kawabata et al., 2012; Latimer et al., 2003; Martin, 2014; Vitaro et al., 2005; Volpe et al., 2006). Some studies have examined university students with ADHD and compared them to their neurotypical peers but have not analyzed protective factors as moderator variables (e.g., Norwalk et al., 2009; Pope, 2010). Given that emerging adulthood is a transitional period that

overlaps with adolescence, it is possible that those factors that serve as buffers for adolescents behave similarly for emerging adults.

Social acceptance. In an 18-month longitudinal study, Dvorsky and colleagues (2016) used multi-informant ratings to evaluate social skills, social acceptance, and multiple academic outcomes of 93 adolescents with ADHD. *Social skills* were related to social relationships in general, while *social acceptance* was specific to social success and popularity with peers. The researchers' results showed that adolescents' self-ratings (as well as their parents' ratings) of their social acceptance moderated the relation between their inattention severity and their grades, such that those with higher levels of social acceptance were less likely to have poor grades (Dvorsky et al., 2016). Thus, in this study, self- and parent-ratings of social acceptance functioned as a protective factor against poor grades for those adolescents with ADHD. This finding was supported by previous research showing that various social factors (e.g., social acceptance, quality of friendships, and prosocial skills) may protect against negative social outcomes for adolescents with ADHD (Latimer et al., 2003; Mikami & Hinshaw, 2006). However, this was the first study to show that social acceptance can buffer against poor academic functioning.

Student support services. The literature suggests that the subset of emerging adults with ADHD who attend post-secondary education may inherently have better coping skills and higher levels of cognitive functioning than peers with ADHD who do not attend post-secondary education (Green & Rabiner, 2012), which may explain their choice to attend post-secondary education. Furthermore, those individuals with ADHD

who choose to attend post-secondary schooling tend to have higher levels of ability, have experienced greater success throughout primary and secondary education, and use better compensatory strategies (Frazier et al., 2007). Similarly, not all university students with ADHD are unsuccessful (e.g., Sparks et al., 2004); findings on academic achievement are mixed, and levels of achievement (i.e., GPA) fall along a continuum. Although this has not been investigated extensively, this suggests that there may be factors on which students with ADHD who succeed differ from their peers, and those factors may be protective against the usually negative academic outcomes associated with ADHD symptoms. For example, better organizational skills in college students with ADHD predicted better academic functioning, as well as lower overall levels of ADHD-related impairment (Dvorsky & Langberg, 2014). Thus, coaching (particularly around planning and organization) provided by university support services may be an especially useful intervention, with a recent study showing that it contributed to a significant increase in GPA for students with ADHD (DuPaul et al., 2017).

Wellness practices. The association between physical exercise and improved cognitive ability (as well as reduced symptoms of ADHD) has been well established in children, adolescents, and young adults with ADHD (Archer & Kostrzewa, 2012; Benzing & Schmidt, 2017; Cerrillo-Urbina et al., 2015; Neudecker et al., 2015; Pindus et al., 2016; Pontifex et al., 2013; Verburgh et al., 2014; Vysniauske et al., 2016). Fewer studies have directly examined whether an association exists between physical exercise and academic performance in individuals with ADHD. Pontifex and colleagues (2013) examined the effect of acute exercise on academic performance as measured by the third

edition of the Wide Range Achievement Test (WRAT-3), rather than something reflecting long-term academic performance, such as the GPA. The researchers found that both children with ADHD and neurotypical controls showed improved academic performance for reading comprehension and arithmetic after exercising on a treadmill, while no effects were found for spelling (Pontifex et al., 2013).

Similarly, there have been limited findings regarding the role of a 'healthy diet' in moderating the relation between ADHD symptoms and academic achievement. A significant proportion of the literature has focused on the effect of food additives on symptoms of ADHD in children (see Nigg et al., 2011, for a review), and findings have been mixed, with Nigg and colleagues' (2011) meta-analysis concluding that restricted food diets could help to manage symptoms in a subset of children with ADHD (small effect sizes). However, the strongest evidence of the effect of nutrition on ADHD symptoms has been related to omega-3 fatty acids, with supplementation of omega-3 fatty acids showing significant reduction in symptoms for children and adolescents with ADHD (Guney et al., 2015; Puri & Martins, 2014; Widenhorn-Müller et al., 2014). Recent work on supplementation with micronutrients has also shown promise in the reduction of ADHD symptoms in children and adults, with medium-to-large effect sizes (Gordon et al., 2015; Rucklidge et al., 2014).

Mindfulness has been operationalized as comprising two main components: self-regulation of attention, related to attending to one's own thoughts, feelings, and sensations; and, orientation to experience, related to maintaining an open curiosity, without judgement, about where one's thoughts go (Bishop et al., 2004). Based on the

idea that mindfulness is a practiced state of self-regulated attention, mindfulness-based interventions (MBI) are being investigated as an 'alternative' treatment for ADHD. Several studies have shown that MBI result in post-treatment decreases in ADHD symptoms in children (van der Oord et al., 2012), adolescents (Haydicky et al., 2015; van de Weijer-Bergsma et al., 2012), and adults (Mitchell et al., 2017; Schoenberg et al., 2013; Hepark et al., 2019), with small-to-medium effect sizes. Despite the growing body of evidence indicating that MBI can help reduce symptoms of ADHD across the lifespan, no study has examined academic performance as an outcome in individuals with ADHD. However, MBI was found to predict improved academic performance in neurotypical children (Harpin et al., 2016) and adolescents diagnosed with learning disabilities (Beauchemin et al., 2008) over time. Brief sessions of MBI were found to improve performance on quizzes for neurotypical undergraduate students, taken as part of the studies (Calma-Birling & Gurung, 2017; Ramsburg & Youmans, 2014).

There have been no previous studies directly examining the academic performance of emerging adults when considering the relations between wellness practices and symptoms of ADHD. However, the literature suggests that wellness practices related to exercise, diet, and mindfulness, may serve to protect individuals with ADHD from poorer academic outcomes (Dubuc et al., 2017). Furthermore, any potential multiplicative benefits of these wellness factors have not been investigated. Thus, an exploration of these factors as moderators, individually or combined, is warranted.

Study Aims and Hypotheses

The aim of the current study is to investigate protective factors that moderate the relation between attentional abilities and academic outcomes in university students. The bulk of the research in this area has been conducted on children and adolescents. Based on the extant literature on adolescents with ADHD, I hypothesize the following:

Hypothesis 1. There will be a negative relation between level of inattention and academic performance.

Hypothesis 2. The use of academic supports (i.e., services provided by student accessibility centres), social supports, and wellness practices will moderate (weaken) the relation between level of inattention and academic performance.

Methods

Participants

See Chapter 2 for a detailed description of participants recruited for this study.

Table 3

Demographic characteristics of included participants

Characteristic	*n*	%
School		
UWindsor	169	56.3
Ryerson U	136	44.6
Gender		
Female	249	81.6
Male	53	17.4
Non-binary/Trans/Other	3	1
Ethnicity		
White	109	35.7
Hispanic or Latinx	8	2.6
Black	35	11.5
Asian or Pacific Islander	40	13.1
South Asian	48	15.7
Arab/Middle Eastern	47	15.4
Mixed	13	4.3
Other	2	.7
Marital Status		
Single	197	64.8
In a relationship (non-cohabitating)	99	32.6
Married / civil union / cohabitating	8	2.6
Employment Status		
Full-time	14	4.6
Part-time	204	66.9
Not currently working or volunteering	87	28.5
Year of Study		
1	118	38.8
2	58	19.1
3	74	24.3
4	42	13.8
5 or beyond	12	3.9
Overall GPA		
<60%	3	1.0
60-69%	35	11.5

70-79%	99	32.5
≥80%	85	27.9
Academic accommodations		
Yes	22	7.3
No	279	92.4
Prefer not to say	1	.3
Previous diagnosis of ADHD		
Yes	14	4.6
No	288	95.4
Met diagnostic criteria for ADHD according to BAARS-IV		
Yes	30	9.8
No	275	90.2

Measures

The following measures were administered to participants to test the hypotheses in this particular study. Please see Chapter 2 for detailed descriptions of the measures.

- Demographics questionnaire
- Barkley Adult ADHD Rating Scale – IV (BAARS-IV; Barkley, 2011a)
- Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995)
- Scale of Protective Factors (SPF-24; Ponce-Garcia et al., 2015)
- Simple Lifestyle Indicator Questionnaire (SLIQ; Godwin et al., 2008)
- Social Adaptation Self-Evaluation Scale (SASS; Bosc et al., 1997)

Table 4

Variable characteristics

Measure	Mean (SD)	Range	Clinical cut-off
BAARS-IV Inattention Raw Total	17.28 (5.4)	9 – 34	N/A
BAARS-IV Inattention Symptom Count Percentile	75.34 (31.4)	1-99	≥93
DASS Depression Total	10.77 (9.7)	0 – 42	≥14
SPF-24 Total	122.54 (20)	67 – 166	N/A
Student Support	31.03 (6.8)	8 – 42	N/A
Social Skills	29.92 (7.6)	7 – 42	N/A
Prioritizing & Planning Behaviour	30.68 (6.8)	11 – 43	N/A
Goal Efficacy	30.68 (6.7)	10 – 42	N/A
SLIQ Total	7.15 (1.5)	3 – 10	N/A
SASS Total	41.8 (6.8)	17 – 57	N/A

Note. BAARS-IV = Barkley Adult ADHD Rating Scale, Fourth Edition; DASS = Depression Anxiety Stress Scales; SPF-24 = Scale of Protective Factors; SLIQ = Simple Lifestyle Indicator Questionnaire; SASS = Social Adaptation Self-Evaluation Scale.

Procedures

See Chapter 2 for detailed procedures.

Results

Data Cleaning. Eleven individuals were above the age of 29*,* and one individual did not report their age. These 12 cases were excluded from analyses. From the remaining subset, 12 univariate outliers and one additional multivariate outlier ($p < 0.001$) were found and excluded from analyses, resulting in a sample size of 305. Missing data was a result of item non-response, wherein participants did not provide information for some items. Data was found to be missing completely at random, χ^2 (18)=22.35, $p > .05$. A large percentage of data (27%) was missing specifically from the GPA variable due to item non-response, likely due to participants not checking their GPAs prior to attending

the research appointment. Because a large amount of data was missing, multiple imputation was conducted to replace the missing values.

Assumptions Testing. Examining P-P plots revealed that the assumption of normality of residuals was violated. However, upon excluding 13 outliers (12 univariate and one multivariate) from analysis, the model revealed adequate normality of residuals. All other assumptions for multiple regression were met (see Chapter 2 for a detailed description of assumptions testing).

Table 5

Comparison of participants to outliers

Measure	N	X^2 (df)	Mean (SD)	*t* (df)
School	330	.137 (1)		
Age	330	151.2 (19)**		
Gender	330	.404 (3)		
Ethnicity	325	3.49 (7)		
GPA	241	3.70 (3)		
BAARS-IV Inattention Raw Total				
Included	305		17.3 (5.4)	-3.414 (26.3)**
Excluded	25		22.3 (7.2)	
DASS Depression Total				
Included	305		10.8 (9.7)	-2.5 (25.7)*
Excluded	25		18.3 (15)	
Student Support				
Included	305		31.03 (6.8)	2.13 (26)*
Excluded	25		26.8 (9.7)	
Social Skills				
Included	305		30 (7.6)	.58 (26.3)
Excluded	25		29 (10.02)	
Prioritizing & Planning Behaviour				
Included	305		30.7 (6.7)	1.99 (25.5)
Excluded	25		26.3 (10.9)	
Goal Efficacy				
Included	305		30.9 (6.5)	2.18 (25.5)*
Excluded	25		26.2 (10.6)	
SLIQ Total				
Included	302		7.15 (1.5)	2.95 (27.04)**
Excluded	25		6.1 (1.7)	
SASS Total				
Included	304		41.7 (6.8)	1.00 (26.06)
Excluded	25		39.8 (9.6)	

*$p < .05$. **$p < .01$. *Note.* Equal variances were not assumed when comparing outliers to included data. BAARS-IV = Barkley Adult ADHD Rating Scale, Fourth Edition; DASS

= Depression Anxiety Stress Scales; SLIQ = Simple Lifestyle Indicator Questionnaire; SASS = Social Adaptation Self-Evaluation Scale.

Main Analyses. In order to examine the effects of the hypothesized protective factors, multiple regression analysis was conducted, with GPA serving as the dependent variable. Symptoms of depression, anxiety, and stress were included in the first block in the model as control variables. The BAARS-IV inattention score was entered as a predictor into the second block, while the SPF-24 subscale scores, social functioning, lifestyle factors, and current use of academic supports were entered as predictors in the third block. Finally, the fourth block contained the interaction terms between inattention and the predictors in the third block. The regression model including the pooled data could not be tested for significance. No interaction terms were significant, suggesting the absence of any moderator effects. Depressive symptoms, as well as the SPF-24 *social skills* and *goal efficacy* subscales were the only significant predictors of GPA (see Table 6). Upon removing depressive symptoms and the aforementioned significant predictors from the model, level of inattention significantly predicted GPA. Inattention did not predict GPA when controlling for symptoms of depression and after the inclusion of the *social skills* and *goal efficacy* subscales, suggesting that the relation between level of inattention and GPA is mediated by the presence of other factors.

Table 6

Multiple Regression Analysis for Predicting GPA

	Model 1		Model 2		Model 3	
Variable	B	SE (B)	B	SE (B)	B	SE (B)
Level of inattention	-.301**	.094	-.048	.115	.123	.121
SPF-24: Social Skills			-.186*	.076	-.188*	.076
SPF-24: Prioritizing and Planning Behaviour			.129	.103	.116	.103
SPF-24: Goal Efficacy			.438**	.110	.390**	.114
Symptoms of depression					-.180*	.081

*$p < .05$. **$p < .01$. Note: Standardized coefficients were not available for pooled imputation data.

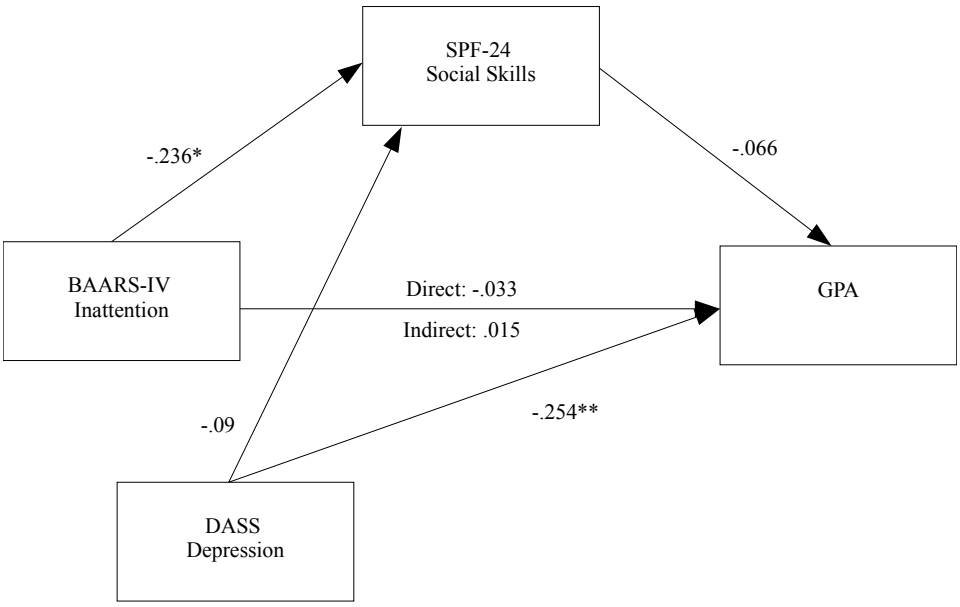
Post-Hoc Analyses. In order to examine the effects of the potential mediators, further regression analyses were conducted. Because Hayes' (2018) PROCESS macro cannot be used with pooled imputation data, regression models were used to manually construct a path model. The indirect effect (AB) was calculated by multiplying paths A and B. The partial posterior approach (Biesanz, Falk, & Savalei, 2010), described as a more powerful alternative to Sobel's test, was used via the authors' *p*-value calculator (Falk & Biesanz, 2016) to determine the significance of the indirect effect.

In order to test social skills as a mediator in the relation between level of inattention and GPA, using symptoms of depression as a covariate, level of inattention and symptoms of depression were entered as predictors, with the SPF-24 *social skills* subscale as the outcome variable. Level of inattention emerged as a significant predictor

of social skills, B = -.236, SE = .101, t = -1.619, p<.05. Symptoms of depression did not significantly contribute variance towards social skills. In a second regression model, level of inattention, symptoms of depression, and social skills were entered as predictors, while GPA was entered as the outcome variable. In this model, only symptoms of depression emerged as a significant predictor, B = -.254, SE = .076, t = -3.335, p<.01. The indirect effect from level of inattention to GPA via social skills was not significant (B = .015, p=0.4), suggesting that social skills is not a mediator in the relation between level of inattention and GPA, and that symptoms of depression contribute the most variance in the relation between level of inattention and GPA.

