

“Will I Be Happy in High School?” Exploring How Interpersonal and Executive Functions  
Influence Adolescent Subjective Well-Being Across the Transition to High School

by

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### **Author's Declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## Abstract

The transition to high school is a stressful life event, with teenagers typically facing increased demands for independent academic work coupled with the need to establish new social networks. Students who successfully navigate this change have higher positive affect than those who find the transition rife with challenges. In addition, those who struggle to adjust post-transition experience increased negative affect and more mental health concerns – all of which are markers of subjective well-being (SWB). This study examined differences in youth SWB coinciding with the move to high school. Additionally, I explored the extent to which variations in teenagers' executive functions (EFs) and positive relations with others predict SWB. To do so, I utilized self-report survey data from a community sample of 13-to-15-year-old adolescents (N = 106). Results showed that post-transition, youth reported significantly lower SWB, as reflected by less life satisfaction and more psychological distress. Psychological distress was higher in adolescent girls, those who experienced more EF challenges, and teenagers with weaker social relationships. Findings were similar for life satisfaction with one notable difference. For adolescents with average to low positive relations with others, greater EF difficulties predicted lower life satisfaction. However, strong social relationships buffered the impact of EF challenges on this aspect of SWB. I discuss how mechanisms accounting for the protective effect of positive social relationships for youth with EF challenges will be crucial to explore in future research.

*Keywords:* subjective well-being, adolescence, transitions, executive functions, close relationships, high school

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دل ناامید تو نہیں ناکام ہی تو ہے  
لبی ہے غم کی شام مگر شام ہی تو ہے

## Table of Contents

<b>Author’s Declaration</b> .....	ii
<b>Abstract</b> .....	iii
<b>Acknowledgements</b> .....	iv
<b>List of Figures</b> .....	viii
<b>List of Tables</b> .....	ix
<b>Literature Review</b> .....	1
Subjective Well-Being in Adolescents.....	1
<i>Subjective Well-Being</i> .....	1
<i>Outcomes Related to Subjective Well-Being in Adolescents</i> .....	4
<i>Predictors of Adolescent Subjective Well-Being</i> .....	6
The Transition to High School .....	8
<i>Individual Differences in High School Transition Outcomes</i> .....	8
<i>Challenges Associated with the High School Transition</i> .....	9
<i>Prior Models of School Well-Being</i> .....	11
Predictors of SWB During the High School Transition.....	14
Executive Functions (EFs) .....	14
<i>EFs During Adolescence</i> .....	15
<i>EFs In High School</i> .....	16
<i>EFs and SWB</i> .....	18
<i>EFs, SWB, and the Transition to High School</i> .....	19

Close Relationships .....	20
<i>Close Relationships and Adolescence</i> .....	21
<i>Close Relationships and SWB</i> .....	22
<i>Close Relationships, SWB, and the Transition to High School</i> .....	24
EFs and Close Relationships? .....	25
Conclusion.....	26
<b>Introduction</b> .....	28
Executive Function (EFs).....	29
Close Relationships.....	32
Current Investigation.....	33
<b>Methods</b> .....	35
Participants .....	35
Materials.....	35
Demographic Questionnaire. ....	35
Positive and Negative Affect Schedule.....	35
Satisfaction with Life Scales.....	36
Ryff Scales of Psychological Well-Being.....	36
Behaviour Rating Inventory of Executive Function .....	36
Brief Symptom Inventory .....	37
Procedure.....	37
Missing Data .....	38

<b>Results</b> .....	39
<b>Discussion</b> .....	42
Clinical Implications .....	48
Contributions to Existing Literature and Limitations .....	50
<b>References</b> .....	52
<b>Appendix</b> .....	71

## List of Figures

<b>Figure 1</b> – LS at Varying Degrees of Positive Relations With Others and EFs .....	79
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## List of Tables

<b>Table 1</b> – Demographic Characteristics of the Study Sample.....	71
<b>Table 2</b> – Descriptive Statistics for Study Variables.....	72
<b>Table 3</b> – Intercorrelations for Study Variables.....	73
<b>Table 4</b> – Mean Group Differences Between Adolescents Pre-and-Post High School .....	74
<b>Table 5</b> – Positive Affect as a Function of Gender, Stage, Social Relationships, and EFs.....	75
<b>Table 6</b> – Negative Affect as a Function of Gender, Stage, Social Relationships, and EFs .....	76
<b>Table 7</b> – Psychological Distress as a Function of Gender, Stage, Social Relationships, and EFs .....	77
<b>Table 8</b> – Life Satisfaction as a Function of Gender, Stage, Social Relationships, and EFs .....	78

## **Literature Review**

Transitioning to high school is a seminal life change for adolescents, with immediate and lasting impacts on their lives and happiness (Benner, 2011). Despite the consequential nature of the high school transition, its exact influence on teenage subjective well-being (SWB) and predictors of SWB during this period remain understudied. Therefore, this review will address multiple strands of current research related to the study of adolescent SWB across the switch to high school. First, it will provide an overview of youth SWB, including established predictors of well-being during early and middle adolescence. Second, it will examine typically expected psychological, academic, and social outcomes in teenagers as they move to high school and how these outcomes relate to SWB. Third, it will highlight the unique challenges of the high school transition to gain insight into what factors may be vital to consider when contemplating relevant predictors of youth well-being. Finally, it will examine executive functions (EFs) and close relationships as relatively under-researched yet crucial factors to explore during this life change. In sum, the following review aims to provide a theoretical basis for studying EFs and close relationships as unique and joint predictors of adolescent subjective well-being during the high school transition.

### **Subjective Well-Being in Adolescents**

#### ***Subjective Well-Being***

Throughout decades of research targeted at understanding how best to define well-being and identify its constitution, two distinct lines of focus have emerged (Ryan & Deci, 2001). Hedonic well-being refers to how satisfying and enjoyable an individual evaluates their life to be (Kahneman et al., 1999). In contrast, the idea that well-being is more than the simple pursuit of pleasure and involves personal self-actualization and growth is termed eudemonic well-being

(Waterman, 1993). In 1984, Ed Diener proposed a conceptualization of hedonic well-being, popularly referred to as subjective well-being (SWB), that remains highly influential to this day and has become a key indicator of overall well-being in recent years (Ryan & Deci, 2001).

According to Diener (1984), the best encapsulation of psychological wellness or happiness is through the construct of SWB, which comprises three parts: the frequency of positive affect (PA), the frequency of negative affect (NA), and one's appraisal of life satisfaction (LS). Classically, PA and NA form the emotional component of SWB. Life satisfaction, which denotes an individual's judgement of how fulfilling they believe their life is, represents the cognitive component of SWB. The tripartite structure of SWB has been the subject of much debate, leading to many proposed structural formulations. These include SWB as composed of three independent parts, as a hierarchal construct with SWB as a higher-order factor and PA, NA, and LS as its indicators, and as a causal mechanism with PA and NA influencing LS, among others (Busseri & Sadava, 2011).

Recent work by Metler & Busseri (2017) has sought to resolve conflicting perspectives on the structure of SWB, focusing on SWB as a hierarchal structure or causal system. As part of a longitudinal study, 452 undergraduates completed self-report questionnaires querying LS, PA, and NA at four points: the start of their first year at university and the end of their first semester, first year, and third year at university. If SWB is a hierarchal construct, associations between PA, NA, and LS components should reflect links between higher-order latent SWB factors over time. If SWB is a causal system, a unidirectional predictive pattern ought to exist, whereby PA and NA would account for LS across the study timeline, but the opposite trend (LS predicting PA and NA) would not arise. Results indicated that higher-order SWB factors fully accounted for longitudinal associations between PA, NA, and LS. In contrast, while PA and NA did

exclusively predict LS at certain time intervals, they did not at others, indicating an inconsistent trend.

Owing to mixed findings from their longitudinal study, Metler & Busseri (2017) conducted an additional experiment to probe the causal mechanism model of SWB further. Components of SWB (PA, NA, and LS) were manipulated, with 195 undergraduates assigned to one of four conditions. Three of the four conditions involved manipulations to PA (increased), NA (decreased), or LS (increased), while the other components remained the same. The fourth condition was a control, with no modifications to PA, NA, or LS levels. If SWB is a causal mechanism, an increase in PA or decrease in NA should consistently increase LS, while any manipulations to LS should not impact PA or NA. Results suggested that not only did PA and NA not significantly predict LS, but LS seemed to uniquely influence PA and NA at certain time points, which contradicts the assumptions of the causal mechanism model of SWB. Conversely, there was a positive predictive path between higher-order latent SWB factors across two measured time points, such that participants in the LS and PA conditions reported significantly higher latent SWB at Session 2 when controlling for SWB at Session 1. These findings suggest that the associations between SWB components across time are accounted for by the link between latent SWB factors, adding further weight to the hierarchical model of subjective well-being. Notably, while the outcomes and predictors of SWB may differ across ages in well-being research, an adolescent and adult's SWB is typically evaluated across the same three components of PA, NA, and LS (Steinmayr et al., 2019).

Following this understanding of the structure of SWB, individuals with high levels of SWB tend to report high LS, high PA, and little NA. In contrast, those who display low SWB (sometimes termed "ill-health") show low LS, low PA, and high NA. The idea of well-being as

not just indicative of the presence or absence of psychological distress but inclusive of indicators of affective well-being and life satisfaction is fundamental to magnifying the narrow focus of health, including adolescent health, beyond pathology. Thinking of well-being as extending beyond mental disorder allows researchers to account for individuals who record higher levels of life quality, a construct that has commonalities with SWB, despite also experiencing psychological symptoms related to mental ill-health (Sharpe et al., 2016). In tandem, it accounts for those who do not enjoy high levels of SWB, even if they do not actively experience any symptoms related to a psychological disorder (Kinderman et al., 2015; Lereya et al., 2022). Furthermore, estimations of PA and NA allow us to understand how emotions impact well-being. Feelings are different from moods and symptoms of psychological distress in that they are more intense and acute (Larsen, 2000). Perhaps most crucially, understanding well-being without centring mental ill-health allows researchers to expand their focus to investigating how to actively improve well-being in conjunction with understanding how to prevent and intervene in the case of mental health difficulties. Indeed, decades of research have been dedicated to investigating SWB in adults and, more recently, in adolescents, leading to the discovery of various positive outcomes associated with adolescent SWB.

### ***Outcomes Related to Subjective Well-Being in Adolescents***

While SWB is an essential outcome in and of itself, it is also a significant predictor of other positive downstream consequences in youth. SWB acts as a bulwark against adverse mental health outcomes. Youth who report high life satisfaction also note experiencing lower levels of depression and anxiety (Bartels et al., 2013; Park, 2004; Proctor et al., 2009). Additionally, high life satisfaction is moderately negatively correlated with externalizing problems in youth (Bartels et al., 2013; MacDonald et al., 2005). The role of SWB as a buffer

against psychological distress and risk-taking behaviour is critical in adolescence, given that most mental disorders have an onset before age 25 (Jones, 2013). Canadian youth aged 15 to 24 are more likely to experience mental illness, like depression and anxiety, as well as substance use disorders than any other age group (Pearson et al., 2013). In the regional context, up to 21% of Ontario high school students (approximately 196,000 students) report experiencing severe levels of psychological distress (Boak et al., 2020). The prevalence of psychological distress in adolescent lives only highlights the importance of promoting SWB in teens.

Subjective well-being is also positively associated with academics, which is crucial for adolescents – school dominates their everyday lives. Students' positive emotions promote academic achievement, assessed as higher examination grades; albeit self-regulated learning and academic motivation mediate this relationship (Mega et al., 2014). In line with propositions made by Pekrun and colleagues (2007), emotions influence self-regulated learning and academic motivation. Specifically, students who report greater positive emotions are also more effective self-regulated learners (Mega et al., 2014). They are better at time management for academic tasks, can self-reflect on their learning and performance in a way that aids their achievement goals, and have an understanding of intelligence that adds to their perception of themselves as capable in academic areas and able to master set goals (Mega et al., 2014).

Moreover, positive emotions also enhance student engagement, a multidimensional construct including academic attainment and behavioural, cognitive, and psychological aspects (Reschly et al., 2008). In 293 schoolchildren between the 7th to 10th grade, adaptive coping mediated the relationship between positive emotions and student engagement (Reschly et al., 2008). Meanwhile, negative emotions were associated with lower levels of student engagement, likely because, unlike positive affect, negative affect did not promote adaptive coping. In Chilean

teens aged 14 to 17, positive emotions encouraged and built efficacy, hope, optimism, and resilience, and higher levels of these components linked directly to better academic performance (Carmona-Hatly et al., 2018). Similar trends were observed in university students. Findings from a within-subjects diary study conducted with 116 undergraduates suggest that those who reported greater positive emotions also experienced higher student engagement, which promoted better objective academic performance (Rodriguez-Munoz et al., 2021). Subjective well-being influences the extent to which students participate in school. In turn, engagement fosters multiple constructive outcomes, including how well they can cope with academic and extracurricular life demands in educational settings.

Undoubtedly, there are many beneficial outcomes associated with SWB. It is only natural then that so much positive psychology research has focused on examining individual differences in SWB and what factors matter most when seeking to increase SWB among adolescents.

### ***Predictors of Adolescent Subjective Well-Being***

Predictors of SWB can be classified across two dimensions – contextual and intrapersonal. Contextual predictors relate to the impact of external life circumstances on SWB (Galinha & Pais-Ribeiro, 2011). They include material resources like income, the influence of stressful life events, and community and societal factors, including the social and political context within which an individual resides (Diener et al., 2018). The predictive power of income on SWB has been the subject of much intellectual interest. Findings show that globally income is closely and linearly related to SWB until a certain income amount (\$95,000), typically higher than the income satiation point associated with positive affect (\$60,000 to 70,000), although considerable variation across societies exists (Jebb et al., 2018). A plateau for SWB in relation to income indicates that SWB is likely further impacted by other factors beyond contextual ones.

We know that two individuals with the same material resources and life circumstances can still vary in their level of SWB. Therefore, it is vital to integrate contextual factors with intrapersonal ones in discussions of known influencers of SWB (Galinha & Pais-Ribeiro, 2011).

Intrapersonal factors are internal individual factors that influence SWB. Variables associated with personality, like extraversion and peripheral factors like high self-esteem and positive predisposition, are known to have stable moderate to strong correlations with SWB (Lucas, 2008). Additionally, there are links between close relationships and SWB. Sociability, time spent interacting with others in social settings, and the availability of social support through social networks are all reliably linked to happiness and SWB (Lucas et al., 2008). Furthermore, psychological and cognitive factors are also critical intrapersonal predictors of SWB. Those who experience psychological distress and disorder like high stress, anxiety, and depression typically report lower SWB. Cognitively, those who pay greater attention to positive stimuli, positively interpret vague or neutral events, and remember events in a more favourable light than they were (positive memory bias) experience higher SWB (Diener & Ryan, 2009).

Many factors that influence adult SWB impact adolescent SWB similarly, with most intrapersonal factors persisting across ages. For example, extraversion, which relates to characteristics like being sociable and outgoing, is significantly associated with life satisfaction in youth (Lampropoulou, 2018). Similarly, high anxiety, depression, low self-esteem, and greater loneliness are also detrimental to SWB in adolescents, as they are in adults (Gilman & Huebner, 2003; Lampropoulou, 2018).

Both environmental and intrapersonal factors are important to consider in evaluating SWB in adolescents, especially given past evidence that demonstrates how loci of control (intrapersonal) interact with adverse life events (contextual) to influence life satisfaction among



teens (Ash & Huebner, 2001; Lefcourt, 1991). Crucially, children and adolescents exist in social surroundings specific to their demographic. School is an example of such an environment.

Adolescents spend much of their waking hours at school, and it constitutes an integral part of their social, emotional, and educational lives (Hatzichristou et al., 2014). Settings like school give rise to unique contextual factors, principally life changes, that are important to consider in investigating adolescent SWB – like school transitions.

### **The Transition to High School**

Approximately five million teenagers in Canada are currently in high school (Statistics Canada, 2021). All have likely experienced the transition to high school, a formative life event characterized by considerable academic, psychological, and social changes. Adolescents vary in how well they can navigate adjusting to an entirely new school environment, with immediate and lasting impacts on academic and psychosocial outcomes amongst teens post-transition.

### ***Individual Differences in High School Transition Outcomes***

For most teenagers, the transition to high school is a largely positive experience, with school-related opportunities seen as exciting rather than daunting (Benner, 2011; Waters et al., 2014). However, a sizeable number of adolescents find the move to a new school environment challenging, uncertain, and disruptive to normal functioning (Benner, 2011).

Youth who experience the transition as an unsettling event endorse acute negative outcomes across academic, social, emotional, and psychological domains. The adverse impacts of the high school transition are particularly salient for diverse youth (specifically African American and Latino students) when the number of adolescents belonging to their ethnic groups decline significantly between middle and high school (Benner & Graham, 2009).

In the direct aftermath of the transition, students report a decline in academic achievement, as evidenced by lower grades, decreased participation, and poorer academic motivation (Barber & Olsen, 2004). Loneliness and depressive symptoms increase post-transition (Barber & Olsen, 2004; Benner et al., 2017). Conjointly, students report experiencing a sense of being devalued and marginalized, increasing the risk of them disengaging from school and ultimately dropping out before graduation – the consequences of which detrimentally influence their lives well into adulthood (Anderson et al., 2000).

Compared to those who struggle, adolescents who undergo positive transitions note better emotional, psychological, and academic outcomes. These include lower loneliness, depressive and anxiety symptoms, higher self-esteem, and better educational attainment (Rice et al., 2011; West et al., 2008). These students also report greater prospective social and emotional health, with more peer support and less internalizing and externalizing issues (Waters et al., 2012)

Notably, while these emotional and psychological outcomes relate to SWB, they do not speak directly to how components of SWB (PA, NA, and LS) change during the transition to high school. Research that looks at psychological distress and SWB specifically within this demographic is sparse, with most work incorporating well-being simply as the presence or absence of mental health concerns. There is then a gap in the current literature that directly investigates variations in SWB during the high school transition, especially as a composite of its cognitive and affective components.

### ***Challenges Associated with the High School Transition***

While numerous factors may be essential to study as predictors of SWB, challenges unique to the transition period can help provide insight into which ones are most salient to consider.

Concurrently, with the transition to high school, teenagers also navigate changes characteristic of early and middle adolescence. Ubiquitous to all adolescents, and therefore relevant to the high school transition, is the experience of puberty, with its normative physical, cognitive, and socio-emotional development. Besides the physical maturation puberty entails, early and middle adolescence also signifies an increase in the capability to engage in abstract thinking and more goal setting (Sawyer et al., 2012). Adolescence is a time of greater refinement of executive functions (EFs), the interconnected cognitive abilities that allow individuals to pursue a set goal (McAuley & White, 2011). Conjointly, teenagers also begin to evolve socially. They increasingly favour peer support over parental guidance, express a heightened need for more autonomy and independence, and display a proclivity toward peer-encouraged risk-taking behaviour (Albert et al., 2013; Heinsch et al., 2020; Sawyer et al., 2012).

Compounding the normative trials of puberty are the unique academic and social challenges associated with the transition to high school. Compared to middle school, high school demands that students take greater ownership of their academics, with larger workloads, more homework, and an expectation to complete tasks independently (Barber & Olsen, 2004). Moreover, educational curriculums become more complex. There are several, increasingly less integrated subjects to learn, with different teachers and classrooms (Dawson & Guare, 2018; Ganeson & Ehrich, 2009). Students can no longer depend on teachers to provide consistent prompts to complete tasks or to keep track of deadlines for them, and teachers offer much less immediate feedback than earlier grades (Shibley et al., 2019). Additionally, teenagers must balance academic tasks with extracurricular activities and leisure time (Fogel et al., 2021). Students themselves identify this need for increased independent work, more homework,

challenging coursework, and new and greater teacher expectations as one prominent concern when transitioning to a new high school (Akos & Galassi, 2004).