Figure 2

Mediation Model: The Effect of Inattention on GPA through Social Skills

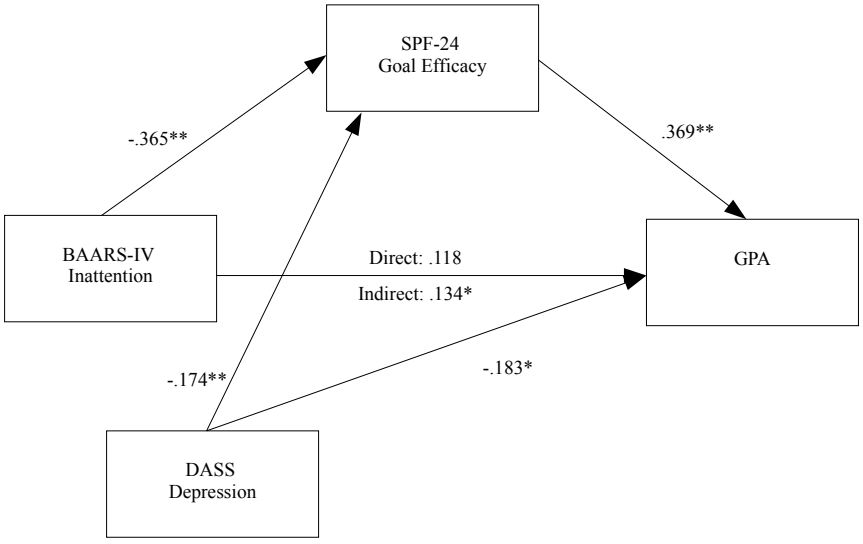


**p < .05. **p < .01.*

To test goal efficacy as a mediator in the relation between level of inattention and GPA, using symptoms of depression as a covariate, level of inattention and symptoms of depression were again entered as predictors, with the SPF-24 *goal efficacy* subscale as the outcome variable. Level of inattention (B = -.365, SE = .077, t = -4.766, p<.01) and symptoms of depression (B = -.178, SE = .042, t = -4.203, p<.01) emerged as significant predictors of goal efficacy. In a second regression model, level of inattention, symptoms of depression, and goal efficacy were entered as predictors, while GPA was entered as the outcome variable. In this model, only symptoms of depression (B = -.183, SE = .081, t = -2.266, p<.05) and goal efficacy (B = .369, SE = .105, t = 3.514, p<.01) emerged as significant predictors of GPA. The indirect effect from level of inattention to GPA via goal efficacy was significant (B = .126, p<0.05), suggesting that goal efficacy is a mediator in the relation between level of inattention and GPA.

Figure 3

Mediation Model: The Effect of Inattention on GPA through Goal Efficacy



**p < .05. **p < .01.*

Discussion

This is the first study to examine the effect of attentional abilities on academic achievement in university students and to explore the potential protective factors. With the first hypothesis, I expected that fewer difficulties with attention would be related to better academic performance, as indicated by marks in courses. This hypothesis was supported by the data. However, when symptoms of depression were added to the analyses, results suggest that depressive symptoms likely present a significant risk for academic problems, and symptoms of depression may actually account for the relation between attention problems and academic achievement. Additionally, symptoms of depression are a substantial concurrent predictor of academic achievement regardless of severity of attention problems.

With the second hypothesis, I expected that the use of academic supports, social supports, and wellness practices would change the relation between limited attentional abilities and academic performance, specifically by weakening it. This hypothesis was not supported by the data. However, results suggest that goal efficacy serves as a protective factor against academic problems regardless of level of attentional abilities.

There are several clinical implications suggested by these findings. First, depressive symptoms concurrent predicted academic achievement and it appear to be the 'active ingredients' in the relation between inattention and academic achievement. This is particularly important because emerging adults and university students with ADHD are more likely to report depression symptoms with comorbid attention symptoms than students without ADHD (Abecassis et al., 2017; Rabiner et al., 2008), and inattention-

type symptoms and depression have been found to statistically overlap in some studies (Chen et al., 2016; Meinzer et al., 2012). While some work has suggested that ADHD and depressive disorders may share endophenotypes (Wei et al., 2019) and, in particular, may be linked to altered reward system functioning (Meinzer et al., 2012), other research has found that environmental factors, such as perceived support from parents, at least partially contributes to the overlap in inattention and depression (Meinzer et al., 2015). Finally, there is some symptom and criterion overlap between depression and ADHD (i.e., DSM-5 criteria for a major depressive disorder includes "diminished ability to think or concentrate"; APA, 2013, p. 161), which may also explain the correlation between reported symptoms of depression and inattention. Due to the shared variance between inattention and depression symptoms, it may be that it is not possible to entirely separate their contributions towards academic achievement. Nevertheless, the addition of depressive symptoms to inattention appears to at least promote worse outcomes with regard to academic achievement, suggesting that the overall impact of attention problems on academic achievement may be lessened by reducing depression symptoms through intervention. These findings suggest individuals with ADHD should be closely monitored for the presence or development of depressive symptoms, and that symptoms of depression should be treated alongside symptoms of ADHD. Higher education settings could play an important role in supporting students with ADHD by offering regular screening for ADHD, offering opportunities that may reduce the likelihood of depression occurring, and making treatment readily available.

Finally, the only significant factor to protect against the negative effect of inattention on academic achievement was goal efficacy. The *goal efficacy* subscale of the SPF-24 was designed to reflect one's "confidence in one's ability to accomplish goals and succeed" (Ponce-Garcia et al., 2015, p. 739). Goal efficacy appears to be a sub-construct of *self-efficacy*, originally described by Bandura (1977) as one's confidence in one's own abilities. Self-efficacy has been found to predict resilience and positive outcomes among various populations (Bender & Ingram, 2018; Blackburn & Owens, 2015; Guerra et al., 2018). Adults with ADHD tend to have lower levels of self-efficacy (Newark et al., 2016), likely due to repeated underachievement in childhood and adolescence (Safren, 2006). Individuals from various populations have reported improved levels of self-efficacy upon receiving psychotherapy (Bresó et al., 2011; Cusack et al., 2019; Zhang et al., 2017) and education-based interventions (Wall et al., 2012). Although psychopharmacology is considered the first-line treatment for individuals with ADHD, the results from the current study suggests that promoting levels of self-efficacy and goal efficacy may enhance academic outcomes for this population, making psychotherapy a viable and important adjunct to psychopharmacological treatment for emerging adults with ADHD. To my knowledge, there have been studies examining the positive effect of CBT in individuals with ADHD, but there have been no studies examining the specific effect of self-efficacy-based interventions in this population. One study by Bramham and colleagues (2009) showed improved levels of self-efficacy in individuals with ADHD receiving both medication and group CBT, although there was no mention of interventions specific to promoting self-efficacy.

Future ADHD intervention research would benefit from (1) including self-efficacy-based interventions, and (2) examining changes in self-efficacy through CBT or other psychological interventions, both with and without the inclusion of self-efficacy-based interventions. Importantly, goal efficacy was found to protect university students regardless of severity of inattention problems, indicating that the promotion of self-efficacy is likely beneficial for all individuals. Universities and colleges may be able to support the promotion of self-efficacy in students by offering workshops on self-esteem, which may also help by normalizing the experience of stress amongst all students.

The results of the current study should be interpreted within the context of its limitations. First, although academic supports were not found to moderate or mediate the relation between inattention and academic achievement, only 19 out of 299 students reported receiving academic supports. Thus, it is likely that the regression analysis including academic supports was underpowered. Future studies may benefit from focusing on participants specifically recruited from student accessibility centres. Secondly, there was a significant percentage of missing data on the study's dependent variable (i.e., GPA). In the current study, dropping the missing cases would have resulted in a smaller sample size than recommended by the *a priori* power analyses. Although multiple imputation was used to replace the missing data and is considered a robust method of missing data replacement, results could be strengthened through the use of real data. Second, participants for this study were university students who participated through two psychology department participant pools, reasonably restricting the type of participants included in the study. Thus, it may be that if secondary school students or

college/vocational students had been included, the results may have differed. Furthermore, individuals attending university are likely to have fewer symptoms or fewer functional consequences, resulting in a selection bias. Future studies would benefit from including participants from other departments, as well as broadening to include other post-secondary institutions aside from four-year universities.

Future research is necessary to clarify the effect of self-efficacy as a protective factor. Conducting this research with individuals who have been diagnosed with ADHD and/or are receiving academic supports would be beneficial to better understand self-efficacy as a protective factor in clinical populations. Furthermore, research examining interventions specific to self-efficacy is needed to understand potential treatment options for individuals with ADHD. Additional research could also clarify whether self-efficacy-based interventions are more likely to benefit people with certain personality characteristics, and how those characteristics may affect long-term outcomes.

Chapter 4

Study II: Factors that moderate the relation between attentional abilities and social functioning in emerging adults

The ability to pay attention varies within and across individuals. When focused attention is consistently poor and leads to dysfunction, a diagnosis of ADHD is often applied and is frequently used a model for understanding the experiences of those with poorer attentional abilities. Once regarded as a disorder of childhood, ADHD is now recognized as a condition that tends to persist throughout adolescence and adulthood for a significant proportion of individuals (30% to 85%; Biederman at al., 1996; Holbrook et al., 2016; Sibley et al., 2017). Emerging adulthood, a period of significant development between ages 18-25 (Arnett, 2000), is considered a sensitive transitional period, often involving a shift in living situations (e.g., residing with roommates instead of parents; Sussman & Arnett, 2014). Present-day emerging adults are often more flexible in terms of careers, friendships, and romantic relationships, and tend to delay marriage and child rearing (Arnett, 2004). However, emerging adults are nevertheless presented with new challenges, often somewhat distinct from those of adolescence (Arnett, 2004), such as being able to successfully initiate romantic relationships and friendships outside of school, managing conflict at the workplace, and compromising with roommates.

Social Functioning and ADHD

Individuals with ADHD have been found to have impairments in social functioning relative to their neurotypical peers across the lifespan (Ray et al., 2017; Ros & Graziano, 2018; Sacchetti & Lefler, 2017). Children diagnosed with ADHD have been

found to be less liked and accepted by others (Hoza, 2007), have fewer friends (McConaughy et al., 2011), and have more conflicts with peers (Thorell et al., 2017). Adolescents (Kofler et al., 2015; Sibley et al., 2010) and adults (Michielsen et al., 2015; Sacchetti & Lefler, 2017) with ADHD have the same challenges in social functioning as children with ADHD, with the addition of issues related to intimate partner violence (Wymbs et al., 2012; Wymbs et al., 2016).

Although not discussed directly in the DSM-5, emotional dysregulation has been identified as a hallmark symptom of ADHD (Hirsch et al., 2018), thought to be related to deficits in executive functioning (Barkley & Fischer, 2010), neuroanatomical abnormalities in the ventral striatum, amygdala, and orbitofrontal cortex seen in individuals with ADHD (Shaw et al., 2014), inconsistent emotional modelling by parents (Steinberg & Drabick, 2015), and/or reduced coherence between autonomic reactivity and facial affect behaviour (Musser & Nigg, 2017), among other theories. This emotional dysregulation may mediate the social difficulties experienced by individuals with ADHD (Bodalski et al., 2018; Bunford et al., 2015; Lopes et al., 2005), although findings are mixed (Ryan et al., 2016).

Social Functioning in Adults with ADHD

Although research supports impairment in social functioning across the lifespan in individuals with ADHD, emerging adulthood is considered a particularly sensitive period of development. Difficulties faced during this time may significantly affect pre-existing impairment of social functioning, particularly because attentional difficulties seem to

exacerbate with the increased demands of higher education (Ryan et al., 2016) and perhaps with the more challenging tasks associated with emerging adulthood, as well.

Nevertheless, findings on social functioning in adults with ADHD have been mixed. Weyandt and colleagues (2013) found no difference in difficulties related to social functioning between university students with and without ADHD, with students with ADHD not reporting any greater difficulty with relationships, social skills, or social adjustment, than their peers without ADHD. In contrast, Fischer and Barkley (2006) examined adults with childhood symptoms of ADHD (specifically hyperactivity), and found that they had poorer relationship quality, fewer close friends, and difficulty maintaining friendships, and were more likely to argue with their friends than adults without childhood ADHD. Similarly, Moyá and colleagues (2014) found that adults with persistent symptoms of ADHD (specifically hyperactivity) had difficulties in social relationships, and particularly intimate partner relationships. However, in this study, those adults who had childhood ADHD but no longer met criteria in adulthood were no different from neurotypical controls in their social functioning (Moyá et al., 2014). Owens and colleagues (2017) had similar results in their investigation of young adult females, finding that those with persistent symptoms of ADHD since childhood showed significant impairment in social functioning in adulthood, but those who no longer met criteria for ADHD in adulthood were no different from neurotypical controls in terms of social functioning.

Marital partners of adults with ADHD described specific behaviours that created conflict within their relationships, which included speaking impulsively, failing to

remember things, frustration intolerance, and angry outbursts, all consistent with symptoms of ADHD (Robin & Payson, 2002). More recent work reported similar findings, with marital partners of adults with ADHD reporting lower levels of intimacy and marital satisfaction than partners of neurotypical adults (Ben-Naim et al., 2017). Intimate partner violence lies at the extreme end of relationship discord, with impulsive behaviour and emotional dysregulation perhaps giving rise to violence perpetrated by adults with ADHD (Wymbs et al., 2012). In a study drawn from the Pittsburgh ADHD Longitudinal Study (PALS), Wymbs and colleagues (2012) compared young adult males to age- and gender-matched neurotypical controls, who were initially evaluated during childhood. Results showed that young adult males with a history of childhood ADHD reported using verbal aggression and violence with their romantic partners more frequently than the neurotypical controls. Importantly, while most of the young adult males with a history of childhood ADHD that were interviewed did not report engaging in violent behaviour, the group was still five times more likely to report using specific violent behaviours (e.g., throwing things or hitting partner), and nine times more likely to report engaging in all of the violent behaviours examined in this study (Wymbs et al., 2012). More recent work with university students found that while ADHD symptoms predicted higher levels of social impairment and state and trait anger, there was no relation between ADHD symptoms and satisfaction or violence in romantic relationships (Sacchetti & Lefler, 2017).

Research on social impairment in emerging adults with diagnosed or symptoms of ADHD is relatively limited. Discrepancy in the extant literature may be due to

differences in methodology (e.g., longitudinal versus cross-sectional designs, marital partners versus romantic partners, use of specific measures, etc.). University students with ADHD may represent a relatively higher functioning subset of emerging adults with ADHD, as evidenced by their self-selection into higher education (Green & Rabiner, 2012), and may have inherent characteristics or factors that protect them from poorer outcomes, social or otherwise.

Subclinical ADHD and Social Functioning

Although a large proportion of individuals with ADHD have symptoms that persist into adulthood, some adults with a childhood history of ADHD may continue to have some symptoms, but not enough to meet DSM-5 diagnostic criteria. Similarly, there are individuals in the general population with more limited attentional abilities who may not meet criteria for an ADHD diagnosis, but still experience functional impairment. Despite not experiencing clinically significant levels of ADHD symptoms, adults with subclinical or subthreshhold ADHD report higher levels of social impairment overall (Gudjonsson et al., 2009), higher levels of friendship problems compared to neurotypical controls (Young & Gudjonsson, 2008), as well as lower levels of emotional empathy, which predicted lower levels social engagement and enjoyment of friendships (Groen et al., 2018). Although research in this area is limited, investigating individuals with subclinical levels of ADHD symptoms contributes to the understanding of ADHD as a continuum rather than a categorical diagnosis, making it a particularly important area of future research.

Protective Factors

In risk-resiliency research, *protective factors* are individual and/or environmental characteristics that buffer against adversity for individuals at high levels of risk and contribute to adaptive behaviour. Although findings are mixed in the literature, emerging adults with symptoms of ADHD may have significant difficulty with social functioning compared to their neurotypical peers, particularly if that difficulty is mediated by emotional dysregulation, hypothesized to be a core feature of ADHD (Barkley & Fischer, 2010). Part of the discrepancy in findings may be due to the small number of studies focusing specifically on emerging adults with ADHD, with most of the literature on social functioning and ADHD focused on children and adolescents (e.g., Hoza, 2007; Kofler et al., 2015; McConaughy et al., 2011; Sibley et al., 2010; Thorell et al., 2017). Many of the few studies examining social functioning in adults with ADHD do not distinguish between emerging, early, and young adults, and sometimes even include middle-aged adults (e.g., Moyá et al., 2014; Owen et al., 2017; Robin & Payson, 2002). Furthermore, little research has specifically examined social functioning in individuals with ADHD, of any age, with the use of protective factors as moderator variables. However, since emerging adulthood is a transitional period that overlaps with adolescence and young adulthood, it is possible that those factors that serve as buffers for adolescents and young adults behave similarly for emerging adults.

Self-esteem. *Self-esteem*, including self-esteem and self-efficacy, refers to the ability to believe in oneself and one's ability to engage in goal-directed behaviour (Schei et al., 2018). Individuals with ADHD often experience early academic difficulty, which

may contribute to the development of negative beliefs and maladaptive coping strategies (Newark et al., 2016). For this reason, adults with ADHD often have lower levels of both self-esteem and self-efficacy (Schei et al., 2018). Higher levels of self-esteem in adolescents with ADHD was found to predict better psychosocial functioning and fewer depressive disorders three years later (Schei et al., 2018), suggesting that higher levels of self-esteem could be a potential protective factor for emerging adults with ADHD. Ray and colleagues (2017) found that an increased amount of time spent in a particular activity buffered the effects of conduct problems on social functioning in adolescents with ADHD, which may be due to an increase in mastery and self-esteem.

Structured style. *Structured style* comprises skills related to executive functioning, including planning, organization, and goal-directed behaviour (Schei et al., 2015). In their three-year follow-up study, Schei and colleagues (2018) found that a more structured style was associated with better psychosocial functioning. This finding is corroborated by previous work on behaviours of adults with ADHD that create conflict within their marriages, which include failing to remember things and speaking impulsively (Robin & Payson, 2002). Thus, a more structured style may serve as a protective factor for emerging adults with ADHD with regard to their social functioning.

Emotional stability. Past literature has shown that emotional dysregulation plays a key role in the relation between ADHD and impaired social functioning (Bodalski et al., 2018; Bunford et al., 2016; Lopes et al., 2005). While emotional dysregulation is a symptom of ADHD, both individuals with ADHD and neurotypical individuals vary in terms of levels of neuroticism, one of the Big Five personality traits (Goldberg, 1993)

which is directly related to emotional dysregulation (Aluja et al., 2016). Neuroticism, or the tendency to experience unpleasant emotions, can also be seen as an inverse index of emotional stability (Sharpe et al., 2011). Previous research has found that symptoms of ADHD in adulthood were associated with higher levels of neuroticism (Nigg et al., 2002), with later research finding that only those adolescents with persistent symptoms of ADHD had higher levels of neuroticism (Miller et al., 2008). Subsequent research has supported these findings (Polner et al., 2015) and extended them to preschool-aged children with symptoms of ADHD (Martel et al., 2014). The relation between symptoms of ADHD and a largely enduring personality trait such as neuroticism supports the conceptualization of ADHD as symptoms along a continuum (Nigg et al., 2002), and may explain why some adults who no longer meet criteria for ADHD continue to experience functional impairment. Thus, based on the extant research and theory, it is possible that low levels of neuroticism (or high levels of emotional stability) could serve as a protective factor against impairment of social functioning in emerging adults with ADHD, particularly because higher levels of neuroticism have been shown to predict emotional dysregulation (Aluja et al., 2016)

Study Aims and Hypotheses

The aim of the current study was to investigate protective factors that moderate the relation between attentional abilities and social functioning in emerging adults attending university. This topic is under-examined in adults, with the bulk of the research in this area being conducted on children and adolescents. Based on the literature on individuals of all ages with ADHD, I hypothesized:

Hypothesis 1. There will be a negative relation between level of inattention and social functioning.