Beyond procedural and academic concerns, worries around re-establishing interpersonal connections with peers and teachers at school emerge as a primary worry for students post-transition (Akos & Galassi, 2004). As teens enter high school, they not only encounter new teachers but also new peers, since many middle schools act as feeders for singular high schools (Benner, 2011). Concurrently, previous friend groups are disturbed since a common meet-up place (school) is physically displaced as students move to new school buildings. Although this offers an opportunity for adolescents to build new friendships, it also represents a challenge since the inability to establish concrete peer and teacher relationships in high school is associated with increased internalizing symptoms (loneliness and depression) in students (Barber & Olsen, 2004, Benner et al., 2017).

Past models of school well-being have incorporated difficulties related to the high school transition in their attempts to account for factors that explain variations in adolescent school satisfaction, general health, and well-being.

### ***Prior Models of School Well-Being***

Historically, education systems have prioritized academic achievement and positive future outcomes as indicators of student success at the expense of the well-being of students while in high school (Huebner et al., 2014). To remedy this neglect, and in recognition of the large space school occupies in adolescents' lives, attempts have been made to account for teenage well-being in school settings.

In adolescents, several contextual and intrapersonal factors contribute to school satisfaction. These primarily relate to social (student-teacher relationships, school connectedness, social relationships, peer relationships), academic (academic support and satisfaction, sharing resources, academic achievement), and safety-related factors (school climate, order, and discipline) (Suldo et al., 2006; Zullig et al., 2011). Researchers have incorporated these factors into models of school well-being.

Konu and Rimpella's (2002) conceptual model of school well-being was one of the first to shift focus from solely health and health promotion to indicators of well-being among students. Grounded in a sociological understanding of well-being as stemming from "having, loving, being, and health," Konu and Rimpella (2002) proposed four categories to represent well-being at school: (1) school conditions ("having"), (2) social relationships ("loving"), (3) means for self-fulfillment ("being"), (4) health status ("health"). From a student's vantage point, school conditions incorporate their surroundings and environment, school subjects and schedules, lunches, and school safety. Social relationships account for peer relationships, teacher-student connections, peer victimization, and school-home synergy, among other factors. Means for self-fulfillment relate closely to academics and independent learning in school and speak to the value of student work, and their ability to gain guidance and encouragement from their school and contribute to school decision-making. Finally, health relates to physical ill-being and illness.

Further research on the applicability of Konu and Rimpella's (2002) school well-being model with Finnish students in primary (aged 10 to 12), lower secondary (aged 13 to 15), and upper secondary (aged 16 to 18) showed that the highest correlation among categories was between social relationships and means for self-fulfillment – above  $r = 0.70$  for all age groups (Konu & Lintonen, 2006). Notably, students in lower secondary school, who are similar in age to

those transitioning to high school in the North American school system, reported experiencing worse social relationships than either primary or upper secondary students (Konu & Lintonen, 2006). Disruption from experiencing the transition from primary to secondary school may be one reason why students in this age group reported poorer social relationships than others – tying together the challenges students face during high school with their well-being. Importantly, the dynamic nature of secondary education with multiple teachers was thought to be one factor contributing to a sense of diminished social relationships in students aged 13 to 15. This speaks to both tasks of entering secondary education – the demand to draw on personal resources to work more independently and the need to re-build social relationships in a novel school environment.

More recent work has also drawn on school well-being models in conceptualizing micro, medium, and macro-level factors that impact adolescent subjective well-being. In a multilevel approach to youth SWB, school was at the macro-level of influence, personal characteristics like demographics and personality traits were at the micro “person” level, and family factors like parental relationships at the medium level (Lampropoulou, 2018). Within school, emotional and academic dimensions were deemed most important in understanding satisfaction or ill-being (Lampropoulou, 2018). The emotional dimension included a student’s learning climate and sense of community, and the academic dimension encompassed academic achievement (Lampropoulou, 2018).

These models offer insight into what facets of the school environment are vital to maintaining school well-being. At the high school level, social relationships seem to be one essential point of overlap. The other point of intersection is academics – not simply academic achievement but adapting to independent learning. This requires the use of cognitive skills that

contribute to essential school-bound skills (reading, writing, and math) and the more peripheral but necessary aspects of completing schoolwork (like planning, organizing, scheduling, multitasking, and task-monitoring). While past research on school well-being makes oblique references to the need to adapt and to perform well academically, none delve further to investigate the underlying cognitive abilities that drive adaptive and academic goal setting and goal pursuit as possible sources of individual differences in SWB amongst students. Additionally, few measure SWB as a tripartite construct comprising PA, NA, and LS in adolescents. Consequently, there continue to be questions about how precisely the transition impacts teenage SWB in school settings. Additionally, we cannot appropriately and parsimoniously account for the processes that characterize independent learning solely through a consideration of academic achievement or means for self-fulfillment at school.

### **Predictors of SWB During the High School Transition**

Like other major life events, school transitions are seemingly a contextual predictor of SWB. However, as described previously, while all teenagers who enter high school experience the transition, their well-being outcomes vary. Clearly, intrapersonal factors are also at play. Likely, a myriad of factors (e.g., age, gender, and personality characteristics) influence teenage SWB during the high school transition period. Nevertheless, two factors stand out, given the school-specific challenges adolescents face post-transition and previous conceptualizations of school well-being. These are (1) executive functions (EFs) and (2) close relationships.

#### **Executive Functions (EFs)**

Executive functions (EFs) refer to the interrelated cognitive abilities that facilitate engagement in adaptive behaviours during goal pursuit (Goldstein & Naglieri, 2014). While many different abilities – like emotional control and even effort— have been postulated as part

of the EF umbrella, three are widely viewed as foundational to the EF construct – working memory, inhibitory control, and cognitive flexibility (Miyake et al., 2000). Working memory involves holding and manipulating information in mind when it is no longer perceptually present in the environment (Baddeley & Hitch, 1994; Diamond, 2013). Essentially, working memory is the ability to keep track of goal-relevant information. Inhibitory control refers to the ability to stop pre-potent but goal-inappropriate thoughts (cognitive inhibition) and actions (response inhibition) (Nigg, 2000; Goldstein & Naglieri, 2014). Cognitive flexibility or mental shifting describes a person's capacity to think about multiple concepts and ideas concurrently or switch between thinking about one concept and contemplating another (Armbruster et al., 2012). Our environment is in constant flux – cognitive flexibility offers us the luxury of adapting and changing our mental representations to deal with our changing surroundings' demands. Together, these core abilities form the crux of our capacity to engage in goal-directed action and thought. More complex executive abilities, like planning, self-monitoring, and task initiation emerge from these core EF skills (Goldstein & Naglieri, 2014).

### ***EFs During Adolescence***

Adolescence is a time of attaining greater independence and autonomy. The maturation of EFs and socio-emotional growth that undergird this developmental stage are key to successfully adapting to its demands. In adolescence, EFs continue to become increasingly refined (McAuley & White, 2011; Theodoraki et al., 2019). Some evidence suggests that while inhibition seems to mature fully by age 12, shifting and updating continue to linearly develop between ages 11 to 17 (Huizinga et al., 2007; Magar et al., 2010; McAuley & White, 2011). However, newer research reports that inhibition continues to develop in late adolescence while working memory and shifting seem to reach a plateau in their specialization (Theodoraki et al.,



2019). Of note, positive correlations between inhibition task performance and age (14 to 18), although significant, were small, suggesting only modest improvements in inhibitory ability over time (Theodoraki et al., 2019). Regardless, EFs, by virtue of their role as orchestrators of goal-pursuit, support adaptation in adolescence, which is especially crucial in times of change, like the transition to high school.

### ***EFs In High School***

EFs are important in high school in both academic and social contexts. As explicated earlier, one challenge going into high school is the need to engage in academic tasks independently with little external prompting. Essentially, high school demands that teenagers become efficient at self-regulated learning (Zimmerman, 2002). An important part of being a self-regulated learner involves effectively engaging in metacognitive behaviours (Zimmerman, 1990). Within the context of self-regulated learning, metacognitive behaviours involve initiating tasks, planning, organizing, and, most crucially, self-monitoring (Zimmerman, 1990). Self-monitoring allows learners to determine the quality of their learning, which in turn enables them to make decisions on how to change strategies, also termed “enacting control” to achieve better future results (Azevedo et al., 2010). Metacognitive behaviours draw on several EF abilities (task initiation, planning, organization, and self-monitoring).

Alongside the heightened use of EFs to appropriately complete academic tasks, EFs like working memory, planning, organizing, task monitoring, and cognitive flexibility are also necessary to handle the dynamically shifting high school environment. Within high school, students must handle juggling extracurricular activities, managing less integrated subject-specific coursework, changing teachers, and attending varying classrooms for different classes (Fogel et

al., 2021; Ganeson & Ehrich, 2009; Guare & Dawson, 2018). In sum, success in the academic domain in high school asks that teens rapidly learn to enact EFs autonomously and successfully.

In the social domain, EFs support peer interactions and enhance social communication, central to broaching the second challenge presented by high school: re-establishing peer connections. Adolescents with weaker working memory are more likely to face challenges with communicative perspective-taking (Nilsen & Bacso, 2017). Communicative perspective-taking refers to an individual's ability to attend to their conversational partner's perspective, and adjust their behaviour as required (Nilsen & Fecica, 2011). Keeping track of and responding appropriately to another individual during conversation requires the use of working memory, among other EFs. Adolescents with weaker EF skills report poorer social relationships and likely have less successful peer interactions due to ineffective interpersonal communication (Nilsen & Bacso, 2017).

In general, adolescence marks an increase in social participation. Teenagers begin attending parties, going to movies, and hanging out with peers on their own (Jarus et al., 2010). These are informal activities that require less planning than more organized tasks like attending music lessons (Jarus et al., 2010). Regardless, teenagers no longer have parents to act as intermediaries to arrange peer meetings, meaning they must carry out the steps of organizing social linkups themselves, which requires that they make use of their EFs. Consider an adolescent planning to meet a friend at their home. To do so, this teen must make use of multiple EFs. They must plan, organize, and schedule a date and time for the meeting and the means of transportation to arrive at their friend's house. They must be able to self-monitor to ensure they leave within time to get to their designated location.

Underscoring the importance of EFs in high school is the finding that adolescents with EF dysfunction fare worse than their typically developing peers in terms of partaking in school activities (Fogel et al., 2021). Self-reports from parents of children and adolescents aged 10 to 14 with EF deficits indicate that their children participate infrequently and are less involved in school settings, even above home and community environments (Fogel et al., 2021). This lower participation rate is attributed to the high-EF school environment (Fogel et al., 2021). Specifically, within school, greater structure, more frequent and intense peer interactions, and novel future-oriented academic tasks all necessitate EF use. For example, social exchanges with peers necessitate effective behavioural regulation, and turning in work with deadlines at future time points requires self-monitoring.

### ***EFs and SWB***

There are direct connections between EFs and SWB. Utilizing an affective n-back task, Pe and colleagues (2012) showed that individuals who updated and retained positive words in working memory were more likely to experience positive than negative emotions and reported higher LS. EFs and SWB are also related indirectly. EFs are linked to other aspects of adaptive human behaviour like self-regulation, also termed self-control (Hofmann et al., 2012). Trait self-control is linked to both LS as well as PA and NA (Hofmann et al., 2013). Notably, individuals with higher trait self-control experience less internal goal conflict, which translates into decreased momentary negative affect (Hofmann et al., 2013).

Additionally, EFs influence SWB through their role in coordinating and supporting social and academic goal pursuit. EFs play a role in enhancing social relationships via their contribution to bettering social communication. Students with better relationships with peers report significantly better mental health within a school context (lower depression and anxiety),

higher self-esteem, and less social dysfunction (Sarkova et al., 2014). This is true regardless of their experience being bullied or bullying other same-age peers (Sarkova et al., 2014). In the academic context, for which EFs are important, SWB is again linked to better outcomes. In 7th and 8th grade students studied over five months, higher LS drove greater academic achievement, and better grades resulted in increased subsequent LS (Ng et al., 2015). Positive or negative affect did not moderate the relationship between LS and academic achievement (Ng et al., 2015).

In essence, well-developed EF skills are necessary to promote positive individual outcomes like better friendships, higher academic achievement, and greater physical health, all of which play a role in maintaining well-being (Luerssen & Ayduk, 2017). Conversely, EF difficulties have emerged as a risk factor for adolescents. Executive dysfunction has been linked to poorer academic achievement, difficulties with vicarious (observational) learning and altruism impacting social competence, low personal well-being, stress, and the maintenance and exacerbation of mental health issues like depression (Biederman et al., 2004; Joorman & Gotlib, 2010; Luerssen & Ayduk, 2017; Nolen-Hoeksema et al., 2008; Ortuno-Sierra et al., 2020; Riccio & Gomes, 2013).

Given these established associations between EFs and high school and EFs and SWB, it becomes important to investigate how EFs and SWB relate explicitly in the context of the high school transition.

### ***EFs, SWB, and the Transition to High School***

Scarce, if any, research investigates EFs in direct relation to SWB during the transition to high school. However, the switch to middle school from elementary has received greater attention within the school transition literature. EFs account for as much as 14% of the individual differences in children's academic and behavioural functioning post the 6th grade, which is the

start of middle school in many North American education systems (Jacobson et al., 2011). Moreover, EFs explain more variance when teachers rate EFs (assessing skills as applied in a school setting) than parents (Jacobson et al., 2011). EF skills, especially applied in academic settings, seem more predictive of adjustment within school environments. While these findings speak to the link between EF skills and social and academic competence post-transition, they do not explore potential changes in SWB.

The academic and social challenges of the middle school transition are like those experienced by students entering high school. It is therefore plausible to assume that similar trends may also emerge in high school, with better EFs fostering outcomes associated with higher SWB in students' post-transition. Crucially, it seems prudent to account for EF skills as they are applied to daily environmental challenges. To my knowledge, no prior studies have investigated adolescent's everyday application of EF skills as a source of individual differences in SWB at all, let alone during the high school transition period.

### **Close Relationships**

In 1977, Urie Bronfenbrenner developed the ecological systems theory of human development. Bronfenbrenner (1977) postulated that a developing person interacts with, responds to, and is impacted by exchanges within and between external agents, proximal and distal settings, and social contexts. Essentially, individuals are seen as nested within multiple systems. Each individual is an active agent in the centre of their universe of "systems" and shapes their environment to accommodate them through a cycle of evoking reactions from and responding to the outside world around them (Darling, 2007). The closest system is the microsystem, which encompasses an individual's immediate groups and societal institutions

(families, peers, schools), followed by the mesosystem, which accounts for the interactions between each agent in the microsystem (e.g., teachers with parents, families with schools).

School transitions are a life change that directly influence an adolescent's most proximal developmental contexts. As a teenager enters a new school environment, many aspects of the microsystem and mesosystem change, potentially impacting individual development. The school is physically different, peer relationships transform as adolescents establish new friendships and disengage from old ones, and connections between teenagers and families evolve as demands for autonomy increase. These changes in social relationships modify the level of social support an individual can draw on as a protective resource during times of stress, possibly affecting psychosocial adjustment and, consequently, SWB during this time. Therefore, close relationships, encompassing families and peers, are vital to investigate during the transition period to understand what role, if any, positive relations with others can play in explaining variations in post-move SWB.

### ***Close Relationships and Adolescence***

A comprehensive examination of close relationships in adolescence is beyond the scope of this literature review. However, some aspects of normative social development influence how disruptive the high school transition is for teens. It is, therefore, briefly appraised within this text in the context of the challenges of the transition period.

As teenagers age, relations with peers attain greater importance, rivalling and sometimes superseding the influence of parents (Brown & Larsen, 2009). Adolescents increasingly turn to peers for social support over parents by the time they are in Grade 7 (Furman and Buhrmester, 1992). Meeting peer expectations, fitting in with same-age friends, and what other age-mates think about them matters more to adolescents than the demands and expectations of adults in

their lives (Brown & Larsen, 2009). In tandem, peer relations become more complex, with questions arising about how relationships will impact social status and whether peers share similar enough values to become friends (Brown & Larsen, 2009). Friendships offer a space within which teenagers can share joint interests and general opinions, emotions, and feelings (Claes & Poirer, 1993). Peers provide opportunities for intimacy and shared understanding. As friends, adolescents can explore and form self-concepts in a non-threatening space, especially since friendships are developed largely voluntarily and often involve individuals on equal footing with each other, unlike families (Boisvert & Poulin, 2016; Bowker & Ramsey, 2018). In the backdrop of this divergence from parents in favour of establishing closer links with peers comes the transition to high school – an event that disturbs friendships. At the same time, families remain stable through the transition and can presumably offer social support during this life change; this is vital given the role families play in promoting SWB.

### ***Close Relationships and SWB***

Both parents and peers contribute significantly to positive emotional and psychological outcomes in adolescents' lives. Qualitative research has determined several dimensions of family life that encourage higher levels of SWB among adolescents. These include thinking of the family home as a safe and comfortable environment, family members displaying love and care for each other regardless of differences in outlook, family communication being open and honest, allowing for the expression of positive and negative emotions, familial sharing of joys and sorrows, encouragement of adolescent autonomy, and reassurance to the teenager about being a valued part of the family unit (Joronen & Astedt-Kurki, 2005). In contrast, adolescents who described their family life as marked by discord and conflict, and their family's involvement in their life as overbearing and encroaching on their autonomy, reported lower well-being

(Joronen & Astedt-Kurki, 2005). More recent quantitative work has corroborated these qualitative findings – noting that teenagers who endorsed warm relationships with their mothers, of which open communication channels were a part, also noted satisfaction rather than ill-being (Lampropoulou, 2018).

The other and sometimes more salient feature of adolescent social relationships – friendships, also impact SWB. Peer relationships can shield teens against adverse psychological and social outcomes, safeguarding against stress and even offsetting negative parent-child relationships (Bowker & Ramsey, 2018). Positive peer relationships are the most valuable aspect of most adolescents' self-reported experience at school (Gowing, 2019). They are linked to higher positive affect in adolescents, with peers believed to be a source of support during challenging times (Gowing, 2019). Some features of adolescent interpersonal functioning – like being affiliated with popular peers and enjoying positive relationship qualities in best friendships (the presence of support and intimacy), are also linked to lower depressive and social anxiety symptoms (La Greca & Harrison, 2005).

On the other end of the spectrum, negative peer relationships promote a range of negative consequences related to SWB. Loneliness, an emotional state of heightened negative affect precipitated by the perception of social relationships as low quality, is linked to a decline in positive mental well-being, which involves an evaluation of both hedonic and eudemonic well-being (Houghton et al., 2016). Additionally, lower peer acceptance is associated with increased peer victimization and rejection (Casper et al., 2020). Clearly, strong, positive relationships with peers and family members are crucial for positive youth development.



### *Close Relationships, SWB, and the Transition to High School*

How do close relationships influence SWB during the transition to high school? Research addressing this line of inquiry remains relatively scant, which is surprising, given the general understanding that supports from close relationships can improve SWB among adolescents. Cross-sectional and longitudinal evidence has shown that as youth enter high school, perceived parent and peer support declines (Newman et al., 2007). Additionally, these changes in perceived social support predict an increase in depressive symptoms from Grade 8 to 9 (Newman et al., 2007). These findings offer insight into how disturbances in social support during the transition period influence mental health outcomes but do not speak specifically to variations in SWB.

Corroborating past findings, Benner and colleagues (2017) also recorded increases in loneliness across the transition period. However, this study additionally found longitudinal evidence that increasing, or at the very least stable, friend support across the transition served as a protective factor against experiencing greater depressive symptoms. School belonging also played a role in maintaining socioemotional well-being amongst teens. Interestingly, parental support did not influence socioemotional or academic outcomes during this time.

While past research serves as a good steppingstone by providing an understanding of how supportive close relationships attenuate disruptions in psychological and emotional functioning, they do not currently explicitly speak to SWB and largely focus on the presence or absence of psychological distress. Ergo, there remain lingering questions as to whether supportive relationships actively increase life satisfaction and positive affect during this time or work to simply deter adverse mental health outcomes, with no additive beneficial impacts on youth functioning.