Hypothesis 2. Higher levels of self-esteem, structured style, and emotional stability will moderate (weaken) the relation between level of inattention and social functioning.

Methods

Participants

See Chapter 2 for a detailed description of participants recruited for this study.

Table 7

Demographic characteristics of included participants

Characteristic	*n*	%
School		
UWindsor	169	55.8
Ryerson U	134	44.2
Gender		
Female	246	81.2
Male	54	17.8
Non-binary/Trans/Other	3	1
Ethnicity		
White	110	36.7
Hispanic or Latinx	8	2.7
Black	35	11.7
Asian or Pacific Islander	40	13.3
South Asian	47	15.7
Arab/Middle Eastern	46	15.3
Mixed	12	4.0
Other	2	.7
Marital Status		
Single	198	65.6
In a relationship (non-cohabitating)	96	31.8
Married / civil union / cohabitating	8	2.6
Employment Status		
Full-time	13	4.3
Part-time	204	67.3
Not currently working or volunteering	86	28.4
Year of Study		
1	117	38.6
2	56	18.5
3	75	24.8
4	42	13.9
5 or beyond	12	4
Overall GPA		
<60%	4	1.8
60-69%	35	15.8

70-79%	99	44.8
≥80%	83	37.6
Academic accommodations		
Yes	22	7.3
No	277	92.3
Prefer not to say	1	.3
Previous diagnosis of ADHD		
Yes	14	4.7
No	286	95.3
Met diagnostic criteria for ADHD according to BAARS-IV		
Yes	31	10.2
No	272	89.8

Measures

The following measures were administered to participants to test the hypotheses in this particular study. Please see Chapter 2 for detailed descriptions of the measures.

- Demographics questionnaire
- Barkley Adult ADHD Rating Scale – IV (BAARS-IV; Barkley, 2011a)
- Barkley Deficits in Executive Functioning Scale (BDEFS; Barkley, 2011b)
- Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995)
- Scale of Protective Factors (SPF-24; Ponce-Garcia et al., 2015)
- Simple Lifestyle Indicator Questionnaire (SLIQ; Godwin et al., 2008)
- Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965)
- Big Five Inventory (BFI; John et al., 1991; John et al., 2008)
- Social Adaptation Self-Evaluation Scale (SASS; Bosc et al., 1997)

Table 8

Variable characteristics

Measure	Mean (SD)	Range	Clinical cut-off
BAARS-IV Inattention Total	17.33 (5.5)	9 – 35	N/A
BAARS-IV Inattention Symptom Count Percentile	75.3 (31.5)	1 – 99	≥93
BDEFS Total	39.80 (11.3)	20 – 71	N/A
BDEFS Total Percentile	73.18 (25.6)	1 – 99	≥75
DASS Depression Total	10.71 (9.6)	0 – 42	≥14
SPF-24 Total	122.3 (20.0)	67 – 166	N/A
Student Support	31.0 (6.8)	8 – 42	N/A
Social Skills	29.90 (7.6)	7 – 42	N/A
Prioritizing & Planning Behaviour	30.60 (6.8)	11 – 43	N/A
Goal Efficacy	30.90 (6.5)	10 – 42	N/A
SLIQ Total	7.13 (1.5)	3 – 10	N/A
RSES Total	28.38 (5.8)	10 – 41	N/A
BFI Neuroticism	3.24 (.81)	1.38 – 5	N/A
SASS Total	41.8 (6.9)	17 – 57	N/A

Note. BAARS-IV = Barkley Adult ADHD Rating Scale, Fourth Edition; BDEFS = Barkley Deficits in Executive Functioning Scale; DASS = Depression Anxiety Stress Scales; SPF-24 = Scale of Protective Factors; SLIQ = Simple Lifestyle Indicator Questionnaire; RSES = Rosenberg Self-Esteem Scale; SASS = Social Adaptation Self-Evaluation Scale.

Procedures

See Chapter 2 for detailed procedures.

Results

Data Cleaning. Eleven individuals were above the age of 29*,* and one individual did not report their age. These cases were excluded from analyses. From the remaining subset, 12 univariate outliers and two multivariate outliers ($p < 0.001$) were found and

excluded from analyses, resulting in a sample size of 304. Seven cases were found to have missing data, which were a result of item non-response, wherein the participant did not provide information for some items. Data was found to be missing completely at random, χ^2 (22)=14.29, $p > .05$. Where possible, item-mean substitution was used to replacing the missing data. One case was dropped from analysis due to large amounts of missing data, resulting in a final sample size of 303.

Assumptions Testing. Examining P-P plots initially revealed that the assumption of normality of residuals was violated. However, upon excluding 14 outliers (12 univariate and two multivariate) from analysis, the model revealed adequate normality of residuals. All other assumptions for multiple regression were met (see Chapter 2 for a detailed description of assumption testing).

Table 9

Comparison of participants to outliers

Measure	N	X^2 (df)	Mean (SD)	*t* (df)
School	330	3.51 (1)		
Age	330	137.8 (19)**		
Gender	330	.373 (3)		
Ethnicity	325	3.15 (7)		
GPA	241	1.1 (3)		
BAARS-IV Inattention Raw Total				
Included	303		17.3 (5.5)	-3.04 (29.3)**
Excluded	27		21.3 (6.6)	
BDEFS Total				
Included	303		39.8 (11.3)	-2.73 (28.2)**
Excluded	26		47.1 (13.3)	
DASS Depression Total				
Included	303		10.71 (9.6)	-2.6 (28)*
Excluded	27		18.4 (14.9)	
Student Support				
Included	303		30.9 (6.8)	1.5 (28.2)
Excluded	27		28.04 (10)	
Social Skills				
Included	303		30 (7.5)	.30 (28.7)
Excluded	27		29.3 (10)	
Prioritizing & Planning Behaviour				
Included	303		30.6 (6.8)	1.42 (28)
Excluded	27		27.6 (10.6)	
Goal Efficacy				
Included	303		30.9 (6.5)	1.85 (27.8)
Excluded	27		27 (10.5)	
SLIQ Total				
Included	300		7.13 (1.5)	2.5 (30.4)*
Excluded	27		6.3 (1.6)	
RSES Total				
Included	303		28.4 (5.8)	1.6 (29.1)
Excluded	27		26.1 (7.2)	
BFI Neuroticism				
Included	303		3.23 (.80)	-1.91 (32.1)
Excluded	27		3.51 (.72)	

SASS Total			
Included	303	41.8 (6.9)	1.31 (27.45)
Excluded	26	39.4 (9.1)	

*$p < .05$. **$p < .01$. *Note.* Equal variances were not assumed when comparing outliers to included data. BAARS-IV = Barkley Adult ADHD Rating Scale, Fourth Edition; BDEFS = Barkley Deficits in Executive Functioning Scale; DASS = Depression Anxiety Stress Scales; SLIQ = Simple Lifestyle Indicator Questionnaire; RSES = Rosenberg Self-Esteem Scale; SASS = Social Adaptation Self-Evaluation Scale.

Main Analyses. In order to examine the effects of the hypothesized protective factors, multiple regression analysis was conducted, with overall social functioning serving as the dependent variable. Symptoms of depression, anxiety, and stress were included in the first block in the model as control variables. Inattention was entered as a predictor into the second block, while the SPF-24 subscale scores, trait neuroticism, trait self-esteem, and overall executive functioning were entered as predictors in the third block. Finally, the fourth block contained the interaction terms between inattention and the predictors in the third block. The regression model including all predictors and interaction terms was statistically significant. However, no interaction terms were significant, suggesting the absence of any moderator effects. Thus, the interaction terms, as well as other predictors that did not have significant effects, were dropped from the model. The final regression model was also statistically significant, $F(6,296) = 45.37$, $p<.001$, with an R^2 of 48% and an adjusted R^2 of 47% (medium-to-large effect size; Cohen, 1992). Depressive symptoms significantly predicted social functioning, as did inattention (see Table 10). However, upon the inclusion of the SPF-24 subscales, inattention was no longer a significant predictor of social functioning, suggesting that the

behaviours measured by the SPF-24 subscales may serve as mediators in the relation between inattention and social functioning.

Table 10

Multiple Regression Analysis for Predicting Social Functioning

	Model 1			Model 2			Model 3		
Variable	B	SE (B)	β	B	SE (B)	β	B	SE (B)	β
Depressive symptoms	-.320	.037	-.45**	-.265	.046	-.372**	-.128	.040	-.180**
Inattention				-.157	.082	-.126*	.028	.070	.022
SPF-24: Student Support							.294	.047	.290**
SPF-24: Social Skills							.241	.043	.265**
SPF-24: Prioritizing and Planning							.132	.056	.130*
Behaviour									
SPF-24: Goal Efficacy							.157	.064	.148*

*$p < .05$. **$p < .01$.

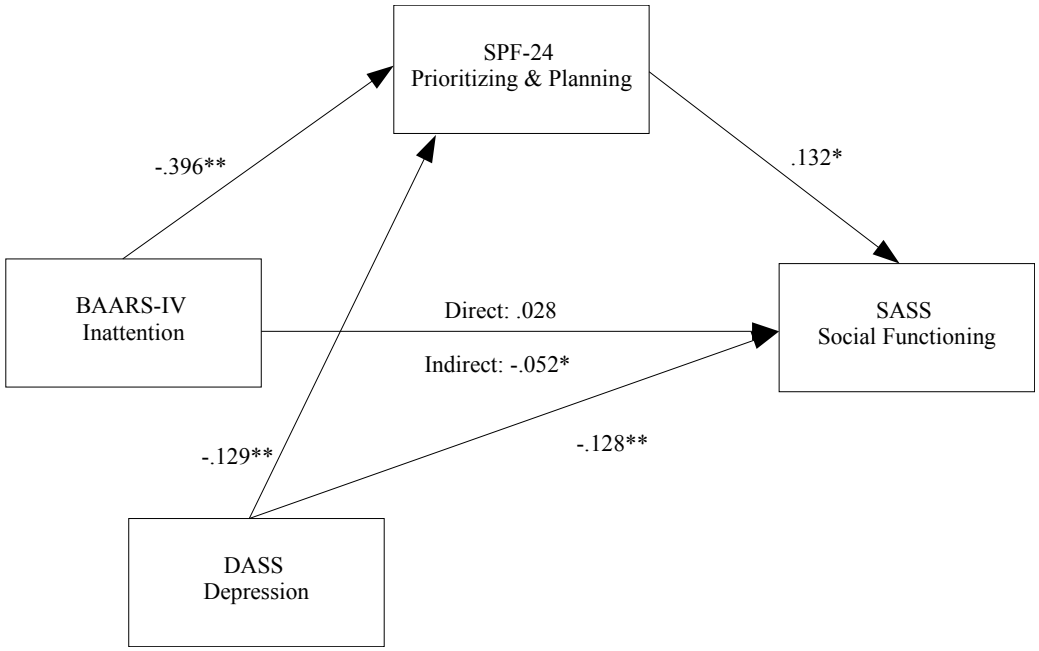
Post-Hoc Analyses. In order to explore possible mediation effects, Hayes' (2018) PROCESS macro for SPSS was used to conduct separate regression analyses to test the potential mediators. This macro allows SPSS to test multiple predictors simultaneously and generates bootstrapped 95% confidence intervals for the indirect effects, allowing for a more robust estimate of effect. Indirect effects are considered significant if the bootstrapped lower limit and upper limit confidence intervals do not include '0'. Model 4 was used for this analysis.

The BAARS-IV inattention score was entered as the predictor variable, while the SASS total score (i.e., social functioning) was entered as the outcome variable. Based on

the results of the main analyses, the DASS depression subscale score was entered as a covariate. The four SPF-24 subscales, reflecting *student support*, *social skills*, *prioritizing and planning behaviour*, and *goal efficacy*, were entered as mediators. As before, the regression model was statistically significant, $F(6,296) = 45.45$, $p<.001$, with an R^2 of 48% and an adjusted R^2 of 47% (medium-to-large effect size; Cohen, 1992). After controlling for the effect of depressive symptoms ($B = -.128$, SE = .040, $t = -3.20$, $p<.01$), *prioritizing and planning behaviour* ($B = -.052$, SE = .024, CI [-.105, -.010]) and *goal efficacy* ($B = -.0540$, SE = .026, CI [-.112, -.012]) emerged as mediators in the relation between inattention and social functioning.

Figure 4

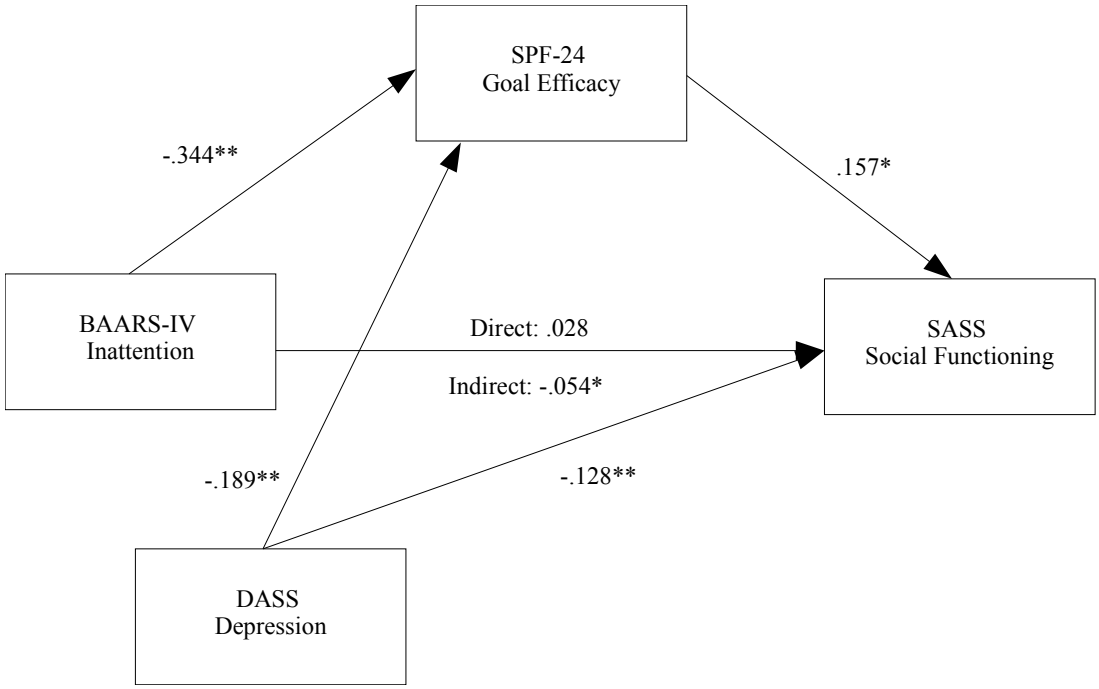
Mediation Model: The Effect of Inattention on Social Functioning through Prioritizing & Planning



**p < .05. **p < .01.*

Figure 5

Mediation Model: The Effect of Inattention on Social Functioning through Goal Efficacy



**p < .05. **p < .01.*

Discussion

This is the first study to examine attentional abilities and social functioning in university students, and to explore potential protective factors. According to Hypothesis 1, it was expected that fewer difficulties with attention would be related to better social functioning. This hypothesis was supported by the data. When symptoms of depression

were added to the analyses, results suggested that both inattention and depression symptoms contribute to lower levels of social functioning.

With the second hypothesis, I expected that higher levels of self-esteem, structured style (i.e., executive functioning), and emotional stability would alter the association between inattention and social functioning, specifically by weakening it. This hypothesis was not supported. However, results suggested that *prioritizing and planning behaviour* and *goal efficacy* significantly buffered against the effects of inattention on social functioning. This suggests that the ability to set priorities when planning and having goal efficacy are protective factors regardless of severity of inattention.

These findings suggest that several factors are involved in promoting both risk and resilience in individuals with inattention, with regard to their social functioning. Although it was expected that higher levels of emotional stability (or lower levels of neuroticism) would serve as a protective factor in the relation between inattention and social functioning, no effect of emotional stability emerged. In part, this may be because relatively few students reported very high levels of neuroticism. Higher levels of neuroticism did predict higher levels of depressive symptoms, which has been well established in the literature (e.g., Goldstein et al., 2019; Kendler et al., 2006). Although the current data does not support the idea that emotional stability protects against the negative effects of inattention, the data does suggest that neuroticism may predict or signal the presence of depression symptoms.

In addition to inattention, depressive symptoms predicted decreased social functioning. Depressive symptoms have been shown to have a profound negative effect

on social functioning, perhaps mediated by a complex interplay of anhedonia, increased sensitivity to rejection, and impaired social perception, among other factors (Kumar et al., 2017; Kupferberg et al., 2016; Lin et al., 2014). As previously stated, adults with ADHD have similar challenges with social functioning, often seemingly related to frustration intolerance and managing conflict, albeit these have been related more to persistent symptoms of hyperactivity in adults (Ficher & Barkley, 2006; Moyá et al., 2014). Depression and ADHD also seem to intersect as both disorders involve at least some difficulty in regulating emotional states (Hirsch et al., 2018), and it is possible that there is some overlapping variance within the regression model between level of inattention and symptoms of depression. Emotional dysregulation appears to be a hallmark symptom of borderline personality disorder, which includes symptoms similar to that of depression (e.g., marked, intense dysphoria) alongside impulsivity and the propensity towards self-harming (APA, 2013), perhaps suggesting shared neural substrates and that some symptoms of depression and ADHD are inextricably linked. Although depressive symptoms did not moderate or mediate the relation between inattention and social functioning in the current study, they do appear to increase the overall contribution of variance, suggesting that depression serves as a separate factor that adds to an overall negative effect on social functioning alongside inattention. These findings suggest individuals with ADHD should be closely monitored for the presence or development of depressive symptoms, and that symptoms of depression should be treated alongside symptoms of ADHD. According to the current results, it is likely that the overall impact

of attention problems on social functioning may improve by reducing depression symptoms through intervention.