## **EFs and Close Relationships?**

Having delved into how close relationships and EFs are related to SWB in the high school setting independently, how they relate to each other both within and outside the school context is relevant to discuss. Previous sections in this literature review comment on how teenagers' social autonomy in high school provokes greater independent use of EFs. However, EFs do not simply encourage social goal achievement when independent socialization increases. EFs and close relationships share a bidirectional association throughout development. Beauchamp and Anderson's (2010) socio-cognitive integration of abilities (SOCIAL) model posits that attention, executive functions, socio-emotional skills, and communicative ability all underlie social functioning. Specifically, executive functions are thought to be part of the cognitive and affective skills that aid the development and emergence of social skills, which are necessary for initiating and maintaining interpersonal relationships. Among EFs, self-regulation, self-monitoring, and inhibitory control are central to facilitating social interactions (Beauchamp & Anderson, 2010). Lack of self-regulation can translate to socially inappropriate behaviour (e.g., interrupting others, being unable to control aggressive reactions), which is a barrier to healthy relationships with peers, parents, and other important social agents.

Notably, age seems to impact the link between EFs and social relationships. In preschool children, interpersonal connections seem to be heavily influenced by effective EF function, but the strength of this association declines by adolescence (Leece et al., 2019). This may be because other factors become more important for social function, like communication and knowledge of tried-and-tested strategies to make and keep friends (Leece et al., 2019).

The concept of interpersonal exchanges contributing to cognitive development is quite old, particularly in socio-constructivist theories - Vygotsky first introduced it in 1978 as part of

his ideas on the zone of proximal development. In line with socio-constructivist ideas, social relationships facilitate EF development by providing a context within which individuals can practice their EF skills. In children, engagement in play with peers contributes to the development of self-regulation (Coplan & Arbeau, 2009). By pre-adolescence, when children are in middle school, definitive pathways between the presence of positive peer relationships and EF development emerge. Specifically, the more a child engages with their peers and is accepted by them, the greater the improvement in their working memory skills (Leece et al., 2019). In contrast, peer rejection predicts lower cognitive inhibition growth, suggesting that isolation results in poor self-regulation outcomes (Leece et al., 2019). These findings demonstrate how close relationships can shape EFs, at least in the middle school context. Plausibly, the high school setting may be another avenue in which EFs and close relationships continue to interact. Moreover, given their independent links to SWB, it is also possible that the two jointly predict SWB. So far, no work has directly looked at these two predictors in tandem during the high school transition period. Given the sensitivity of EFs to improvement in the presence of positive close relationships in other age groups, further investigation into whether this is true for high school students is warranted. Additionally, there is a possibility that close positive relationships may emerge as a protective factor for SWB, especially in those who experience EF difficulties during the high school transition period.

## **Conclusion**

Decades of research on SWB have produced a cornucopia of insights on the subjective well-being of diverse demographics, including adolescents. However, a multitude of questions remain unanswered, particularly in the context of transitional life changes – like the move from middle to high school. Much has been said about declines in mental health outcomes across the

transition period – but what about specific indicators of SWB, beyond accounting solely for psychological distress? Furthermore, entirely unexplored is the influence of EFs on adolescent SWB, especially when increasing academic and social demands ask teenagers to attain greater independence employing their EFs in everyday life. Finally, we know close relationships promote positive outcomes in youth. What role do close relationships play during the high school transition? Are they protective against declines in SWB? How do they interact with EFs, if at all? The following sections attempt to answer these lines of inquiry in the hope of better understanding how best to intervene to improve transition outcomes among adolescents.

## **“Will I Be Happy in High School?” Exploring How Interpersonal and Executive Functions Influence Adolescent Subjective Well-Being Across the Transition to High School**

Starting high school is a formative milestone in an adolescent’s life that requires considerable psychological, academic, and social adjustment. Adolescents differ in their ability to navigate this transition (Benner, 2011; Waters et al., 2014). Youth who experience the transition as uncertain and challenging typically report increased academic challenges, loneliness, and mental health concerns along with declines in positive affect, and self-esteem, sometimes culminating in their disengagement from or dropping out of school prior to graduation (Akos & Galassi, 2004; Anderson et al., 2000; Benner 2011; Benner et al., 2017). Compared to those who struggle, adolescents who undergo positive transitions note better psychological adjustment, including lower loneliness, depression, and anxiety, and are expected to have greater prospective well-being (Rice et al., 2011; Waters et al., 2012; West et al., 2008). These corollaries of the high school transition are all facets of subjective well-being (SWB), a construct that has moved beyond narrow definitions reflecting the presence or absence of mental distress to broadly include one’s affective experiences and appraisal of life satisfaction (Diener, 1984; Huppert, 2009; Park, 2004).

Approximately five million youth currently attend public elementary and secondary schools in Canada (Statistics Canada, 2021). Almost all these youth have or will experience the switch to high school, with all its immediate and lasting impacts on teenage well-being. As such, an important goal for research is to elucidate factors that predict individual differences in adolescent SWB across the high school transition.

The specific challenges linked to entering and navigating a high school environment offer a window into what predictors might meaningfully influence SWB across the transition period.

Adolescence in and of itself brings normative development associated with puberty, including biological changes resulting in physical maturation, shifts in intrapersonal dynamics, and psychological and social restructuring (Sawyer et al., 2012). Additionally, within new school surroundings, teenagers must re-establish their social connectedness and position in new peer groups while also coping with an increasingly complex academic curriculum that comprises more independent learning and a heavier workload (Barber & Olsen, 2004; Benner, 2011; Coffey, 2013; Waters et al., 2012). Previous models of well-being in the context of school settings reflect these challenges, frequently accounting for social relationships and academic achievement as crucial factors impacting teenage SWB at the macro level, contributing to both satisfaction and ill-health (Konu & Rimpella, 2002; Lampropoulou, 2018). However, prior models rarely account for the influence of predictive factors on the differing components of SWB (positive affect, negative affect, and life satisfaction) and scarce existing research incorporates measures of the cognitive abilities that directly drive academic performance and adaptive behaviour. Here, I attempt to account for individual differences in SWB in teenagers as they transition to high school by considering two critical factors that impact how well an individual integrates to a new school environment both academically and socially: executive functions (EFs) and close personal relationships.

### **Executive Function (EFs)**

EFs refer broadly to interrelated cognitive skills that facilitate engagement in adaptive behaviours during goal pursuit (Goldstein & Naglieri, 2014). The EF umbrella encapsulates a wide range of capabilities, with working memory, inhibitory control, and cognitive flexibility forming the foundation from which more complex skills like emotional control, organizing, and planning are thought to emerge (Goldstein & Naglieri, 2014). Adolescence is a time of continued

EF refinement and substantive individual differences in EF persist across the teen years (McAuley & White, 2011; Theodoraki et al, 2019).

Successful adaptation in high school requires psychosocial adjustment, which demands that youth evaluate the suitability of previously employed behaviour and adjust if it does meet new environmental demands (Madariaga et al., 2014 as cited in Piqueras et al., 2019). In a North American cultural context, there is an expectation that adolescents will begin to use their executive skills more autonomously upon transitioning to high school. As students enter high school, they are subject to a changed, more complex curriculum – there are with more subjects to learn, that are increasingly less integrated with each other, with different teachers and classrooms (Dawson & Guare, 2018; Ganeson & Ehrich, 2009). Additionally, adolescents must balance academic tasks with extracurricular activities and leisure time (Fogel et al., 2021). Students themselves recognize this need for greater independent work, listing more homework, difficult coursework, and new and higher expectations from teachers as one prominent concern when switching to a new high school (Akos & Galassi, 2004; Uvaas & McKeivitt, 2013). At the same time, they perceive themselves as receiving less support and monitoring from teachers and administrators (Barber & Olsen, 2004).

For adolescents, this means tackling academic tasks on their own, by becoming self-regulated learners, which requires the use of their EF skills (Zimmerman, 2002). For example, to learn independently outside of school, teenagers must plan and organize their schedules to accommodate discrete multi-subject schoolwork (goal pursuit). They must direct themselves to initiate tasks related to assigned schoolwork and keep track of varying deadlines in different classes, all without the comfort of relying on as many teacher or parental reminders.

EFs are also important in social contexts. EFs are important for interpersonal interactions because they facilitate effective communication between individuals (Nilsen & Bacso, 2017). Challenges with appropriately exercising working memory, a core EF skill, predicts poorer communicative perspective-taking in adolescents, which is in turn associated with weaker peer relations (Nilsen & Bacso, 2017). In a new school environment, the recreation of social connections necessitates that communication between peers be effectual, so the exchange of ideas and interests can facilitate new friendships. The role of EFs in enabling successful social interaction is especially vital given that social relationships are essential for adolescent's psychological well-being in the context of the school environment (Sarkova et al., 2014). EFs are also important for other aspects of establishing and maintaining social connections too. For example, to arrange a trip to a friend's house (goal pursuit), a person must make appropriate use of their EF skills. They must plan and organize to schedule a date and time for the meeting, and the means of transportation to arrive at their friend's house. They must be able to self-monitor to ensure they leave within time to get to their designated location.

Well-developed EF skills are essential for promoting positive outcomes like better long-term relationships, higher academic achievement, and better self-control, all of which play a role in maintaining well-being (Luerksen & Ayduk, 2017). Conversely, challenges with EFs have emerged as a risk factor for adolescents, contributing to poorer academic and social outcomes, lower adaptive functioning, mental health issues, stress, and low personal well-being (Biederman et al., 2004; Diamond, 2013; Ortuno-Sierra et al., 2020; Riccio & Gomes, 2013). Additionally, past research has indirectly linked specific EF skills, like self-regulation and working memory, with SWB (Hoffmann et al., 2012; Hoffmann et al., 2014; Pe et al., 2013). For instance, individuals who retain and update positive (but not negative) information in working memory



report higher levels of life satisfaction and affect balance (Pe et al., 2013). Additionally, EF skills predict social and academic competence, and consequently, successful adjustment (typically associated with high SWB) during the middle school transition (Jacobson et al., 2011).

### **Close Relationships**

Close relationships have been implicated in adolescents' subjective well-being. Additionally, positive relations with close others have also emerged as a protective factor against risk in adolescence, indirectly improving subjective well-being within this demographic. Youth who perceive their families as interpersonally warm, supportive of personal autonomy, and who have open communication with their parents, endorse higher levels of life satisfaction, whereas teenagers who perceive their families as hostile, and themselves as overly dependent on family members, report the converse (Joronen & Astedt-Kurki, 2005; Lampropoulou, 2018).

In adolescence, peer relationships become increasingly influential as a source of social support (Furman and Buhrmester, 1992). Friendships offer a space within which teenagers can share common interests, as well as express general opinions, emotions, and feelings (Claes & Poirer, 1993). Within this demographic, peers provide opportunities for intimacy and shared understanding – as friends, adolescents can explore and form self-concepts in a non-threatening space (Bowker & Ramsey, 2018). Additionally, friendships can shield teens against negative psychological and social outcomes – safeguarding against stress and even counterbalancing negative parent-child relationships (Bowker & Ramsey, 2018).

Positive peer relationships are linked to higher positive affect in adolescents, with peers believed to be a source of support during challenging times (Gowing, 2019). In contrast, negative peer relationships promote high negative affect, stress, and risk-taking behaviour, with poor peer networks associated with adverse mental health outcomes like depression and loneliness

(Gowing, 2019; Houghton et al., 2016; La Greca & Harrison, 2005). Although peer relationships attain increasing importance in adolescence, they do not act in isolation – both family and friend connections work in tandem to influence adolescent development, producing positive and negative functional outcomes lasting into early adulthood (Richards et al., 2019).

### **Current Investigation**

EFs are important for goal-directed behaviour and are used more autonomously by youth to navigate the changing academic and social demands that are inherent to high school. To our knowledge, youths' everyday application of executive skills has not been investigated as a potential source of individual differences in SWB during the high school transition period.

In addition, peer and family connections have emerged as protective factors for adolescent well-being. There is also reason to believe that close relationships share a bidirectional association with EFs. It has been argued that EFs such as inhibitory control and self-monitoring allow individuals to achieve social goals, while others posit that interpersonal relationships (especially peer connections at school) provide a context within which individuals practice EF skills (Beauchamp & Anderson, 2010; Lecce et al., 2019). Peer relationships support EF skill development, which has implications for adolescents with poorly developed EFs (Lecce et al., 2019). Therefore, it is crucial to account for close relationships during the high school transition period.

To address these gaps, my present investigation probes the unique and joint influence of EFs and close relationships on adolescent SWB across the transition to high school. To do so, I will investigate three main questions: (1) Do indicators of SWB differ significantly between adolescents pre-and-post high school? (2) Do close personal relationships and executive functions uniquely predict SWB in youth as they transition to high school? Moreover, (3) Do

close personal relationships moderate the link between EFs and adolescent subjective well-being during the move to high school?

First, I hypothesize that compared to pre-high school, teenagers' post-high school will display low levels of SWB, as reflected in more NA and psychological distress and less PA and life satisfaction. Second, I believe that higher positive relations with close others will predict greater levels of adolescent SWB through the transition to high school. However, given the disruption in social and school connectedness in new educational settings, I expect fewer overall positive relations with others after the transition to high school. Additionally, less EF challenges will predict higher adolescent SWB. Adolescents will experience more EF difficulties, and struggle with the emphasis on self-directed learning in high school, post-transition. Third, I expect that in youth with inadequately developed EF capabilities, close personal relationships will moderate the link between EFs and SWB during the transition period.

## Methods

### Participants

One hundred and ninety-one youth (108 female) were recruited from local schools and community spaces (e.g., libraries and malls). Youth ranged in age from 11 to 18 years ( $M = 13.5$ ,  $SD = 1.5$ ) and self-identified as having racial/ethnic backgrounds that are reflective of [blinded] region (57.1% Caucasian, 6.3% East Asian, 5.2% African, 4.7% Hispanic, 3.7% First Nations, Métis, and Inuit, 2.6% South Asian, 2.6% Middle Eastern, 17.8% ‘Missing or Other’). The current investigation was restricted to 106 youth from the full sample who were between the ages of 13 and 15 years (57.5 % female), which enabled us to capture those who were immediately before ( $n = 64$ ;  $M_{age} = 13$ , 46.9% female) and after ( $n = 42$ ;  $M_{age} = 14.4$ , 73.8% female) the transition to high school. The racial/ethnic backgrounds of individuals in the study sample reflected those of the full sample (Table 1).

### Materials

Descriptive statistics for constructs assessed through surveys, including SWB components (positive affect, negative affect, satisfaction with life), EFs, and positive relations are presented in Table 2. All constructs had high internal consistency ( $\alpha > .70$ ) and were normally distributed (skew values less than + 1 and more than -1 and kurtosis values less than +1).

**Demographic Questionnaire.** This background survey included questions related to the participant’s age, gender (dummy coded with boys as “1”), ethnicity, education level, primary language, and exposure to and fluency in English.

**Positive and Negative Affect Schedule (PANAS;** Watson et al., 1988). This 20-item questionnaire probes the extent to which an individual experiences positive (PA) and negative

(NA) state affect. Participants were asked to indicate the extent to which they experienced specific emotions related to either PA or NA in the present moment (that is, when they were completing the questionnaire) on a 5-point Likert scale ranging from *very slightly or not at all* (1) to *extremely* (5). Items were summed to create a total PA and NA score.

**Satisfaction with Life Scales** (SWLS; Diener et al., 1985). This 5-item scale measures an individual's cognitive judgement of their overall life satisfaction. Participants indicated the extent to which they agree with each item by providing a rating on a 7-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7). Items were summed to create a score reflecting overall life satisfaction.

**Ryff Scales of Psychological Well-Being** (Ryff, 1989). This 42-item self-report survey provides a measure of psychological well-being through six constructs: positive relations with others, autonomy, self-acceptance, purpose in life, environmental mastery, and personal growth. Participants indicated the extent to which they agreed with each statement related to themselves or their lives on a 6-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (6). Notably, only items related to the positive relations with others subscale were analyzed in the current study. Items from this subscale were summed to create a total composite score for global positive relations with others.

**Behaviour Rating Inventory of Executive Function** (BRIEF-SR; Gioia et al., 2000). This 80-item self-report rating scale measures an adolescent's subjective perception of their goal-directed behaviour (e.g., their ability to inhibit pre-potent actions, to self-monitor, to successfully execute tasks requiring working memory). Participants indicated whether they had experienced an issue with each behaviour over the preceding 6-month period using a 3-point Likert scale that

ranged from *never* (0) to *often* (2). Items were summed to create a global measure of executive dysfunction, termed the global executive composite (GEC).

**Brief Symptom Inventory** (BSI; Derogatis & Melisaratos, 1983). This 53-item self-report scale measures psychological symptoms across nine dimensions, reflecting a wide range of psychopathological syndromes (e.g., depression, anxiety). Participants rated whether they experienced each symptom over the past week on a 4-point scale ranging from *not at all* (0) to *extremely* (4). Items were summed to create a score reflecting current mental health distress, termed the global severity index (GSI). The BSI was modified for use in this sample to exclude two items related to suicidality.

## **Procedure**

This study is a secondary analysis of data from a broader investigation examining emotion regulation and well-being in adolescents. Informed consent was obtained from youths' parents/guardians prior to the study and assent was obtained from adolescents at the time of the session. Teenagers completed eight questionnaires in a quiet space located in their school, community, or in our lab using either a laptop or paper and pencil. Questionnaires were administered in the following fixed order: Demographic Questionnaire, Lifespan Emotion Regulation Questionnaire (LERQ), Emotion Regulation Questionnaire (ERQ), Rosenberg Self-Esteem Scale, PANAS, SWLS, BSI, Ryff Scales, and BRIEF-SR. The LERQ, ERQ, and Rosenberg Self-Esteem Scales were not considered in the analysis for the current study. The sessions were approximately 35 to 45 minutes long. Youth received \$15.00 CAD in remuneration and the opportunity to be part of a draw for a \$50 gift card. This study obtained clearance from a University of Waterloo Research Ethics Board.

## **Missing Data**

A single participant was excluded due to excessive missing data (i.e., more than 20% missing responses on several measures). One youth was excluded due to being a multivariate outlier, while four others were removed from further analysis because they were influential univariate outliers. The remaining sample comprised of a total of 106 adolescents. The percentage of missing data from each scale was as follows: PANAS (2.4%), SWL (2.1%), BSI (2.3%), Ryff scales (4.8%), and BRIEF-SR (1.6%). Given the small proportion of missing data (less than 5% of all possible items), imputation with the expectation-maximization algorithm was used for missing values at the item-level on the PANAS, SWLS, BSI, and Ryff scales. For the BRIEF-SR, missing values were replaced with a value of “1” following guidelines in the manual. SPSS Version 28 was utilized to carry out all data analysis. Predictors were mean centered prior to the creation of interaction terms during multivariate regression analysis.

## Results

Table 3 displays bivariate correlations between study variables. Youth who endorsed higher executive dysfunction reported significantly lower positive relations with others ( $p < .001$ ). In addition, those who indicated experiencing significantly greater negative affect and psychological distress as well as lower life satisfaction also noted greater executive difficulties ( $ps < .001$ ). Conversely, youth who endorsed having more positive relations with others reported significantly lower negative affect and psychological distress ( $ps < .001$ ), higher positive affect ( $p = .02$ ), and greater life satisfaction ( $p < .001$ ). Overall, youth with weaker interpersonal relationships and greater executive difficulties tended to display lower subjective well-being as reflected in multiple indicators.

Given the directional nature of our hypotheses, one-tailed independent samples t-tests were initially used to compare subjective well-being indicators in the pre-and post-high school transition groups (Table 4). Students in the post-high school compared to pre-high school group reported significantly lower life satisfaction, whereas psychological distress showed the opposite pattern. Both positive and negative affect were statistically comparable across the two groups. In addition, predictors of SWB differed considerably among pre-and-post high school students, such that post-high school, students reported significantly lower positive relations with others and more EF difficulties.

Next, hierarchical regressions were used to model subjective well-being indicators as a function of gender, school stage (pre-or-post high school), EF difficulties, and positive relations with others (step 1) and the interaction of EF difficulties and positive relations with others, school stage and positive relations with others, and school stage and EF difficulties (step 2).



The main effects of gender, school stage, positive relations with others, and EF difficulties explained 6.3% of the variation in positive affect, which was not significant (Table 5). None of the main effects were significant ( $p > .05$ ). The addition of interactions between school stage, positive relations with others, and EF difficulties did not add significant explanatory power to the regression model ( $p = .78$ ).