In the current study, *prioritizing and planning behaviour* and *goal efficacy* emerged as protective factors in the relation between inattention and social functioning, after controlling for the effect of depressive symptoms. The *prioritizing and planning behaviour* subscale of the SPF-24 was constructed to reflect aspects of self-regulation and executive functioning, including "prioritizing, planning, and goal setting" (Ponce-Garcia et al., 2015, p. 739). As a related but distinct concept, the *goal efficacy* subscale of the SPF-24 was designed to reflect one's "*confidence* in one's ability to accomplish goals and succeed" (Ponce-Garcia et al., 2015, p. 739). Goal efficacy appears to be a sub-construct of *self-efficacy*, originally described by Bandura (1977) as one's confidence in one's own abilities. These findings are in line with previous research showing that better self-esteem (i.e., a broad concept including the sub-construct of self-efficacy) and structured style (i.e., planning, organization, and goal-directed behaviour; Schei et al., 2015) predict better psychosocial functioning in individuals with ADHD (Schei et al., 2015, 2018). Both concepts appear to be determinants of resilience (see Ponce-Garcia et al., 2015, for a review).

The integrated cognitive and affective model of ADHD suggests that disrupted self-regulation (i.e., suppression of non-goal-oriented thoughts and behaviours) is a core feature of the disorder (Nigg & Casey, 2005), which has been supported by some subsequent research (Shiels & Hawk, 2010). Executive dysfunction has similarly been included in several models of ADHD (e.g., Barkley, 1997; Halperin & Schulz, 2006;

Sergeant, 2000, 2004; Sonuga-Barke, 2003; Sonuga-Barke et al., 2008), although the extent of executive dysfunction proposed in individuals with ADHD varies within these models. It is unsurprising, then, that adults with ADHD tend to have lower levels of self-efficacy (Newark et al., 2016), likely due to repeated underachievement in childhood and adolescence (Safren, 2006).

The results of the current study suggest that the ability to engage in planning and goal setting (amongst other self-regulatory behaviours) buffers against the negative effects of inattention on social functioning, as does one's level of confidence in one's own ability to set goals and succeed. These protective factors are intrinsically related (i.e., those more able to engage in goal setting are more likely to feel confident in one's ability to set goals). Although individuals with ADHD have been found to have some level of impairment in the area of self-regulation and/or executive functioning, psychological and cognitive interventions for the training and improvement of executive functioning and self-regulation have shown some promise for those with ADHD. Mindfulness meditation training has been one such intervention. Mindfulness meditation has been described as the practice of orienting one's attention to the present moment and approaching the present moment with "curiosity, openness, and acceptance". (Bishop et al., 2004, p. 232). Mindfulness meditation-based training has shown promising results in improving symptoms of ADHD, anxiety, and depression (Cairncross & Miller, 2016; Zylowska et al., 2008), as well as in improving executive functioning, emotional regulation (large effect sizes; Hepark et al., 2019; Mitchell et al., 2017), and quality of life (Hepark et al., 2014). In a recent study, Janssen and colleagues (2020) found that

participants reported significantly reduced ADHD symptoms and a significant improvement in executive functioning after undergoing eight 2.5-hour sessions of mindfulness-based cognitive therapy (with one silent day and at-home practice).

In an especially relevant pilot study, Solanto and Scheres (2020) adapted their CBT program for adults with ADHD to the needs of college students and implemented it as group therapy. The intervention took place across 12 sessions, with three sessions specifically dedicated to teaching executive functioning strategies, including behaviours such as scheduling, prioritizing, and chunking. Two sessions were also dedicated to the identification and challenging of negative and irrational thoughts that may contribute to depression and anxiety. Although the researchers did not find significant changes in depression and anxiety, participants with ADHD showed significant improvement in ADHD symptoms and executive dysfunction after completing the program.

A seven-week, manualized intervention designed specifically for women with ADHD comprised individual one-hour sessions with each participant, and focused on establishing routines and using schedules; organizing physical environments by teaching organizational strategies; providing education on time management, including using timers; helping participants recognize patterns of sensory stimulation in order to avoid sensory overload; and, helping participants develop stress management skills, including taking breaks, doing breathing exercises, and meditation (Gutman et al., 2020). Trained occupational therapists served as the interventionists in this study. Although the intervention directly supports executive functioning, the researchers did not specifically assess levels of executive functioning pre- and post-intervention. However, large effect

sizes were found with regard to level of ADHD symptoms and perceived stress, with the intervention group showing significant decreases as compared to the control group.

Although the aforementioned studies did not measure levels of self-efficacy pre- and post-intervention, individuals receiving general psychotherapy report improved levels of self-efficacy (Bresó et al., 2011; Cusack et al, 2019; Zhang et al., 2017). Other research examining mindfulness-based therapies in adults with ADHD have found that participants report improved levels of self-efficacy alongside reduction of ADHD symptoms (Edel et al., 2017), suggesting that mindfulness-based therapies might be an effective medium by which to promote the protective factors of self-efficacy and self-regulation in all adults, including adults with ADHD. Overall, although psychopharmacology is considered the first-line treatment for individuals with ADHD, the results from the current study suggests that promoting levels of self-regulation and self-efficacy may protect against the negative effect of attention on social functioning in this population, making psychotherapy a viable and important adjunct to psychopharmacological treatment.

The results of the current study should be interpreted within the context of its limitations. Participants for this study largely comprised university students who participated through two psychology department participant pools, reasonably restricting the type of participants included in the study. Furthermore, a large percentage of the sample identified as female. Future studies would benefit from including participants from outside university settings, as well as including diverse participants in order to increase the generalizability of the results.

Future research is necessary to clarify the effect of self-regulatory behaviours and self-efficacy as protective factors. Conducting this research with individuals who have been diagnosed with ADHD would be beneficial to better these protective factors within clinical populations. Furthermore, research examining interventions specific to self-regulation and self-efficacy is needed to understand potential treatment options for individuals with ADHD. Additional research is also needed to better understand the factors that may influence individuals with ADHD to seek treatment, and how those characteristics contribute to treatment outcomes.

Chapter 5

Study III: Factors that moderate the relation between attentional difficulties and legal outcomes in emerging adults

Emerging adulthood is a period of significant development between ages 18-29 (Arnett et al., 2014), and is considered a sensitive transitional period involving uncertainty about the future, increased self-sufficiency, and increased demands on executive functioning (Newcomb-Anjo et al., 2017). Emerging adults typically face a significant increase in expectations related to independent living, the pressure to gain financial independence, and transitions to higher education or entering the workforce. Perhaps due to the pressure of these expectations, delinquency appears to be particularly common in emerging adulthood, with Statistics Canada reporting that emerging adults had the highest rate of criminal behaviour of any age group (Allen, 2014).

Attentional abilities range widely within and across individuals. At the far end of the attention continuum is ADHD, a neurodevelopmental condition characterized by developmentally inappropriate levels of inattention, hyperactivity, and/or impulsivity (APA, 2013). ADHD persists from childhood into adulthood for a significant proportion of individuals (~60%; Sibley at al., 2017). In childhood, ADHD is associated with various comorbid psychiatric conditions (Elia et al., 2008; Gillberg et al., 2004; Yoshimasu et al., 2012), most prominently specific learning disorders (APA, 2013; Reale et al., 2017), as well as 'externalizing disorders' such as oppositional defiant disorder (ODD) and conduct disorder (CD; APA, 2013). Studies of long-term outcomes in adolescents and adults with ADHD have found that they are at higher risk of engaging in

delinquency (Barkley et al., 2004; Langley et al., 2010), likely due to a combination of several factors, including symptoms of impulsivity, fewer social supports (Hoza, 2007), difficulty in school (Watts, 2018), and the possible presence of comorbid conditions (Ayaz et al., 2015; Dalsgaard et al., 2013), as noted above. The pressure of expectations associated with emerging adulthood may leave individuals with ADHD particularly vulnerable to poor outcomes (e.g., Diggs & Neppl, 2018). Thus, an examination of factors that buffer against poor legal outcomes for emerging adults with ADHD is warranted.

Legal Outcomes in Individuals with ADHD

Few long-term, prospective studies have been conducted on legal outcomes for young or emerging adults with ADHD. In their work, Barkley and colleagues (2004) followed a clinical sample of children diagnosed as hyperactive, as well as a neurotypical control group, into emerging adulthood (i.e., all participants between ages 19 to 25 at follow-up). They found that a greater proportion of those with childhood hyperactivity had been arrested for misdemeanours and felonies compared with their neurotypical peers. Furthermore, even after controlling for childhood CD-related symptoms, the number of ADHD symptoms in childhood, the severity of ADHD symptoms in adolescence and ADHD persistence into adulthood predicted lifetime engagement in drug-related criminal activity (Barkley et al., 2004). Research by Satterfield and colleagues reported similar results with a significant proportion of adults (between ages 32 to 42 at follow-up) with a childhood history of hyperactivity and concurrent conduct problems had adult records of being arrested (44%), convicted (29%), and incarcerated

(26%; (Satterfield et al., 2007) However, because these authors did not control for presence of CD symptoms and the research was retrospective, the relation between delinquency and ADHD symptoms alone is unclear. In another longitudinal sample of males with a childhood history of ADHD but not conduct disorder were followed into emerging adulthood (between ages 18 to 25 at follow-up), and were found to have a significantly greater number of arrests, convictions, and incarcerations, compared to neurotypical controls (Mannuzza et al., 2008).

While all of the previously described studies were conducted in the United States, a study conducted in Denmark found that 47% of individuals followed into adulthood (mean age of 31.1 years at follow-up) with a childhood diagnosis of ADHD were convicted of crimes (Dalsgaard et al., 2013). Notably, Dalsgaard and colleagues (2013) accounted for common comorbid conditions (e.g., ODD, CD, and learning disorder), but found that gender was the most important predictor of later criminal convictions, with males with childhood ADHD being more than twice as likely to be convicted compared with females with childhood ADHD. While a childhood history of comorbid ODD was not found to increase the risk of adult involvement in criminal activities, a history of comorbid CD or tic disorder almost doubled the risk (Dalsgaard et al., 2013). Furthermore, Dalsgaard and colleagues (2013) found that individuals diagnosed with ADHD-C were twice as likely to have convictions as compared to those diagnosed with ADHD-PI, even after controlling for a history of comorbid CD.

Overall, the reviewed studies suggest that individuals with a history of childhood ADHD are significantly more likely to be involved in criminal activity, measured by

number of arrests, convictions, and incarcerations, as compared to neurotypical controls. However, the results of one study presented an alternative conclusion. In their study, Sanctis and colleagues (2014) followed individuals with ADHD into adolescence and emerging adulthood (follow-up ages ranging from 15 to 25 years). They found no differences between them and neurotypical controls in number of arrests, convictions, or incarcerations. However, this sample was recruited from much lower socioeconomic status groups (i.e., individuals with ADHD and neurotypical controls were demographically matched), which may have resulted in a higher level of criminal activity in general. The researchers noted that because arrest rates were much higher in their control group than in other studies, an ADHD diagnosis may have a smaller effect in the examination of criminal outcomes in individuals from lower socioeconomic status groups specifically (Sanctis et al., 2014), with the effect of ADHD symptoms perhaps dwarfed by the effects of socioeconomical status and local environment.

Petty crime and delinquency. The current literature suggests that symptoms of ADHD could contribute more to petty, non-violent crime, as well as drug-related crimes (Barkley et al., 2004; Fontaine et al., 2008; Sourander et al., 2006). While some minor delinquent acts are considered transient and somewhat normative during adolescence, a subset of adolescents engage in more persistent delinquency, making them more likely to continue offending into adulthood (Moffitt & Caspi, 2001; van der Put et al., 2016). Moffitt & Caspi (2001) found that ADHD was one of the risk factors for persistent delinquency, along with difficult temperament, poor parenting, and poor neurocognitive performance (on intelligence, memory, language, psychomotor, and achievement tests,

among others). These results were validated by a later meta-analysis (Pratt et al., 2002). As mentioned earlier, these results may be partly due to the high occurrence of comorbidity between ADHD and ODD or CD, and previous work in this area has shown mixed results. In one study, the researchers compared adolescent and young adult males with ADHD, with individuals with both ADHD and ODD, as well as with individuals with both with ADHD and CD. Results showed that all individuals with ADHD (regardless of comorbidity) were at higher risk for delinquency, although those with comorbid CD had the highest level of risk (Sibley et al., 2011). Similarly, recent work found that juvenile offenders with only ADHD were more likely than neurotypical controls (but less likely than those with ADHD+ODD or ADHD+CD) to repeatedly engage in criminal behaviour, perhaps suggesting a more persistent course of delinquency (van der Put et al., 2016). Other work found no relation between ADHD and delinquency after controlling for comorbid externalizing conditions (Mordre et al., 2011; Gudjonsson et al., 2014; Satterfield et al., 2007; Young et al., 2016).

In general, the literature on types of crime conducted by adults with ADHD (without persistent externalizing comorbidity) is sparse, and often dependent on self-report, which has been found to be inconsistent (Sibley et al., 2010). Violent crimes (including murder, sexual crime, and assault) were either not examined or reported at very low frequencies (Dalsgaard et al., 2013; Koisaari et al., 2015; Silva et al., 2014), supporting the idea that symptoms of ADHD are more likely to contribute to minor criminal activity or delinquency (Barkley et al., 2004; Fontaine et al., 2008; Sourander et al., 2006). Mannuzza and colleagues (2008) found that individuals with ADHD reported

more instances of theft than robbery, while Dalsgaard and colleagues (2013) found that they reported more instances of vandalism and fraud than the use of weapons or arson. Both findings similarly support the hypothesis that individuals with ADHD engage in less violent crimes. Critically, although not compared to any other types of criminal activity, Koisaari and colleagues (2015) found that individuals with ADHD reported significantly more instances of drunk driving and other traffic related crimes than reported by neurotypical controls.

Traffic violations. Adults with ADHD have been shown to have difficulty driving due to impaired selective (Dinn et al., 2001), divided (Tucha et al., 2008), and sustained attention (Tucha et al., 2009), as well as due to impaired set-shifting (Rohlf et al., 2012), working memory (Alderson et al., 2013), and planning and problem-solving (Marije Boonstra et al., 2005), among other impairments. Due to these impairments, drivers with ADHD may be more likely to be involved in traffic violations and accidents. Longitudinal research on emerging adults with childhood histories of hyperactivity found that, when compared to the neurotypical controls, they had more hit-and-run collisions, reckless driving citations, and citations for driving without a license (Fischer et al., 2007). More individuals with childhood hyperactivity also had their licenses suspended or revoked and had driven while their licenses were suspended. Recent work by Koisaari and colleagues (2015) had similar results with 23 individuals of their sample of 111 40-year-old adults with ADHD did not have a driver's license, which was a significantly higher number than the four individuals without a driver's license in their control group. Notable, this study did not report why they did not have driver's licenses. Drunk driving

was found to be more common among individuals with ADHD, and they had a higher number of traffic violations in general compared to non-ADHD peers (Koisaari et al., 2015). A qualitative study of 17 emerging adults with ADHD examined driving behaviours using a camera in their cars over the course of three months and found that the group of individuals with ADHD were in eight collisions, as compared to one collision in the neurotypical control group (Merkel et al., 2016). For seven of the eight collisions in the ADHD group, the driver was assessed to be at fault, and three of the drivers were using cell phones at the time of the accident, four drivers were looking away from the road, and "in one case, it was unclear what the driver was doing" (Merkel et al., 2016, p. 263).

While inattentiveness and impairments in executive functioning and/or self-regulation appear to be at the root of driving issues in individuals with ADHD, conduct problems have been found to moderate (i.e., strengthen) the relation between ADHD and risky and alcohol-impaired driving (Thompson et al., 2007). Moreover, the relations between ADHD and emotional dysregulation, antisocial behaviour and aggression, and risk-taking (Pollak et al., 2018) may further contribute to unsafe driving. A meta-analysis by Vaa (2014) debated the increased risk of driving violations in individuals with ADHD but did find an increased relative risk of driving violations in individuals with ADHD and comorbid ODD, compared to individuals with ADHD alone. Nevertheless, findings on the variance contributions of conduct problems on driving with ADHD are currently limited and mixed (Garner et al., 2014).

Personality characteristics. Of the Big Five personality traits (Goldberg, 1993), Nigg and colleagues (2002) found that symptoms of ADHD were related to low levels of conscientiousness and agreeableness, and high levels of neuroticism, in young adults with ADHD (both in and outside of university), as well as in parents of individuals with ADHD. These findings were supported by subsequent work by Parker and colleagues (2004), who found that ADHD symptoms were associated most strongly with low levels of conscientiousness and agreeableness, with the inattention facet of ADHD particularly associated with low levels of conscientiousness and extraversion. More recent research replicated these findings using structural equation modeling, reporting that the inattention facet of ADHD was associated with higher levels of neuroticism and lower levels of conscientiousness (Knouse et al., 2013). Van Dijk and colleagues' (2017) research similarly showed that participants with ADHD had significantly higher levels of neuroticism and lower levels of agreeableness, conscientiousness, and extraversion than neurotypical controls. Overall, based on the extant literature, symptoms of ADHD appear to be at least positively associated with levels of neuroticism and negatively associated with levels of agreeableness and conscientiousness, with the potential existence of more complex interplay between ADHD symptoms and personality characteristics.

Research specifically investigating the potentially mediating and/or moderating effects of personality traits in the relation between ADHD and delinquency has been minimal. In a study examining male prison inmates (i.e., a significantly more functionally impaired population than will be examined in the proposed study), Retz and colleagues (2004) found that symptoms of ADHD were associated with higher levels of neuroticism

and lower levels of agreeableness and consciousness. (Gudjonsson et al., 2009), again examining prison inmates, found a negative association between current ADHD symptoms and extraversion. Neither study included personality characteristics as moderators or mediators in their analyses.

Protective factors

In risk-resiliency research, individual and/or environmental characteristics that buffer against adversity for individuals at high levels of risk (such as that conferred by ADHD), and contribute to adaptive behaviour, are known as *protective factors*. The extant literature indicates that emerging adults with ADHD may be more prone to engaging in delinquency, including traffic violations. Due to the frequent comorbidity of ADHD with conduct-related problems, including CD and ODD, it is not yet clear how much risk is conferred from symptoms of ADHD versus that from the conduct-related problems. Furthermore, levels of personality traits such as neuroticism, agreeableness, and conscientiousness may play a significant role in moderating the relation between ADHD symptoms and delinquency. Unfortunately, little research has specifically examined delinquency in emerging adults with ADHD, including the use of protective factors as moderator variables.