For negative affect (Table 6), 23.1% of variance was explained in step 1. Negative affect was significantly higher in adolescents who reported lower positive relations with others ( $p = .03$ ) and more EF dysfunction in daily life ( $p = .003$ ). The addition of interactions between school stage, positive relations with others, and EF difficulties did not add significant explanatory power to the regression model ( $p = .52$ ).

For psychological distress (Table 7), 31.1% of variance was explained in step 1. Psychological distress was significantly higher in those identifying as female ( $p = .03$ ), in youth with greater EF challenge ( $p = .002$ ) and in those with weaker positive relations with others ( $p = .003$ ). Two-way interactions between school stage, EF difficulties and positive relations with others in step 2 were not significant.

For life satisfaction (Table 8), 47.9% of variance was explained in step 1. Life satisfaction was significantly higher in youth who reported higher positive relations with others ( $p < .001$ ) and those who reported less difficulties with EF use ( $p = .02$ ). The addition of interaction terms in step 2 added an incremental variance of 3.3%, but this increase did not add significant explanatory power to the LS regression model ( $p = .096$ ). Main effects for school stage were also found, such being in high school predicted lower life satisfaction ( $p = .04$ ). Additionally, the interaction between positive relations with others and EF difficulties was significant ( $p = .012$ ).

The interaction was probed using simple slopes analysis in PROCESS 4.1 for SPSS (Hayes, 2022). Specifically, the association of EF difficulties and satisfaction with life was examined at the 16<sup>th</sup> (“low”) 50<sup>th</sup> (“average”), and 84<sup>th</sup> (“high”) percentiles of positive relations with others (Figure 1). This analysis revealed that satisfaction with life was consistently high for youth with higher levels of positive relations with others, irrespective of EF difficulties,  $t(106) = -0.15, p = .88$ . However, for adolescents with average or low levels of positive relations with others, increasing EF difficulties were significantly associated with decreasing satisfaction with life (average:  $t(106) = -2.30, p = .02$ ; low:  $t(106) = -3.40, p = .001$ ).

## Discussion

How might we improve subjective well-being amongst teenagers during the high school transition period? Evidence from the present study suggests that the answer partly lies with adolescents' close, positive relationships and ability to utilize their EFs effectively. Transitioning to high school is a significant life change for teenagers with acute and lasting impacts on their well-being. Past research has shown that those who struggle with the move to secondary school are likely to display several adverse outcomes, including mental health difficulties, like higher depression, anxiety, and loneliness, reduced general well-being, and an increased vulnerability to educational disengagement (Benner 2011; Bharara, 2020; Van Rens et al., 2017, Waters et al., 2012).

The current study corroborates past work by verifying that the switch to high school impacts mental health outcomes in the immediate window of adolescence during which the change occurs. Specifically, students post-transition report experiencing significantly greater overall psychological distress than those pre-high school. My study is novel in that it not only accounts for the presence or absence of mental distress but also examines the emotional and cognitive aspects of subjective well-being, as defined by Diener (1984). My results suggest that the high-school transition has differential impacts on aspects of SWB. While life satisfaction was significantly lower post-high school, positive and negative affect remained statistically comparable between our pre-and-post high school groups, even though numerical changes in these constructs were as expected. This is contrary to our proposed hypothesis, which postulated that positive affect would decrease along with life satisfaction, and negative affect would increase considerably post-transition.

Why did I see no significant differences in affect across our groups when life satisfaction was clearly and meaningfully lower for the post-high school cohort? Past work suggests that in adults, different major family and work life events evoke varying rates of adaptation and have discrepant impacts on emotional and cognitive well-being (Luhmann et al., 2011). Importantly, across groups, life events have more negative effects on life satisfaction than affective well-being (Luhmann et al., 2011). This pattern could also hold for our sample of adolescents, with a life change like a school transition impacting life satisfaction more strongly than PA or NA. Notably, the change in LS between our pre-and-post high school groups produced the largest effect size ( $d = .66$ ), lending further credence to the idea that LS may be more sensitive to the disruptive impacts of the high school transition. Another consideration is the difference in rating period between the PANAS survey measuring PA and NA and the BSI questionnaire accounting for psychological distress, which was significantly higher post-transition. The PANAS asks participants to rate specific feelings in the present moment, while the BSI probes various psychological symptoms, including emotions, experienced over a week. It is possible that widening the period that participants consider when making ratings can better capture everyday emotions.

Regardless, my results suggest that only life satisfaction is significantly lower post-transition. Past recommendations for transition planning have suggested developing an individualized curriculum for students, emphasizing procedural, academic, and social factors. The idea is that schools could promote better adjustment through increased teaching of strategies to complete independent work and by improving social connectedness through teacher-pupil links and peer-mentorship programs, which pair incoming students with upper-year high school students (Akos & Galassi, 2004; Uvaas & McKeivitt, 2013). These proposals are valuable and

likely to improve SWB among teens. However, I believe that we can also incorporate attention to mental health and life satisfaction into transition planning. How might we intervene to advance life satisfaction and decrease psychological distress among youth? The unique and joint contributions of close relationships and EFs to teenage SWB during the transition period offer some potential cues.

Adolescents in my study described having significantly lower positive relations with others and experiencing considerably higher executive dysfunction post-switching to secondary school. The loss of friendships and the need to re-establish new social connections in novel school environments is a well-established feature of school transitions (Benner, 2011). However, my finding that teenagers face noticeably greater EF difficulties post-entering high school is seemingly at odds with prior work that designates adolescence as a time of fine-tuning EF skills. Typically, such refinement involves showing increased mastery over engaging with and executing goal-directed thought and actions as teens age (Crone, 2009; McAuley & White, 2011). I can resolve this apparent contradiction if the new high-school environment, rife with challenging autonomous social and academic tasks, is considered an arena where adolescents practice and master their EF skills. When the adjustment is fresh, individuals have yet to learn how to apply their EFs in their novel surroundings effectively, and therefore report experiencing greater challenges with EF execution. Previous work has addressed the decline in academic achievement, primarily measured through lower grades, post-high school (Benner et al., 2017). My study is innovative in that it goes beyond academic achievement and explicitly investigates EFs, demonstrating the surge in self-perceived EF difficulties as expectations to become a self-regulated learner increase. These findings signal that the shift to autonomous EF use should occur gradually for adolescents starting high school. Furthermore, parents and educators should

prepare to scaffold the learning of independent EF use, with the awareness that some students will require EF support well into high school.

Positive relations with others and executive dysfunction uniquely predicted adolescents' negative affect, psychological distress, and life satisfaction. Specifically, identifying as an adolescent girl, having weaker social relationships, and reporting greater EF difficulties seemed to put individuals at risk of increased psychological distress during adolescence. Additionally, I believe my study is one of the first to address how adolescents' perceived, subjective evaluation of their EF difficulties impacts their subjective well-being. Importantly, school stage does not moderate the relationship between EF difficulties and SWB indicators. Therefore, teenagers who report greater EF challenges experience lower SWB, particularly life satisfaction, irrespective of their school environment – perceived EF difficulties are a risk factor for worse SWB across early adolescence. Notably, close relationships moderated the association between EF difficulties and life satisfaction. Strong close relationships emerged as a protective factor for life satisfaction, such that those with more positive relations with others reported consistently high life satisfaction, regardless of any EF challenges they described experiencing – this was irrespective of school status. The relationship between social relationships and EF skills is complex. Some argue that EF skills such as inhibitory control and self-monitoring allow individuals to achieve social goals, while others posit that social relationships (especially peer connections at school) provide a context within which individuals practice EF skills (Beauchamp & Anderson, 2010; Lecce et al., 2019). These findings suggest an association between EF skills and social relationships; my study confirms that such a link exists, with greater EF challenges linked to poorer positive relations with others.

Peer relationships support EF skill development, which has implications for adolescents with poorly developed EF (Leece et al., 2019). Plausibly, close relationships can act as a source of assistance to scaffold EF skills for individuals with EF challenges. Scaffolding can be done directly, through dyadic peer and parent tutoring, and by modifying teaching instructions to better suit student needs (Daley & Birchwood, 2010). EF support can also be delivered indirectly, with adolescents exhibiting poor EF skills offloading complex tasks to peers or parents (e.g., having peers arrange social outings, relying on friends to obtain information about assigned homework, relying on parental reminders to engage in task initiation or to stay on-task). However, given that teenagers with greater EF difficulties also report weaker social relationships, it is possible that those who do need external EF-supportive scaffolding the most have limited access to it because of less well-developed interpersonal connections. In these cases, interventions should predominantly focus on facilitating and reinforcing social relations, which in turn may aid effective EF application and will likely increase subjective well-being amongst EF-challenged youth.

While my study demonstrates the protective nature of close, positive relationships for life satisfaction in teenagers with EF difficulties, the exact mechanisms underlying this moderating association remain unclear. Traditionally, the tripartite structure of social support involves emotional, informative, and material support (Jacobson, 1986). I speculate that adolescents with ineffective EF skills, but rich interpersonal connections may utilize close others in one or all these ways to meet the increased social and academic demands of adolescence, especially when entering high school. For example, struggling teens could use close others to engage in affective relief (including venting, seeking encouragement and validation, and asking for care and acceptance). Social support through emotional means may not directly encourage more effective

EFs but will likely contribute to a heightened perception of available, high-quality social support, which is linked to significantly higher levels of life satisfaction and positive affect, as shown in the present study. Adolescents could also use peers and family to offload tasks that tax cognitive resources (e.g., asking friends about assigned homework, relying on peers to arrange social outings, depending on parents or siblings to keep track of chores), which may help compensate for the EF skills teens lack themselves. Consequently, they may experience diminished impacts of executive dysfunction, and higher levels of SWB. Future research will need to directly assess these suggested mechanisms to scrutinize further the precise role of close relationships as a protective factor for SWB in adolescents experiencing EF difficulties.