Conscientiousness and agreeableness. Research on children engaging in aggressive behaviour has found that a personality profile comprised of high novelty-seeking, low reward dependence, and symptom persistence confers the highest risk for the development of conduct-related problems in children with ADHD (Kerekes et al., 2017). Alternatively, Kerekes and colleagues (2017) found that conduct-related scores

and on the above personality profile were negatively associated with levels of self-directedness and cooperativeness, which appear to map onto the Big Five personality traits of conscientiousness and agreeableness. The researchers suggest that high levels of self-directedness and cooperativeness can serve as a protective factor against antisocial behaviour, with level of self-directedness being the most important buffer against aggressive behaviour. Although this study was conducted with children, given that research has shown that cooperativeness can protect against recurrent criminal behaviour (Falk et al., 2017), it is possible that the personality profile of high levels of conscientiousness and agreeableness could serve as a protective factor and moderate the relation between ADHD and delinquency in emerging adults.

Wellness practices. The association between physical exercise and reduced symptoms of ADHD has been well established in children, adolescents, and young adults with ADHD (Archer & Kostrzewa, 2012; Benzing & Schmidt, 2017; Cerrillo-Urbina et al., 2015; Neudecker et al., 2015; Pindus et al., 2016; Pontifex et al., 2013; Verburgh et al., 2014; Vysniauske et al., 2016). To my knowledge, there are no studies that have directly investigated the presences of a relation between physical exercise and delinquent behaviour in individuals with ADHD. Similarly, the role of a 'healthy diet' in protecting against delinquency in individuals with ADHD symptoms has never been investigated. At present, the strongest effects of nutrition on ADHD symptoms have been related to omega-3 fatty acids, with supplementation of omega-3 fatty acids showing significant reduction in symptoms for children and adolescents with ADHD (Guney et al., 2015; Puri & Martins, 2014; Widenhorn-Müller et al., 2014). Recent work on supplementation with

micronutrients has also shown promise in the reduction of ADHD symptoms in children and adults, with medium-to-large effect sizes (Gordon et al., 2015; Rucklidge et al., 2014). Still, these factors have not been examined within the context of delinquency and poor outcomes of ADHD in university students.

Mindfulness has been operationalized as comprising two main components: self-regulation of attention, related to attending to one's own thoughts, feelings, and sensations; and, orientation to experience, related to maintaining an open curiosity, without judgement, about where one's thoughts go (Bishop et al., 2004). Based on the idea that mindfulness is a practiced state of self-regulated attention, mindfulness-based interventions (MBI) are being investigated as an 'alternative' treatment for ADHD. Several studies have shown that MBI result in post-treatment decreases in ADHD symptoms in children (van der Oord et al., 2012), adolescents (Haydicky et al., 2015; van de Weijer-Bergsma et al., 2012), and adults (Cairncross & Miller, 2016; Mitchell et al., 2017; Schoenberg et al., 2013; Hepark et al., 2019), with small-to-medium effect sizes. Despite the growing body of evidence indicating that MBI can help reduce symptoms of ADHD across the lifespan, no studies have directly examined the relation between ADHD symptoms and delinquency, with mindfulness as a moderator. In a very small study, mindfulness training (for both adolescents and their parents) was found to be effective in the reduction of externalizing symptoms in two adolescents with ADHD; however, moderation analyses were not conducted (Bögels et al., 2008).

There have been no studies directly examining the relation between ADHD symptoms and delinquent acts, when including the above-mentioned wellness practices

as moderators. In general, the extant literature suggests that wellness practices related to exercise, diet, and mindfulness, may serve to improve symptoms of ADHD overall, which may allow them to function as protective against delinquency in emerging adulthood. Thus, an exploration of these factors as moderators is warranted.

Study Aims and Hypotheses

The aim of the current study is to investigate protective factors that moderate the relation between attentional abilities and unlawful activity in emerging adults attending university. Based on the extant literature on individuals of all ages with ADHD, I hypothesize:

Hypothesis 1. There will be a positive relation between level of inattention and level of engagement in unlawful activity.

Hypothesis 2. Increased levels of agreeableness and conscientiousness will moderate (weaken) the relation between level of inattention and level of engagement in unlawful activity.

Hypothesis 3. The use of wellness practices will moderate (weaken) the relation between level of inattention and level of engagement in unlawful activity.

Methods

Participants

See Chapter 2 for a detailed description of participants recruited for this study.

Table 11

Demographic characteristics of included participants

	Outliers excluded		Outliers included	
Characteristic	*n*	%	*n*	%
School				
UWindsor	170	55.7	179	56.3
Ryerson U	135	44.3	139	43.7
Gender				
Female	249	81.6	259	81.4
Male	53	17.4	56	17.6
Non-binary/Trans/Other	3	1	3	1
Ethnicity				
White	110	36.4	116	36.9
Hispanic or Latinx	8	2.6	8	2.5
Black	35	11.6	37	11.8
Asian or Pacific Islander	40	13.2	40	12.7
South Asian	48	15.9	50	15.9
Arab/Middle Eastern	47	15.6	48	15.3
Mixed	12	4	13	4.1
Other	2	.7	2	.6
Marital Status				
Single	197	64.8	207	65.3
In a relationship (non-cohabitating)	99	32.6	102	32.2
Married / civil union / cohabitating	8	2.6	8	2.5
Employment Status				
Full-time	14	4.6	15	4.7
Part-time	205	67.2	210	66
Not currently working or volunteering	86	28.2	93	29.2
Year of Study				
1	117	38.5	123	38.8
2	58	19.1	60	18.9
3	75	24.7	76	24
4	42	13.8	43	13.6
5 or beyond	12	3.9	15	4.7

Overall GPA				
<60%	4	1.8	4	1.7
60-69%	35	15.7	36	15.5
70-79%	99	44.4	104	44.8
≥80%	85	38.1	88	37.9
Academic accommodations				
Yes	22	7.3	23	7.3
No	279	92.4	291	92.4
Prefer not to say	1	.3	1	.3
Previous diagnosis of ADHD				
Yes	14	4.6	16	5.1
No	288	95.4	298	94.6
Prefer not to say	0	0	1	.3
Met diagnostic criteria for ADHD according to BAARS-IV				
Yes	31	10.2	37	11.6
No	274	89.8	281	88.4

Measures

The following measures were administered to participants to test the hypotheses in this particular study. Please see Chapter 2 for detailed descriptions of the measures.

- Demographics questionnaire
- Barkley Adult ADHD Rating Scale – IV (BAARS-IV; Barkley, 2011a)
- Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995)
- Scale of Protective Factors (SPF-24; Ponce-Garcia et al., 2015)
- Simple Lifestyle Indicator Questionnaire (SLIQ; Godwin et al., 2008)
- Big Five Inventory (BFI; John et al., 1991; John et al., 2008)
- General Crime Scale (Evans et al., 1997)

Table 12

Variable characteristics

	Outliers Excluded		Outliers Included		
Measure	Mean (SD)	Range	Mean (SD)	Range	Clinical cut-off
BAARS-IV Inattention Total	17.32 (5.4)	9 – 35	17.53 (5.6)	9 – 35	N/A
BAARS-IV Inattention Symptom Count Percentile	75.4 (31.4)	1 – 99	76.1 (31)	1 – 99	≤93
DASS Depression Total	10.70 (9.7)	0 – 42	11.20 (10.1)	0 – 42	≤14
SPF-24 Total	122.6 (20)	67 – 166	121.32 (21.3)	46 – 166	N/A
Student Support	31.02 (6.8)	8 – 42	30.7 (7.1)	8 – 42	N/A
Social Skills	29.9 (7.54)	7 – 42	29.80 (7.9)	7 – 42	N/A
Prioritizing & Planning Behaviour	30.66 (6.8)	11 – 43	30.3 (7.1)	6 – 43	N/A
Goal Efficacy	30.97 (6.4)	10 – 42	30.54 (6.9)	3 – 42	N/A
GCS	23.2 (16.3)	0 – 86	24.52 (19.5)	0 – 145	N/A
BFI Agreeableness	3.93 (.6)	2.11 – 5	3.91 (.61)	1.89 – 5	N/A
BFI Conscientiousness	3.50 (.63)	1.78 – 4.78	3.43 (.64)	1.33 – 4.78	N/A
SLIQ Total	7.14 (1.5)	3 – 10	7.08 (1.56)	2 – 10	N/A

Note. BAARS-IV = Barkley Adult ADHD Rating Scale, Fourth Edition; DASS = Depression Anxiety Stress Scales; SPF-24 = Scale of Protective Factors; GCS = General Crime Scale; BFI = Big Five Inventory; SLIQ = Simple Lifestyle Indicator Questionnaire.

Procedures

See Chapter 2 for detailed procedures.

Results

Data Cleaning. Eleven individuals were above the age of 25, and one individual did not report their age. These 12 cases were excluded from analyses. From the remaining subset, 12 univariate outliers and one additional multivariate outlier ($p < 0.001$) were identified. Individuals more involved in criminal behaviour might be outliers when examined within a typical university student population. In order to best understand those with higher levels of reported delinquency, data was analyzed twice, first excluding the outliers and then including the outliers, resulting in sample sizes of 305 and 318, respectively. Twenty-one cases were found to have missing data (less than 5% of the total data), which were a result of item non-response, wherein the participant did not provide information for some items. Most missing data (14 data points) related to a question about engaging in mindfulness meditation. Data was found to be missing completely at random, χ^2 (21)=17.82, $p > .05$. Item-mean substitution was used to replacing the missing data.

Assumptions Testing. Examining P-P plots revealed that the assumption of normality of residuals was violated. Upon excluding 13 outliers (12 univariate and one multivariate) from analysis, the model revealed adequate normality of residuals. All other assumptions for multiple regression were met (see Chapter 2 for a detailed description of assumption testing).

Main analyses with outliers excluded. In order to examine the effects of the hypothesized protective factors, multiple regression analysis was conducted, with level of criminal involvement serving as the dependent variable. Symptoms of depression,

anxiety, and stress were included in the first block in the model as control variables. Inattention was entered as a predictor into the second block, while the SLIQ subscale scores, trait agreeableness, and trait conscientiousness were entered as predictors in the third block. Finally, the fourth block contained the interaction terms between inattention and the predictors in the third block. The regression model including all predictors and interaction terms was statistically significant, with inattention emerging as a significant predictor of level of involvement in criminal activity. The interaction between inattention and exercise was also significant, while *smoking*, *alcohol use*, and *mindfulness meditation* all emerged as independent predictors (see Table 13). Depression symptoms significantly predicted criminal involvement only prior to the inclusion of inattention. A second regression model with only significant predictors included was statistically significant, $F(6,279) = 26.07$, $p<.001$, with an R^2 of 36% and an adjusted R^2 of 35%, considered a large effect size (Cohen, 1992). Inattention remained significant even after the inclusion of the aforementioned SLIQ subscales, suggesting either partial mediation or that the behaviours assessed by the subscales are independent predictors of criminal activity. The interaction between inattention was no longer significant after other non-significant predictors were dropped from the model, suggesting a possible suppressor effect, wherein the two subscale variables predict more variance within each other than in the relation between inattention and criminal involvement. The final model with only significant predictors included was statistically significant, $F(4,300) = 37.94$, $p<.001$, with an R^2 of 34% and an adjusted R^2 of 33%, considered a large effect size (Cohen, 1992).

Table 13

Multiple Regression Analysis for Predicting Criminal Activity: Outliers Excluded

	Model 1			Model 2		
Variable	B	SE (B)	β	B	SE (B)	β
Inattention	1.092	.160	.366**	.765	.145	.256**
Mindfulness Meditation				2.462	1.211	.096*
Alcohol use				1.63	.270	.290**
Smoking				8.745	1.44	.30**

*$p < .05$. **$p < .01$.

Post-hoc analyses with outliers excluded. In order to explore possible mediation effects, Hayes' (2018) PROCESS macro for SPSS was used to conduct separate regression analyses to test the potential mediators. This macro allows SPSS to test multiple predictors simultaneously and generates bootstrapped 95% confidence intervals for the indirect effects, allowing for a more robust estimate of effect. Indirect effects are considered significant if the bootstrapped lower limit and upper limit confidence intervals do not include '0'. Model 4 was used for this analysis.

The BAARS-IV inattention score was entered as the predictor variable, while the GCS total score (i.e., level of criminal involvement) was entered as the outcome variable. Based on the main analyses, symptoms of depression were not included as a covariate. The three significant factors reflecting smoking, alcohol use, and mindfulness meditation were entered as mediators. The regression model was statistically significant, $F(4,300) = 37.94$, $p<.001$, with an R^2 of 34% (large effect size; Cohen, 1992). Mindfulness meditation did not emerge as a significant mediator in the relation between inattention and level of criminal involvement. Alcohol use ($B = .109$, SE = .063, CI [.01, .26]) and

smoking (*B* = .213, SE = .084, CI [.066, .40]) both emerged as significant risk factors, with higher alcohol use and smoking predicting a higher level of criminal involvement than would be the case with inattention alone. No stable protective factors emerged for the relation between inattention and criminal involvement.

Main analyses with outliers included. The previously reported multiple regression analysis was repeated but with all outliers included. Level of criminal involvement served as the dependent variable. As before, symptoms of depression, anxiety, and stress were included in the first block in the model as control variables. Inattention was entered as a predictor into the second block, while the SLIQ subscale scores, trait agreeableness, and trait conscientiousness were entered as predictors in the third block. Finally, the fourth block contained the interaction terms between inattention and the predictors in the third block. The regression model including all predictors and interaction terms was statistically significant, as was the interaction of inattention and agreeableness, the interaction of inattention and exercise, and the interaction of inattention and the SLIQ total score (i.e., general level of engagement in wellness practices). This suggests that these factors may moderate the relation between inattention and criminal involvement. Exercise, alcohol use, smoking, and mindfulness meditation were also significant as independent predictors. Both inattention and depression symptoms were no longer significant upon the inclusion of the interaction terms. Upon running the regression analysis with only significant predictors, the SLIQ total score was no longer significant as an independent predictor, although it remained significant as an interaction. Upon removal of the SLIQ total score as an independent predictor, exercise

as an independent predictor was no longer significant, suggesting that exercise was independently predicting the SLIQ total score rather than mediating the relation between inattention and involvement in criminal activity. The final model with only significant predictors included was statistically significant, $F(7,314) = 34.98$, $p<.001$, with an R^2 of 45% and an adjusted R^2 of 43%, considered a large effect size (Cohen, 1992). Upon removing all other non-significant variables, inattention, mindfulness meditation, alcohol use, and smoking all remained significant independent predictors, while the interaction terms between inattention and exercise, the SLIQ total score, and agreeableness remained significant moderators (see Table 14). The interaction terms accounted for a significant proportion of the variance, $\Delta R^2 = .062$, $\Delta F(3, 307) = 11.42$, $p < .001$.

Table 14

Multiple Regression Analysis for Predicting Criminal Activity: Outliers Included

	Model 1			Model 2			Model 3		
Variable	B	SE (B)	β	B	SE (B)	β	B	SE (B)	β
Inattention	1.35	.184	.382**	.940	.163	.267**	.844	.157	.240**
Mindfulness meditation				3.901	1.41	.124**	4.34	1.35	.138**
Alcohol use				2.10	.299	.324**	1.78	.291	.273**
Smoking				10.0	1.64	.286**	9.4	1.64	.270**
Inattention x exercise							.175	.034	.279**
Inattention x SLIQ total							-.452	.106	-.240**
Inattention x agreeableness							-.844	.285	-.131**

*$p < .05$. **$p < .01$.

Post-hoc analyses with outliers included. Hayes' (2018) PROCESS macro for SPSS was used again to explore and test the mediation and moderator effects. Model 4 was used for the mediation analyses, while Model 1 was used for the moderator analyses.

The BAARS-IV inattention score was entered as the predictor variable, while the GCS total score (i.e., level of criminal involvement) was entered as the outcome variable. Depression symptoms were not included as a covariate as it was not a significant predictor in the main analyses. The mediation analyses were conducted first. The three significant factors reflecting smoking, alcohol use, and mindfulness meditation were entered as mediators. The regression model was statistically significant, $F(4,313) = 46.25$, $p<.001$, with an R^2 of 37% (large effect size; Cohen, 1992). As with outliers excluded, mindfulness meditation did not emerge as a significant mediator in the relation between inattention and level of criminal involvement. Alcohol use ($B = .15$, SE = .092, CI [.017, .375]) and smoking ($B = .232$, SE = .085, CI [.080, .413]) again emerged as significant risk factors, with higher alcohol use and smoking predicting a higher level of criminal involvement than would be the case with inattention alone.

Three separate moderation analyses were conducted. The BAARS-IV inattention score was entered as the predictor variable, while the GCS total score was entered as the outcome variable. Exercise, the SLIQ total score, and trait agreeableness were entered separately as moderators. Exercise did not emerge as a significant moderator, but both the SLIQ total score ($B = -.303$, SE = .100, CI [-.499, -.106]) and trait agreeableness ($B = -.884$, SE = .326, CI [-1.53, -.242]) interaction terms emerged as moderators and

significant protective factors in the relation between inattention and criminal involvement.

Figure 6

The Interactive Effects of Inattention and Overall Wellness Practice on Criminal Involvement

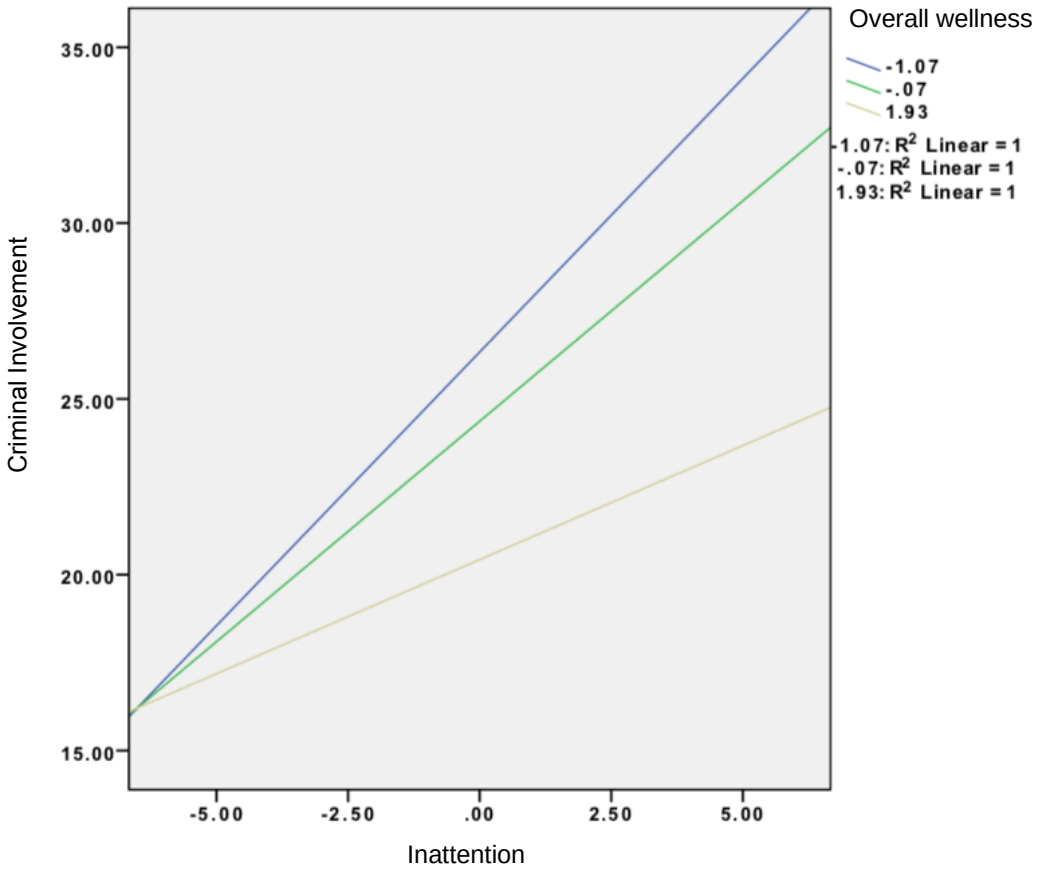
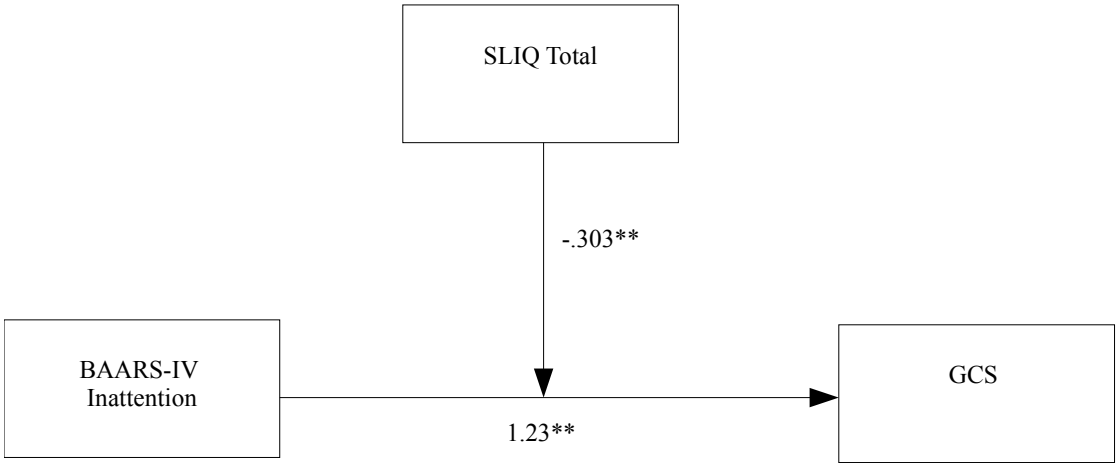


Figure 7

The Effect of Inattention on Criminal Involvement with Overall Wellness Practice as a Moderator



*$^{*}p < .05$. $^{**}p < .01$.

Figure 8

The Interactive Effects of Inattention and Agreeableness on Criminal Involvement

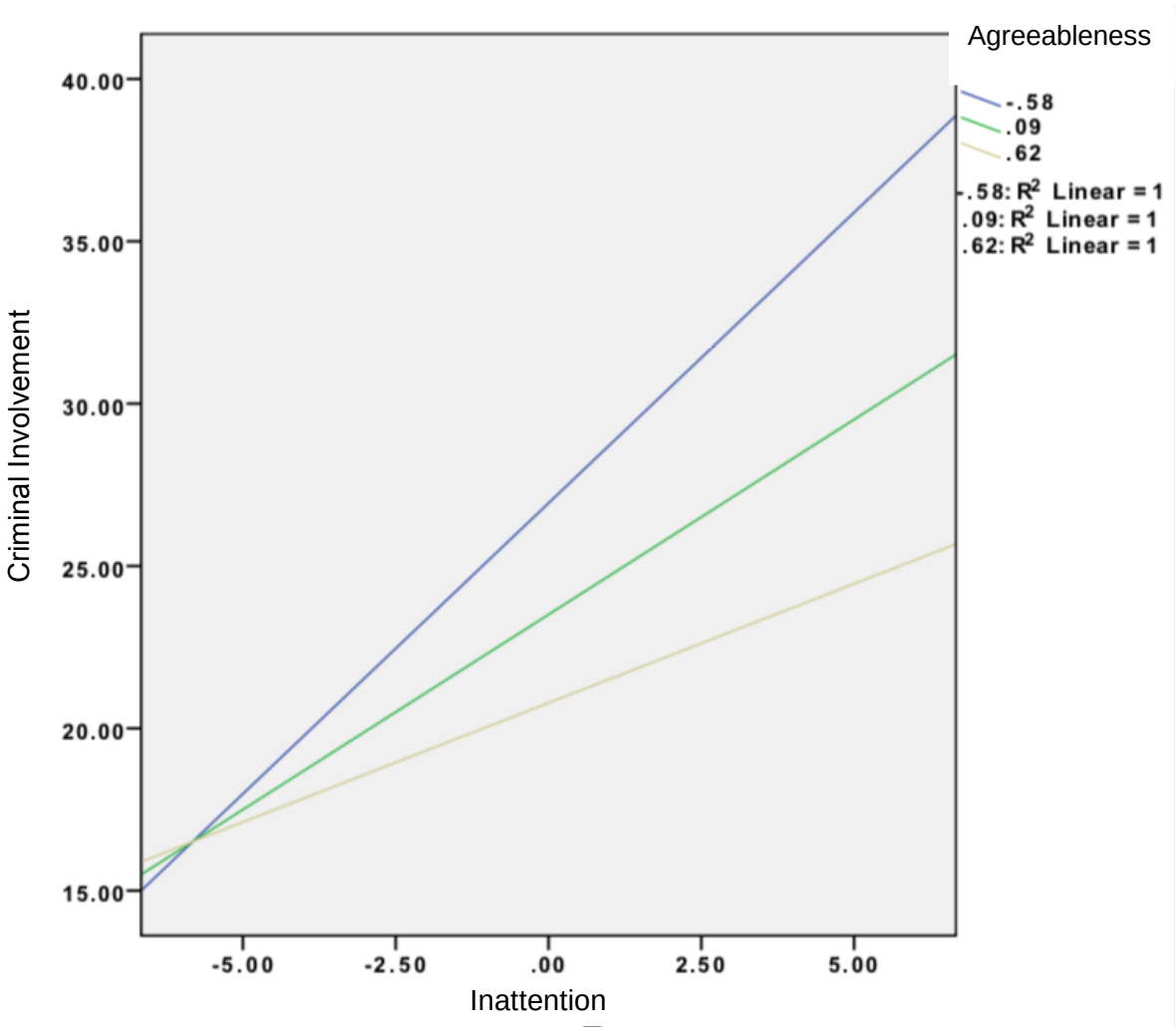
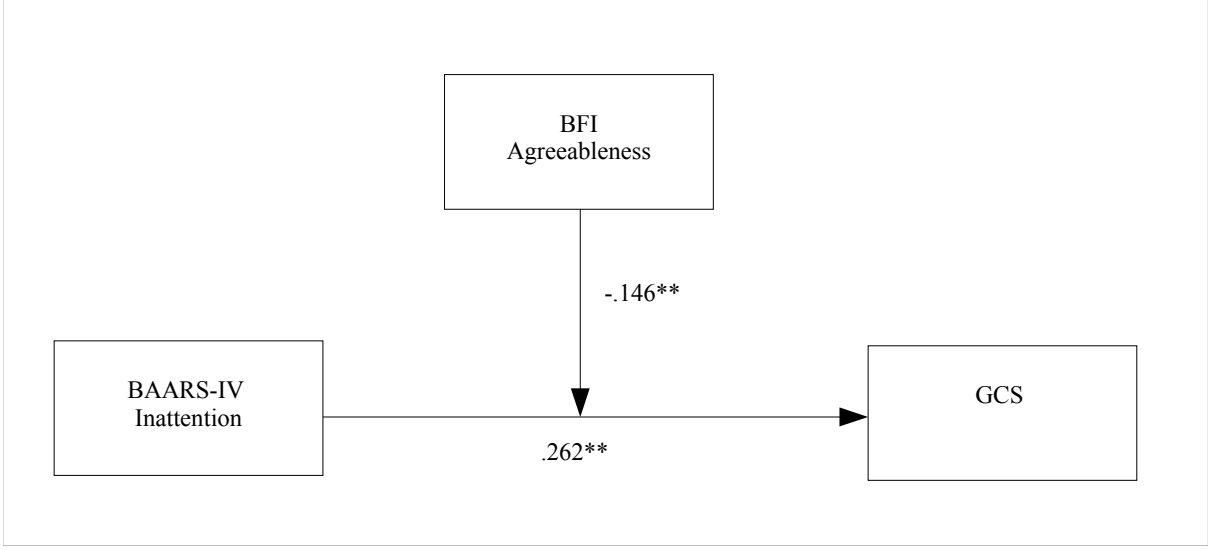


Figure 9

The Effect of Inattention on Criminal Involvement with Agreeableness as a Moderator



$*p < .05$. $**p < .01$.

Discussion

This is the first study to examine level of inattention in the context of level of criminal involvement or delinquency in university students, and to explore potential protective factors within this relation. Because individuals with higher levels of criminal involvement might be data outliers as compared to the general population and exclusion of their data may have resulted in a restricted range (Goodwin & Leech, 2006), data was analyzed separately with outliers included and excluded. According to Hypothesis 1, it was expected that greater difficulties with inattention would be related to greater involvement in criminal activity. This hypothesis was supported in both analyses.

With the second hypothesis, I expected that higher levels of agreeableness and conscientiousness would weaken the association between inattention and level of criminal involvement. This hypothesis was not supported with outliers excluded, but it was partially supported with outliers included: higher levels of agreeableness alone buffered against criminal involvement for individuals with higher levels of inattention.

Finally, with the third hypothesis, I expected that the use of wellness practices would weaken the association between inattention and level of criminal involvement. Again, this hypothesis was not supported with outliers excluded, but was partially supported with outliers included. Although none of the specific wellness practices examined (e.g., mindfulness meditation, exercise, diet, etc.) served as protective factors in the relation between inattention and criminal involvement, an overall score relating to engagement in wellness practices protected against criminal involvement for individuals with higher levels of inattention. Although not specifically hypothesized, with outliers excluded and included, smoking and alcohol use emerged as significant risk factors for individuals at any level of inattentiveness, with regard to criminal involvement.

These findings suggest that there is likely a complex interplay of factors in promoting both risk and resilience in individuals with inattention, especially in the context of their involvement in criminal activity. Consistent with previous research (Kerekes et al., 2017), trait agreeableness was found to buffer against criminal involvement in the current study, albeit differentially with individuals with higher levels of inattention, suggesting that agreeableness may protect against delinquency in those with ADHD. This finding extends previous research on delinquency to emerging adults

with inattention. Agreeableness comprises several facets, including straightforwardness, altruism, compliance, and tender-mindedness (John & Srivastava, 1999), and has been found to have a negative association with symptoms of ADHD (Gomez & Corr, 2014; Miller et al., 2008; Stanton & Watson, 2016).

Although personality traits have been historically regarded as generally stable (Cobb-Clark & Schurer, 2012; Debast et al., 2014), the majority of research in this area has found that certain personality characteristics are susceptible to change throughout a person's lifetime, especially if the traits are adaptive (see Debast et al., 2014, for a review). For example, longitudinal research has shown that trait agreeableness increases with age (Allemand et al., 2008; Lucas & Donnellan, 2011). Promisingly, personality traits appear to be amenable to change through certain interventions. Krasner and colleagues (2009) investigated a psychoeducation and mindfulness-based intervention with primary care physicians, involving mindfulness meditation, didactic material, and self-awareness exercises (comprising the use of journaling and narrative storytelling) and found that it resulted in improved levels of conscientiousness, agreeableness, empathy, and emotional stability. In another study, older adults who went through a cognitive intervention involving 16 weeks of crosswords and Sudoku puzzles showed an increased level of openness to experience at the end of the intervention (Jackson et al., 2012). A more recent meta-analysis of interventions targeting personality traits showed that psychological interventions, regardless of the type of therapy, are largely associated with changes in personality traits (Roberts et al., 2017).

Generally, ADHD has been associated with lower levels of agreeableness (Gomez & Corr, 2014; Miller et al., 2008; Stanton & Watson, 2016). However, if personality traits are amenable to change as previous research suggests, it may be possible to foster agreeableness as a trait in individuals with ADHD or subclinical ADHD through psychosocial intervention (including psychotherapy, and mindfulness- and cognitive-based interventions). Psychological interventions for ADHD tend to comprise cognitive-behavioural therapy, executive functioning training, and/or mindfulness meditation. To my knowledge, no research has yet been published on interventions specifically for personality traits in adults with ADHD.

While previous research found that self-directedness, perhaps representative of conscientiousness, was the most important buffer against aggressive behaviour (Kerekes et al., 2017), the current study did not find any buffering effect of trait conscientiousness against criminal involvement. In part, this may be because our general sample of university students who opted to participate in a study was likely to have lower levels of aggression, and because individuals are less likely to report aggressive and delinquent behaviour in general due to social desirability (Kämpfe et al., 2009). Social desirability response tendencies might also relate to a lower tendency towards active delinquency; in fact, individuals more involved with criminal activity may have lower social desirability bias on questionnaires due to a disregard for social conventions (Verschuere et al., 2014). It is possible, also, that the BFI conscientiousness score does not adequately represent self-directedness. While conscientiousness is a broader construct that may include self-directedness, it also includes facets such as competence, order, dutifulness, deliberation,

and self-discipline (John & Srivastava, 1999). Thus, it is possible that a protective effect may have emerged had self-directedness been measured more specifically.

While overall engagement in wellness practices moderated the relation between inattention and criminal involvement, that no specific wellness practice emerged as a protective factor suggests that overall engagement in wellness practices may relate to a different factor altogether that was not examined in this study. That is, while the overall score protects against involvement in criminal activity, the 'active ingredient' of this process is not yet clear. The SLIQ overall score comprised scores on questions related to diet, exercise, smoking, alcohol use, and level of everyday stress. While smoking and alcohol use emerged as risk factors, diet and exercise did not emerge as protective factors. Thus, it is possible that a particular pattern of wellness practices protects against delinquency; that is, better diet and exercise must co-exist with low levels of smoking, alcohol use, and everyday stress in order to serve as protective factors. This suggests that high levels of smoking and alcohol use may confer such a high level of risk that protective factors in the form of healthy diet and exercise cannot sufficiently buffer against them and inattention at once. Alternatively, individuals with healthy eating and exercise behaviours may be less likely to smoke or use alcohol at higher levels, making it difficult to parse out the individual contributions of healthy eating and exercise. Finally, it is also possible that an increased overall score additionally relates to a sixth factor that is not directly measured through the questionnaire. That factor may be a variable that promotes the general development of or continued engagement in wellness practices and may drive the protective element of the overall score.

There are several constructs that may serve as this potential 'sixth factor'. Although this research has not been conducted in individuals with ADHD or inattention, previous work has investigated factors that may promote engagement in wellness practices, such as limiting dietary fat intake and exercise. Potential factors include one's ability to cope with stressors, self-efficacy, social support, and accessibility (to resources to manage stress, to exercise equipment, to healthy foods, etc.), among others (Chang et al., 2008). In one study, young mothers with obesity benefited from an intervention involving repeated education about stress management, exercise, and healthy eating (Chang et al., 2017), suggesting that education may be an additional factor. Socioeconomic status has been proposed to be a higher-order factor in predicting health-related behaviours (Wang & Chen, 2012), which might be mediated by education.

Although examining factors that may predict engagement in wellness practices was beyond the scope of the current study, the extant literature suggests that healthy eating and exercise can be promoted through education, and results from the current study suggests that promoting engagement in these wellness practices may protect against engaging in criminal activities for this population. While psychopharmacology is considered the first-line treatment for individuals with ADHD, results suggest that psychotherapy, including education on wellness practices, may be an important component of treatment that may help to protect against delinquency.

The results of the current study should be interpreted within the context of its limitations. Participants for this study largely comprised university students who participated through psychology department participant pools in two universities,

reasonably restricting the type of participants included in the study. They were unlikely to be very low in socioeconomic status or level of education, and they were unlikely to have very high criminal involvement. A large percentage of the sample identified as female, further restricting the sample. Future studies would benefit from including participants from outside university settings, as well as including diverse participants in order to increase the generalizability of the results.

In order to better understand the relation between delinquency and ADHD, as well as any risk or protective factors, future research may benefit from recruiting participants from correctional facilities. Furthermore, conducting this research with individuals who have been diagnosed with ADHD (or are diagnosed within the context of the study) may serve to clarify the relation between ADHD and delinquency. As previous research suggested self-directedness as a potential protective factor, examining this construct more specifically may be able to clarify its involvement in the relation between ADHD and delinquency. Finally, clinical practice may benefit from the development of interventions specific to promoting levels of agreeableness and engagement in wellness factors. Developing these interventions and assessing their effectiveness is needed to fully understand potential treatment options for individuals with ADHD, especially as it may serve to lower rates of crime.

Chapter 6

General Discussion

The literature on attentional abilities and ADHD comprises decades of research on risk factors for negative outcomes across lifespan. Most of this work has focused on individuals with a diagnosis of ADHD, but there are a growing number of studies examining subclinical ADHD and those with suboptimal attention levels. Comparatively, there has been much less research done with protective factors in individuals with ADHD, and even lesser on individuals across the spectrum of attentional abilities. In part, this may be due to the salience of the risk factors associated with ADHD, which have monumental effects on long-term outcomes for individuals with ADHD (Roberts et al., 2015). Although the literature in this area is minimal, especially with adults, previous work on protective factors in the context of ADHD has found that higher levels of self-esteem in adolescents with ADHD predicted better psychosocial functioning and fewer depressive disorders three years later (Schei et al., 2018). Additionally, better organizational skills in college students with ADHD predicted better academic functioning and lower levels of overall impairment (Schei et al., 2015), as well as better long-term psychosocial functioning (Schei et al., 2018). Previous research with adolescent females with ADHD found that higher levels of social competence buffered against symptoms of depression (Mikami & Hinshaw, 2006). Similarly, social acceptance was previously identified as a protective factor for adolescents with ADHD (Dvorsky et al., 2016).

In order to understand the spectrum of attentional abilities and the progression of more limited attention, such as ADHD, an examination of factors that are especially likely to buffer against its inherent risk is necessary. Furthermore, research about protective factors provides the opportunity to develop or alter interventions that may help to prevent poorer outcomes in this population. Based on a desire to promote wellness and resilience in emerging adults with more limited attentional abilities, as well as to work towards a more complete understanding of ADHD as a disorder, I chose to study the potentially protective contributions of self-esteem and self-efficacy, social acceptance and social skills, wellness practices, and personality factors within the relations between attentional abilities and negative outcomes.

The current studies investigated (1) the academic, social, and legal outcomes associated with inattention-type symptoms in emerging adulthood, and (2) factors that may buffer against any negative effects conferred by limited attentional abilities. The goal of the first study was to examine the relation between attentional abilities and academic functioning, as well as the potential protective effects of social acceptance, the use of student support services, and engagement in wellness practices. The goal of the second study was to examine the relation between attentional abilities and social functioning, as well as the potential protective effects of self-esteem and self-efficacy, structured style, and emotional stability. Finally, the goal of the third study was to examine the relation between attentional abilities and legal outcomes, as well as the potential protective effects of conscientiousness, agreeableness, and engagement in wellness practices.

Thematic Results

Outcomes related to inattention. Some previous work has suggested that adults with ADHD are likely to have poorer outcomes with regard to academic achievement in post-secondary education (Advokat et al., 2011; Blase et al., 2009; Gropper & Tannock, 2009), likely due to reported difficulties with organization, planning, cognitive flexibility, time management, and working memory (Barkley & Murphy, 2011; Reaser et al., 2007). Similarly, adults with ADHD have been found to have impairments in social functioning relative to their neurotypical peers (Michielsen et al., 2015; Sacchetti & Lefler, 2017). This may be particularly evident during emerging adulthood, when attentional difficulties may be exacerbated with increased demands of higher education (Ryan et al., 2016) and perhaps with the increased pressure of independence. Adults with symptoms of ADHD have been found to have poorer relationship quality and fewer close friends (Fischer & Barkley, 2006), as well as difficulty with intimate partner relationships (Moyá et al., 2014), although these outcomes seem to be related directly to hyperactivity-related symptoms. Finally, there is some disagreement in the literature on criminal outcomes, with some studies suggesting that adults with ADHD have poorer outcomes with petty crime and delinquency (Sibley et al., 2011), but other research found no such relation (Mordre et al., 2011; Gudjonsson et al., 2014). Compared to research on academic achievement, research on social and legal outcomes for adults with ADHD has been limited, and the current investigation aimed to clarify the relations between more limited attentional abilities and all three outcomes. Consistent with hypotheses for all three studies, higher levels of inattention predicted poorer academic achievement, more

difficulty with social functioning, and greater criminal involvement. These findings provided the basis for the examination of protective factors within the context of ADHD.

Depression as a risk factor for ADHD symptoms and poor outcomes. Emerging adults and university students with ADHD are more likely to report depression symptoms alongside symptoms related to inattention (Abecassis et al., 2017; Rabiner et al., 2008), and it has been suggested that ADHD and depressive disorders may have shared endophenotypes (Meinzer et al., 2012; Wei et al., 2019). In the present investigation, depression symptoms emerged as a significant risk factor for inattention and for poor outcomes in academic achievement and social functioning. Due to the shared variance between both clusters of symptoms, it may not be possible to entirely separate their contributions towards academic achievement or social functioning. Nevertheless, it is evident that symptoms of depression and inattention-type symptoms together promote worse outcomes in academic achievement and social functioning. Results suggest that individuals with more limited attentional abilities should be closely monitored for the presence or development of depressive symptoms, and that symptoms of depression should be treated whether or not the individual chooses to treat any attentional difficulties.

Factors that protect against poor academic achievement. Because not all university students with ADHD are unsuccessful (e.g., Sparks et al., 2004), previous research has suggested that there may be other factors that buffer or protect against poor academic outcomes. In general, previous work on protective factors for academic achievement in adulthood has been limited. Research with adolescents suggests that

better social skills and greater social acceptance could protect against poorer academic outcomes for those with ADHD (Dvorsky et al., 2016). Emerging adults attending post-secondary education have been found to have better academic outcomes with stronger organizational skills despite having ADHD (Dvorsky & Langberg, 2014), and may benefit from organizational coaching provided by university accessibility services (DuPaul et al., 2017). While there is evidence to suggest that exercise may contribute to promoting better academic outcomes in individuals with ADHD (Pontifex et al., 2013), research on diet and mindfulness meditation practice has largely focused on reduction of ADHD symptoms without examining academic outcomes. In the current study, although all of the aforementioned factors were hypothesized as potential protective factors, only goal efficacy (a sub-construct of self-efficacy) emerged as a protective factor in the relation between inattention and academic achievement, and it appeared to buffer the relation at every level of attentional ability. Given the evidence for psychotherapy as a strong intervention to improve self-efficacy (Bresó et al., 2011; Cusack et al., 2019; Zhang et al., 2017), this suggests that psychotherapy may be an important adjunct to psychopharmacological treatment in adults with more limited attentional abilities, and may help to enhance their academic outcomes.

Factors that protect against poor social functioning. Research on social functioning in adults with ADHD has been limited and mixed, which may be due to the presence of other factors confounding the relation between ADHD symptoms and social functioning impairments. Previous work on potential buffers or protective factors in the relation between ADHD and social functioning has largely focused on children and

adolescents. In adolescents with ADHD, higher levels of self-esteem predict better psychosocial functioning (Ray et al., 2017; Schei et al., 2018), as does structured style and executive functioning (Robin & Payson, 2002; Schei et al., 2018). Based on previous work on neuroticism, I further hypothesized that lower levels of neuroticism, or higher levels of emotional stability, might play a protective role against social functioning impairment. In the current study, higher levels of self-esteem, structured style, and emotional stability were hypothesized to serve as protective factors in the relation between inattention and social functioning. Although no effect of emotional stability emerged, goal efficacy (a sub-construct of self-efficacy) again emerged as a protective factor, as did prioritizing and planning behaviour (reflecting aspects of executive functioning), and both served as buffers at every level of attentional ability. As before, both self-efficacy and executive functioning are potentially modifiable through psychotherapy and coaching, further suggesting that psychotherapy may be a more important adjunct to psychopharmacological intervention than previously assumed for adults with more limited attentional abilities.

Factors that protect against delinquency. As before, research on delinquency in adults with ADHD is limited, and the examination of protective factors within this relation has been sparse. Previous work involving children with ADHD found that a personality profile negatively associated with self-directedness and cooperativeness predicted aggressive behaviour (Kerekes et al., 2017), suggesting that this personality profile could serve as a buffer against delinquency, which was supported by previous research on criminality (Falk et al., 2017). Although no specific studies examined

wellness practices (e.g., exercise, diet, etc.) as protective in the relation between ADHD symptoms and delinquency, several studies have suggested that exercise (Neudecker et al., 2015; Vysniauske et al., 2016) and diet (Gordon et al., 2015; Guney et al., 2015; Puri & Martins, 2014) can help to reduce symptoms of ADHD in general, suggesting that they may buffer the relation by reducing the risk conferred by ADHD symptoms. Mindfulness meditation has also been explored as an intervention for ADHD and has been shown to reduce externalizing symptoms in one small study (Bögels et al., 2008). The current investigation revealed higher levels of agreeableness buffered against delinquency for individuals with higher levels of inattention, suggesting that this personality characteristic may be particularly protective for individuals with ADHD. No specific wellness practices emerged as protective factors, but an overall score relating to overall engagement in wellness practices, again, buffered against delinquency for individuals with higher levels of inattention. The factors that emerged as protective have been shown to be modifiable (Chang et al., 2017; Roberts et al., 2017), again urging for the use of psychotherapy and coaching as an adjunct to the psychopharmacological intervention used as first-line treatment for ADHD.

Implications

Lesch's (2018) recent editorial proposed a shift in research on ADHD from a deficit-focused view towards a resources-based view, one that is aligned with individuals improving their functioning despite the symptoms and limitations associated with ADHD. To that end, the results of this dissertation have important implications for university and college student accessibility services, as well as for treatment for ADHD

or more limited attentional abilities in emerging adults. Modifiable protective factors emerged across all three studies, namely self-efficacy, aspects of executive functioning, agreeableness, and wellness practices. Self-efficacy appears to be a particularly notable protective factor, with results showing that it buffers against poor outcomes in both academic achievement and social functioning. By adulthood, individuals with ADHD have typically experienced years of being reprimanded in school for interrupting others, failing to finish homework, and other difficulties associated with ADHD symptoms, resulting in low self-esteem and self-efficacy (Newark et al., 2016). Despite this common experience for children with ADHD, psychostimulant medication remains the first-line and often, the only treatment prescribed (Cortese et al., 2018; de Seixas & Müller, 2009).

Although psychosocial interventions, including CBT, are recommended for children with ADHD, a recent review reported that only about 20% received CBT (compared to 90% receiving psychostimulant medication; Danielson et al., 2018). Furthermore, these interventions were aimed at reducing symptoms of ADHD rather than psychological sequelae associated with ADHD, such as low self-esteem. Research conducted on interventions specifically aimed at improving self-esteem show that adults with ADHD benefit from such interventions (Shaikh, 2018), but research in this area has been limited. Future research should examine the effect of psychotherapy on the psychological effects associated with growing up with ADHD in adults. Similarly, classroom-based interventions to promote higher levels of self-esteem would benefit all children, but especially children with ADHD, who are at higher risk for decreased self-esteem directly due to their ADHD symptoms. Earlier intervention is necessary.

Depression symptoms emerged as a significant risk factor for individuals for ADHD, likely promoting worse outcomes in academic achievement and social functioning. This may be due to a multitude of factors, including an overlap in symptom presentations and potentially shared endophenotypes. Although there has been some work conducted on ADHD and comorbid depression (Abecassis et al., 2017; Rabiner et al., 2008), it is not clear if this knowledge has been translated into training for future clinicians, including clinical/counselling psychology and social work students. Not only is it crucial to assess for symptoms of depression in individuals referred for ADHD assessments, but monitoring for and the earlier detection of the development of depression symptoms in individuals receiving treatment for ADHD could serve to protect them from significant difficulty in the domains of academic achievement and social functioning. Similarly, treating depression symptoms as they arise may reduce the impact of ADHD symptoms on academic achievement and social functioning. Clinicians and trainees, including medical students, psychologists- and social workers-in-training, and other future professionals who will provide care to people with ADHD, should remain aware that depression symptoms commonly co-occur with ADHD, and are an additional, but modifiable, risk factor for poor outcomes.

Faculty at universities and colleges are likely to come across students struggling with difficulties related to inattention. Because young children with ADHD often have more negative learning experiences, likely contributing to their lower levels of self-esteem and self-efficacy, it follows that positive learning experiences, perhaps in the form of one-on-one guidance and mentoring, may serve to promote levels of self-efficacy. The

results of the current investigation suggest that bolstering this facet of self-esteem could protect against the negative effects of inattention in the classroom. Previous work suggests that inquiry-based learning, in which students generally take a more active or 'hands-on' approach towards learning (e.g., a laboratory component of a science lecture-based course), may promote higher levels of self-efficacy and confidence (Bentley et al., 2015; Jeffery et al., 2016). Other work with younger students has found that positive teacher-student relationships including trust and comfort were significantly associated with student self-esteem (Dessel et al., 2017). Overall, college and university faculty are encouraged to continue their work towards creating positive learning environments for their students, including using more active approaches to learning and providing mentorship where possible. Should it become clear that students are struggling even within a positive context, which is often the case, faculty should encourage and support the student in seeking services at their college or university's counselling centre and accessibility services.

University and college students with ADHD would benefit from executive functioning coaching provided by their school's student accessibility service centres. In the current investigation, fewer than 10 students who reported symptoms of ADHD also reported receiving any sort of coaching from accessibility services. Previous work has shown that university and college students with ADHD do benefit from executive functioning and/or study skills coaching (Parker et al., 2013; Prevatt et al., 2011), but it is not clear how common it is for student accessibility centres to offer coaching to their students. Given the potential for improvement in executive functioning, which may

protect against poorer social and academic outcomes, university and college student accessibility service centres are urged to provide executive functioning coaching to their students with ADHD.

Overall Limitations

The results of the current investigation should be interpreted within the context of its limitations. Firstly, participants for these studies largely comprised university students who participated through two psychology department participant pools, reasonably restricting the type of participants included in the study. Individuals attending university are likely to have fewer symptoms or fewer functional consequences, resulting in a selection bias. Data from secondary school students or college/vocational students may produce different results. Students from the current sample were unlikely to be very low in socioeconomic status or level of education, and they were unlikely to have very high criminal involvement. The majority of the sample comprised individuals who identified as female, which further reduced generalizability. Participants also provided information about their symptoms, their functioning, and their personalities. Thus, methods bias may have played a role in the results. Due to an error in data entry and reduced access to physical copies of questionnaires during the COVID-19 pandemic, I was not able to calculate Cronbach's alpha scores for all questionnaires included in this dissertation. Thus, I am unable to speak to the level of internal consistency for most of the questionnaires in this project, which calls the reliability of the analyzed data into question. Where possible, I have included correlations between similar measures in an effort to assess reliability. Additionally, although I calculated the sample size necessary

to detect the size of effects posited by previous research, it may have been that some of the constructs included in this study had smaller effect sizes than we anticipated. Thus, a larger sample may have detected other significant relations in the data. Finally, because this was an exploratory study, no correction was made for multiple comparisons from the same sample of participants. Multiple comparisons raise the likelihood of a Type I error. Thus, the results from these studies should be explored again in new, different samples.

Future studies would benefit from a more diverse sample, including broadening to include other post-secondary institutions aside from four-year universities. For future studies examining delinquency and criminal involvement, it might be beneficial to recruit participants from correctional facilities. Lastly, future studies may also benefit from the inclusion of multiple sources of data, including reports from significant others in the lives of the participant and experimental sources of data collection.

Conclusions

This study suggests that higher levels of inattention predict poorer academic achievement, greater social impairment, and greater involvement in criminal activity. Furthermore, the results indicate that self-efficacy, in particular, may be an important point of intervention for individuals with subclinical and clinical levels of ADHD. Overall, the results provide support for the use of psychotherapy as an adjunct treatment for emerging adults with ADHD. Future research would help to clarify the specific nature of interventions that could be used to promote the development of the aforementioned protective factors. Because the individuals assessed were university students, education on wellness practices, executive functioning coaching, and psychotherapy for self-

efficacy, agreeableness, and depressive symptoms, could all be offered through student counselling centres and student accessibility services, and could eventually serve to protect students from poorer long-term outcomes.

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Appendix A

DEMOGRAPHIC INFORMATION

Age (years): ____

Gender: [1] FEMALE [2] MALE [3] NON-BINARY [4] OTHER [5] PREFER NOT TO ANSWER [6] _____

Race/ethnic background:

[1] ABORIGINAL

[2] ASIAN OR ASIAN DESCENT (NON-ARAB)

[3] HISPANIC/LATINO

[4] NON-HISPANIC BLACK OR AFRICAN DESCENT

[5] NON-HISPANIC WHITE, CAUCASIAN, OR EUROPEAN DESCENT

[6] ARAB OR MIDDLE-EASTERN DESCENT

[7] OTHER/MIXED (please describe) _____

[8] PREFER NOT TO ANSWER

Marital Status:

[1] SINGLE

[2] IN A ROMANTIC RELATIONSHIP (NON-COHABITING)

[3] MARRIED/CIVIL UNION/COHABITING

[4] WIDOWED

Please describe your current level of employment, outside of being a student:

[1] Full-time (including volunteer work)

[2] Part-time (including volunteer work)

[3] Not currently employed or volunteering

Do you smoke cigarettes? [1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please indicate how many cigarettes you smoke per day (on average): _____

Do you consume caffeine (e.g., caffeinated coffee, caffeinated tea, energy drinks, energy shots)?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please indicate how much coffee/tea/energy drinks you drink per day (on average): _____ (indicate size)

Do you drink alcohol? [1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please indicate how frequently you drink alcohol:

[1] daily

[2] 3 or more times a week / a couple times a month

[3] less than 3 times a week

[4] less than 1 time per month

If YES, please indicate how many alcoholic drinks you consume per week (on average): ____

Do you use cannabis (marijuana, hashish, liquid THC, etc)?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please indicate how frequently you use cannabis (marijuana, hashish, liquid THC, etc.)

[1] daily

[2] 3 or more times a week

[3] less than 3 times a week / a couple times a month

[4] less than 1 time per month

MEDICAL HISTORY

Have you ever been diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD)?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, were you ever prescribed a stimulant medication, such as Ritalin?

[1] YES [2] NO [3] N/A [4] PREFER NOT TO ANSWER

Have you *ever* been diagnosed with or had experience with any of the following:

Traumatic Brain Injury? [1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please specify what kind:_____

If YES, do you receive treatment or accommodations for this currently?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

Seizure Disorder? [1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please specify what kind:_____

If YES, do you receive treatment or accommodations for this currently?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

Learning Disability? [1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please specify what kind:_____

If YES, do you receive treatment or accommodations for this currently?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

Mental Health Disorder? [1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please specify what kind:_____

If YES, do you receive treatment or accommodations for this currently?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

Are you currently taking any form of medication?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please specify what kind:_____

DEVELOPMENTAL HISTORY

Has anyone ever told you that you:

Started talking late? [1] NO [2] YES

Crawled or walked late? [1] NO [2] YES

Were difficult to manage as a young child? [1] NO [2] YES

Were late in being toilet trained? [1] NO [2] YES

Had problems getting along with other children? [1] NO [2] YES

Were aggressive toward others? [1] NO [2] YES

ACADEMIC HISTORY

What is the highest level of education you have completed so far?

[1] High School Diploma or equivalent

[2] College Degree

[3] Bachelor's Degree

[4] Master's or Professional Degree

[5] Doctorate Degree

Please indicate your year at UWindsor:

[1] 1st year [2] 2nd year [3] 3rd year [4] 4th year [5] 5th year or beyond

To which academic faculty do you belong?

[1] Faculty of Arts, Humanities and Social Sciences

[2] Faculty of Science

[3] Faculty of Business Administration

[4] Faculty of Education

[5] Faculty of Engineering

[6] Faculty of Human Kinetics

[7] Faculty of Nursing

[8] Inter-Faculty Program, Please Specify:

_____

Overall GPA: [1] below 60 [2] 60-70 [3] 70-80 [4] 80 or above

Major GPA: [1] below 60 [2] 60-70 [3] 70-80 [4] 80 or above

Are you currently having any difficulty in university?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

IF YES, please describe:

_____

_____

Do you receive any special accommodations at university?

[1] YES [2] NO [3] PREFER NOT TO ANSWER

If YES, please describe:

_____

_____

Appendix B

DASS

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.
The rating scale is as follows:
0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1	I found myself getting upset by quite trivial things	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I just couldn't seem to get going	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I had a feeling of shakiness (eg, legs going to give way)	0	1	2	3
8	I found it difficult to relax	0	1	2	3
9	I found myself in situations that made me so anxious I was most relieved when they ended	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting upset rather easily	0	1	2	3
12	I felt that I was using a lot of nervous energy	0	1	2	3
13	I felt sad and depressed	0	1	2	3
14	I found myself getting impatient when I was delayed in any way (eg, lifts, traffic lights, being kept waiting)	0	1	2	3
15	I had a feeling of faintness	0	1	2	3
16	I felt that I had lost interest in just about everything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3

18	I felt that I was rather touchy	0	1	2	3
19	I perspired noticeably (eg, hands sweaty) in the absence of high temperatures or physical exertion	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life wasn't worthwhile	0	1	2	3
22	I found it hard to wind down	0	1	2	3
23	I had difficulty in swallowing	0	1	2	3
24	I couldn't seem to get any enjoyment out of the things I did	0	1	2	3
25	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
26	I felt down-hearted and blue	0	1	2	3
27	I found that I was very irritable	0	1	2	3
28	I felt I was close to panic	0	1	2	3
29	I found it hard to calm down after something upset me	0	1	2	3
30	I feared that I would be "thrown" by some trivial but unfamiliar task	0	1	2	3
31	I was unable to become enthusiastic about anything	0	1	2	3
32	I found it difficult to tolerate interruptions to what I was doing	0	1	2	3
33	I was in a state of nervous tension	0	1	2	3
34	I felt I was pretty worthless	0	1	2	3
35	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
36	I felt terrified	0	1	2	3
37	I could see nothing in the future to be hopeful about	0	1	2	3
38	I felt that life was meaningless	0	1	2	3
39	I found myself getting agitated	0	1	2	3
40	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
41	I experienced trembling (eg, in the hands)	0	1	2	3

42	I found it difficult to work up the initiative to do things	0	1	2	3

Appendix C

The Big Five Inventory (BFI)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree Strongly
1	2	3	4	5

I see Myself as Someone Who...

___1. Is talkative

___2. Tends to find fault with others

___3. Does a thorough job

___4. Is depressed, blue

___5. Is original, comes up with new ideas

___6. Is reserved

___7. Is helpful and unselfish with others

___8. Can be somewhat careless

___9. Is relaxed, handles stress well

___10. Is curious about many different things

___11. Is full of energy

___12. Starts quarrels with others

___13. Is a reliable worker

___14. Can be tense

___15. Is ingenious, a deep thinker

___16. Generates a lot of enthusiasm

___17. Has a forgiving nature

___18. Tends to be disorganized

19. Worries a lot

___20. Has an active imagination

___21. Tends to be quiet

___22. Is generally trusting

___23. Tends to be lazy

___24. Is emotionally stable, not easily upset

___25. Is inventive

___26. Has an assertive personality

___27. Can be cold and aloof

___28. Perseveres until the task is finished

___29. Can be moody

___30. Values artistic, aesthetic experiences

___31. Is sometimes shy, inhibited

_____32. Is considerate and kind to almost everyone

___33. Does things efficiently

___34. Remains calm in tense situations

___35. Prefers work that is routine

___36. Is outgoing, sociable

___37. Is sometimes rude to others

___38. Makes plans and follows through with them

___39. Gets nervous easily

___40. Likes to reflect, play with ideas

41. Has few artistic interests

___42. Likes to cooperate with others

___43. Is easily distracted

___44. Is sophisticated in art, music, or literature

Appendix D

Social Adaptation Self-evaluation Scale

Items	
	Do you have an occupation? Yes No
	If yes
1.	How interested are you in your occupation?
	3 — very 2 — moderately
	1 — a little 0 — not at all
	If no
2.	How interested are you in your home-related activities?
	3 — very 2 — moderately
	1 — a little 0 — not at all
3.	Do you pursue this occupation, these activities with:
	3 — a lot of enjoyment? 2 — some enjoyment?
	1 — only a little enjoyment? 0 — no enjoyment at all?
4.	Are you interested in hobbies/leisure?
	3 — very 2 — moderately
	1 — a little 0 — not at all
5.	Is the quality of your spare time:
	3 — very good? 2 — good?
	1 — fair? 0 — unsatisfactory?
6.	How frequently do you seek contacts with your family members (spouse, children, parents, etc.)?
	3 — very frequently 2 — frequently
	1 — rarely 0 — never
7.	Is the state of relations in your family:
	3 — very good? 2 — good?
	1 — fair? 0 — unsatisfactory?
8.	Outside of your family, do you have relationships with:
	3 — many people? 2 — some people?
	1 — only a few people? 0 — nobody?
9.	Do you try to form relationships with others:
	3 — very actively? 2 — actively?
	1 — moderately activity? 0 — in no active way?
10.	How — in general — do you rate your relationships with other people?
	3 — very good 2 — good
	1 — fair 0 — unsatisfactory
11.	What value to you attach to your relationships with others?
	3 — great value 2 — some value
	1 — only a little value 0 — no value at all

12. How often do people in your social circle seek contact with you?
    3 — very often 2 — often
    1 — rarely 0 — never
13. Do you observe the social rules, good manner, politeness, etc.?
    3 — always 2 — most of the time
    1 — rarely 0 — never
14. To what extent are you involved in community life (such as club, church, etc.)?
    3 — fully 2 — moderately
    1 — slightly 0 — not at all
15. Do you like searching for information about things, situations and people to improve your understanding of them?
    3 — very much 2— moderately
    1 — not much 0 — not at all
16. Are you interested in scientific, technical or cultural information?
    3 — very 2 — moderately
    1 — only slightly 0 — not at all
17. How often do you find it difficult to express your opinions to people?
    0 — always 1 — often
    2 — sometimes 3 — never
18. How often do you feel rejected, excluded from your circle?
    0 — always 1 — often
    2 — sometimes 3 — never
19. How important do you consider your physical appearance?
    3 — very 2 — moderately
    1 — not very much 0 — not at all
20. To what extent do you have difficulties in managing your resources and income?
    0 — always 1 — often
    2 — sometimes 3 — never
21. Do you feel able to organise your environment according to your wishes and needs?
    3 — very much so 2 — moderately
    1 — not very 0 — not at all

Appendix E

RSES

Instructions

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

1. On the whole, I am satisfied with myself.

Strongly Agree Agree Disagree Strongly Disagree

2. At times I think I am no good at all.

Strongly Agree Agree Disagree Strongly Disagree

3. I feel that I have a number of good qualities.

Strongly Agree Agree Disagree Strongly Disagree

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

Strongly Agree Agree Disagree Strongly Disagree

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

Strongly Agree Agree Disagree Strongly Disagree

6. I certainly feel useless at times.

Strongly Agree Agree Disagree Strongly Disagree

7. I feel that I'm a person of worth, at least on an equal plane with others.

Strongly Agree Agree Disagree Strongly Disagree

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

Strongly Agree Agree Disagree Strongly Disagree

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

Strongly Agree Agree Disagree Strongly Disagree

10. I take a positive attitude toward myself.

Strongly Agree Agree Disagree Strongly Disagree

Appendix F

SPF-24
(Ponce-Garcia, Madewell, & Kennison, 2015)

This questionnaire helps us identify areas of strength in your life. Please read each statement below carefully and indicate the extent to which they apply to you by selecting a number (1 to 7) that corresponds to your answer choice.

		Disagree Completely	Mostly Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Mostly Agree	Completely Agree
	My friends/family:							
1.	Keep me up to speed on important events	1	2	3	4	5	6	7
2.	See things the same way	1	2	3	4	5	6	7
3.	Are seen as united	1	2	3	4	5	6	7
4.	Are supportive of one another	1	2	3	4	5	6	7
5.	Are optimistic	1	2	3	4	5	6	7
6.	Spend free time together	1	2	3	4	5	6	7
	I am good at:							
7.	Socializing with new people	1	2	3	4	5	6	7
8.	Interacting with others	1	2	3	4	5	6	7
9.	Making new friends	1	2	3	4	5	6	7
10.	Being with other people	1	2	3	4	5	6	7
11.	Working with others as part of a team	1	2	3	4	5	6	7
12.	Starting new conversations	1	2	3	4	5	6	7
	When working on something, I:							
13.	Can see the order in which to do things	1	2	3	4	5	6	7
14.	Plan things out	1	2	3	4	5	6	7
15.	Organize my time well	1	2	3	4	5	6	7
16.	Set priorities before I start	1	2	3	4	5	6	7
17.	Do better if I set a goal	1	2	3	4	5	6	7
18.	Make a list of things to do in order	1	2	3	4	5	6	7
	order of importance							
	I am confident in my ability to:							
19.	Achieve goals	1	2	3	4	5	6	7
20.	Think out and plan	1	2	3	4	5	6	7
21.	Make good decisions/choices	1	2	3	4	5	6	7
22.	Think on my feet	1	2	3	4	5	6	7
23.	Succeed	1	2	3	4	5	6	7
24.	Solve problems	1	2	3	4	5	6	7

	During the past month, how would you rate your sleep quality overall?	Very good	Good	Bad	Very bad
	Do you currently receive support from Student Support Services?	Yes	No		
	If yes, what kind of support?	Extra time on exams	Note taker	Separate room for exams	Other
	If "other", please describe:				

Appendix G

Simple Lifestyle Indicator Questionnaire

Diet: To answer these questions, think about your eating habits in the past year. Indicate how often you eat the following foods. Please include all meals, snacks and eating out

1. Lettuce or green leafy salad, with or without other vegetables

[ ] less than 1/week [ ] 1/week [ ] 2-3x/week [ ] 4-6x/week [ ] once/day [ ] 2+/day

2. Fruit: include fresh, canned or frozen, but do not include juices

[ ] less than 1/week [ ] 1/week [ ] 2-3x/week [ ] 4-6x/week [ ] once/day [ ] 2+/day

3. High fiber cereals or whole grain breads: this includes cereal such as Raisin bran, Fruit and Fiber, cooked oatmeal, and breads which are whole wheat, multigrain, rye or pumpernickel

[ ] less than 1/week [ ] 1/week [ ] 2-3x/week [ ] 4-6x/week [ ] once/day [ ] 2+/day

Exercise: To answer the following questions please indicate how many times per week you take part in the following activities for a duration of at least 30 minutes or more at a time:

I. Light exercise, such as:

- light gardening and light housework (dusting, sweeping, vacuuming)
- leisurely walking (walking your dog)
- bowling, fishing, carpentry, playing a musical instrument
- volunteer work

[ ] 0/week [ ] 1-3x/week [ ] 4-7x/week [ ] 8 and more/week

II. Moderate exercise, for example:

- brisk walk
- bicycling, skating, swimming, curling

- gardening (raking, weeding, spading)
- dancing, Tai Chi or moderate exercise classes

[ ] 0/week [ ] 1-3x/week [ ] 4-7x/week [ ] 8 and more/week

III. Vigorous exercise, for example:
- running, bicycling, x-country skiing, lap swimming, aerobics
- heavy yard work
- weight training
- soccer, basketball or other league sports

[ ] 0/week [ ] 1-3x/week [ ] 4-7x/week [ ] 8 and more/week

IV. Mindfulness meditation:

[ ] 0/week [ ] 1-3x/week [ ] 4-7x/week [ ] 8 and more/week

Alcohol: Please indicate how many drinks of the following types of alcohol you consume in an average week:

✓ Wine: ___drinks (3-5 oz.)

✓ Beer: ____drinks (10-12 oz or 1 bottle)

✓ Spirits: __drinks (1-1 ½ oz.)

Smoking: Please indicate your smoking habits below:

Are you a smoker? [ ] Yes [ ] No

If yes, how long have you been smoking? __years

If no, did you ever smoke? [ ] Yes [ ] No

If yes, how many years ago did you quit? __years

Life Stress: To answer this question please circle the number which you feel best corresponds to the level of stress in your everyday life

1 2 3 4 5 6

Not at all stressful Very stressful

Appendix H
GCS

In your life, how often have you:

	Never	Once	2-5 times	Many times	Countless times
1. Smoked a pack of cigarettes in a day.	0	1	2	3	4
2. Cheated on a test or plagiarized a paper.	0	1	2	3	4
3. Skipped school without an excuse.	0	1	2	3	4
4. Avoided paying for things such as movies, bus rides, or food.	0	1	2	3	4
5. Committed acts of vandalism.	0	1	2	3	4
6. Been suspended from school.	0	1	2	3	4
7. Bought liquor.	0	1	2	3	4
8. Failed to return extra change a cashier gave you by mistake.	0	1	2	3	4
9. Been loud, rowdy, and unruly in a public place.	0	1	2	3	4
10. Been late to school without an excuse.	0	1	2	3	4
11. Used torrenting or other online methods to distribute music, television, movies, software, or other media.	0	1	2	3	4
12. Hitchhiked where it was illegal.	0	1	2	3	4
13. Been drunk in a public place.	0	1	2	3	4
14. Begged for money or things from strangers.	0	1	2	3	4
15. Illegally copied computer software or video games.	0	1	2	3	4
16. Ran away from home.	0	1	2	3	4
17. Damaged another car but did not try to notify the owner.	0	1	2	3	4
18. Stole things from school.	0	1	2	3	4
19. Gambled illegally such as betting on sporting events or card playing.	0	1	2	3	4
20. Been paid for having sexual relations with someone.	0	1	2	3	4
21. Stole money from family members.	0	1	2	3	4
22. Drove a car while drunk.	0	1	2	3	4
23. Made obscene telephone calls such as calling someone and saying dirty	0	1	2	3	4

things.					
24. Urinated in a public place (like behind a bush).	0	1	2	3	4
25. Been involved in gang fights.	0	1	2	3	4
26. Sold marijuana or hashish (i.e., pot, grass, or hash).	0	1	2	3	4
27. Sold hard drugs such as heroin, cocaine, or LSD.	0	1	2	3	4
28. Knowingly bought, sold, or held something stolen (or tried to do any of these things).	0	1	2	3	4
29. Taken a vehicle other than your own for a ride (drive) without the owner's permission.	0	1	2	3	4
30. Thrown objects (such as rocks, snowballs, or bottles) at cars or people.	0	1	2	3	4
31. Stole or tried to steal items worth $5 or less.	0	1	2	3	4
32. Stole or tried to steal items worth between $5 to $50.	0	1	2	3	4
33. Stole or tried to steal items worth more than $50.	0	1	2	3	4
34. Lied about age to buy alcohol or to be admitted to a bar.	0	1	2	3	4
35. Carried a hidden weapon other than a pocket knife.	0	1	2	3	4
36. Purposely damaged or destroyed property to your school.	0	1	2	3	4
37. Purposely damaged or destroyed property belonging to your family members.	0	1	2	3	4
38. Broke into a building or vehicle (or tried) to steal something or just look around.	0	1	2	3	4
39. Stole or tried to steal a motor vehicle such as a car or motorcycle.	0	1	2	3	4
40. Used force (strong-arm) methods to get money or things from family members.	0	1	2	3	4
41. Used force (strong-arm) methods to get money or things from students at your school.	0	1	2	3	4
42. Used force (strong-arm) methods to get money from strangers.	0	1	2	3	4

43. Hit or threatened to hit a fellow student or teacher at school.	0	1	2	3	4
44. Hit or threatened to hit a family member.	0	1	2	3	4
45. Hit or threatened to hit someone other than a student, teacher, or family member.	0	1	2	3	4
46. Had or tried to have sexual relations with someone against their will.	0	1	2	3	4
47. Attacked someone with the idea of killing or seriously injuring them.	0	1	2	3	4
48. Set fire to someone's property.	0	1	2	3	4
49. Used torrenting or other online methods to access music, television, movies, software, or other media.	0	1	2	3	4
50. Driven an automobile without an operator's license or permit.	0	1	2	3	4
51. Had alcoholic beverages (beer, wine, or hard liquor).	0	1	2	3	4
52. Had marijuana or hashish (grass, pot, or hash).	0	1	2	3	4
53. Had hallucinogens (LSD, Acid, Mescaline, or Peyote).	0	1	2	3	4
54. Had amphetamines (uppers or speed).	0	1	2	3	4
55. Had barbiturates (downers or reds).	0	1	2	3	4
56. Had heroin (horse or smack).	0	1	2	3	4
57. Had cocaine (coke or crack).	0	1	2	3	4

Vita Auctoris

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