Regardless, it is abundantly clear that building and strengthening social bridges is vital for teenagers. The need to establish interpersonal connection is not restricted to entering a new social milieu (high school) and likely represents the increased want for peer socialization during adolescence. Considering the large amount of time teenagers spend at school, both middle and high schools can and should provide students with as many opportunities as possible to foster social connections. Beyond bonding with same-age peers through classroom and extra-curricular activities, establishing open, active lines of communication with upper-year students and teachers themselves will help improve the availability of social support and active school belonging students' experience. Educators and administrators can facilitate programs and events to build such connections at school. For example, schools can include mentorship programs, pairing younger students with a student a year above them at school, who can offer emotional, informational, and instrumental support and advice on how to best navigate trials related to school and life. Such a program can take advantage of adolescents' gravitation toward peers for advice and support by providing them with mentors who are similar in age. Mentorship itself is



built around the idea of helping others and providing guidance, drawing on altruism. Altruistic traits include empathy, social responsibility, interpersonal trust, and sociality, which are linked to higher life satisfaction through increased positive emotions (Lu et al., 2020). Thus, introducing such peer programming can be doubly beneficial by improving well-being, specifically LS, among both mentors and mentees.

Additionally, schools can improve connectedness within their walls by encouraging links between teachers and students. Ideally, more systemic organizational changes, like smaller teacher-student classroom ratios, can help promote greater individualized attention per student and thus bolster connections between the two parties. However, teacher-student ties can also be reinforced informally through the organization of meetings where teachers and students may be able to interact more personally, for example, in the style of “Meet A Teacher” events. These measures can help support adolescent social integration into schools, leading to positive downstream effects like better mental health outcomes and higher overall well-being.

### **Clinical Implications**

I worked with data from a community sample to investigate SWB, EFs, and close relationships among youth. However, it is likely that our findings are also applicable more generally to teens and adults who have disorders characterized by executive dysfunction, like Attention-Deficit Hyperactivity Disorder (ADHD). ADHD is a neurodevelopmental condition that often, although not universally, includes EF deficits (Lipszyc & Schachar, 2010; Martinussen et al., 2005; Nutt et al., 2007). Inattention symptoms related to ADHD (e.g., struggling with focus, organization, being forgetful) are closely related to EFs and are known to be moderately negatively related to life satisfaction in middle schoolers (self-rating:  $r = -.41$ ;

teacher rating:  $r = -.40$ ), such that as inattentiveness increases, life satisfaction declines (Lee et al., 2004; Ogg et al., 2016).

Recommendations for targeting EF-related ADHD symptoms include structured psychotherapies that can develop EF skills in tandem with other processes like improving adaptive functioning and growing self-esteem and self-reliance (Nutt et al., 2007). Additionally, the mode of EF intervention (cognitive/metacognitive, biofeedback, or others) should be tailored to each child, with parents and teachers involved in treatment planning, including design and alterations to the program (Riccio & Gomes, 2013). My findings expand on these proposals with the suggestion that support from close others is important in helping increase subjective well-being regardless of the specific EF difficulties an individual experiences.

Furthermore, there is little empirical evidence to advocate that traditional EF interventions produce long-term progress in applying EF skills in everyday life (Riccio & Gomes, 2013). Additionally, EF intervention effects are often narrow. Programs that focus on training working memory improve performance on untaught working memory tasks, but not tasks of other EF skills like cognitive flexibility (Diamond, 2012). Subsequently, perhaps it is best to also attend to protective factors that can shield adolescents with executive dysfunction disorders from the negative downstream consequences of ineffective EF use – like close relationships, as my findings imply. Importantly, opportunities for social connection will be crucial for children with EF impairments, who perpetually experience EF challenges and their subsequent adverse impact on SWB. This demographic will likely benefit tenfold from school programming like peer-mentorship programs, where they can build trusting and affirming relations with other students outside their immediate classroom environment. Moreover, teacher-

parent connections will be essential, so adolescents feel supported and like they belong to the two environments in which they spend almost all their teenage lives – home and school.

### **Contributions to Existing Literature and Limitations**

The present study advances our understanding of adolescent SWB during a seminal life change – the transition to high school. My findings bolster existing work demonstrating the disruptive psychological and social impact of the switch to high school on teenagers. They establish concrete evidence of lower subjective well-being, specifically life satisfaction, post-transition. Furthermore, I provide novel evidence that EFs are tied to well-being, irrespective of school status, such that increasing challenges in applying EF skills in everyday life predict significantly lower life satisfaction, higher negative affect and more psychological distress among youth. Importantly, my work shows that close relationships emerge as a moderator for the association between EF challenges and life satisfaction – those with strong, close, positive relationships experience consistently high life satisfaction, regardless of EF challenges. I discuss the implication of these results on school programming for enhanced social opportunities for adolescents in middle and high school. In addition, I suggest potential pathways for future research, especially around examining the precise mechanism by which close relationships serve as a protective factor for EF-challenged youth.

There are several limitations to the current study. First, it employed a cross-sectional study design, which restricts me from establishing causal trends across the transition period. I cannot comment on when LS begins to decrease during the transition to high school and whether difficulties in EF application precede lower LS. Second, girls were overrepresented in my post-high school cohort, while middle schoolers had greater numerical representation in my overall sample. Replications of this study should incorporate equal numbers of pre-and-post high school

students, and balanced gender ratios across samples. Third, I focused on changes in SWB coinciding with the high school transition, including only teenagers in the exact age range within which the transition occurs. A longitudinal examination of how SWB fluctuates within participants across the transition, as well as whether changes in EF effectiveness, perceived social support, and life satisfaction last throughout high school will be essential to investigate. This is in service of establishing timelines, setting curriculum expectations, and enhancing school programming for scaffolding EFs and providing opportunities for growth in peer relationships. Fourth, while my study accounts for perceived social support received from peers and parents, it does not include a measure for teacher support, which comprises a major part of feeling connected to the school environment and enhancing well-being among students. Future work focused on children and adolescents exploring similar phenomena should include peers, parents, and teachers as three distinct groups that teenagers derive much of their social support from and explore the exact role all three groups play in supporting SWB among youth. Finally, as mentioned previously, I cannot speak to the exact mechanism by which positive relations with others moderates the link between LS and EF challenges – this is an important area of prospective research.

In sum, this work builds on and complements past research, extends it through the addition of unique new findings, and provides a bridge to further investigation to best facilitate the continued construction of a body of work that aims to enable adolescents to live their best, most fulfilled lives, even during stressful life changes.

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## Appendix

**Table 1**

*Demographic Characteristics of the Study Sample (N=106)*

Ethnicity	Study sample	
	<i>n</i>	%
Caucasian	63	59.4
Hispanic	8	7.5
African	4	3.8
Middle Eastern	4	3.8
East Asian	3	2.8
South Asian	2	1.9
Indigenous (First Nations, Métis, Inuit)	2	1.9
Missing or Other	20	18.9



**Table 2***Descriptive Statistics for Study Variables (N = 106)*

Variable	<i>M</i>	<i>SD</i>	$\alpha$	Skew	Kurtosis
Positive affect	29.14	7.99	.85	0.03	-0.73
Negative affect	17.27	7.12	.88	0.93	-0.20
Satisfaction with life	23.97	5.96	.78	-0.32	-0.55
Psychological distress	1.21	0.65	.96	0.04	-0.56
Executive dysfunction	139.25	28.85	.97	0.37	-0.70
Positive relations with others	57.15	12.79	.86	-0.08	-0.59

**Table 3***Intercorrelations for Study Variables (N = 106)*

Variable	1	2	3	4	5	6
1. Positive affect	—	—	—	—	—	—
2. Negative affect	.25*	—	—	—	—	—
3. Satisfaction with life	.38**	-.37**	—	—	—	—
4. Psychological distress	.03	.44**	-.30**	—	—	—
5. Executive dysfunction	-.18	.41**	-.46**	.44**	—	—
6. Positive relations with others	.22*	-.38**	.63**	-.45**	-.46**	—

\* $p < .05$ . \*\* $p < .01$  (two-tailed).

**Table 4***Mean Group Differences Between Adolescents Pre-and-Post High School*

Indicator	Pre-High School ( <i>n</i> = 64)		Post-High School ( <i>n</i> = 42)		<i>t</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Positive affect	29.99	8.41	27.86	7.20	1.34	.09	.27
Negative affect	16.51	6.48	18.44	7.93	-1.37	.09	.27
Psychological distress	1.12	0.67	1.35	0.59	-1.84	.04*	.37
Life satisfaction	25.45	5.78	21.71	5.58	3.30	<.001**	.66
Positive relations with others	59.34	12.96	53.81	11.90	2.22	.01*	.44
EF difficulties	134.92	27.89	145.86	29.34	-1.93	.03*	.38

\**p* < .05, \*\**p* < .01 (one-tailed).

**Table 5***Modelling Positive Affect as a Function of Gender, School Stage, Social Relationships, and EFs*

Model	Step 1			Step 2		
	B	SE	t	B	SE	t
1 Gender	0.29	1.61	0.18	0.35	1.64	0.21
1 Stage	-1.36	1.66	-0.82	-1.75	1.72	-1.02
1 PRO	0.10	0.07	1.45	0.13	0.09	1.36
1 GEC	-0.03	0.03	-0.86	-0.03	0.04	-0.78
2 PRO x GEC				0.002	0.002	0.73
2 Stage x PRO				-0.08	0.14	-0.57
2 Stage x GEC				0.03	0.06	0.46
Total $R^2 / \Delta R^2$			.06			.07/ = .01

*Note.* Stage = pre-or-post high school; PRO = positive relations with others; GEC = general executive composite, a measure of executive dysfunction experienced by an individual; PRO x GEC, Stage x PRO, Stage x GEC = interaction terms.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\* $p < .001$  (two-tailed)

**Table 6***Modelling Negative Affect as a Function of Gender, School Stage, Social Relationships, and EFs*

Model	Step 1			Step 2		
	B	SE	t	B	SE	t
1 Gender	2.02	1.30	1.55	1.91	1.31	1.46
1 Stage	-0.12	1.34	-0.09	-0.27	1.38	-0.19
1 PRO	-0.12	0.06	-2.22*	-0.07	0.08	-0.91
1 GEC	0.08	0.02	3.07**	0.08	0.04	2.23*
2 PRO x GEC				0.000	0.002	-0.26
2 Stage x PRO				-0.15	0.12	-1.28
2 Stage x GEC				0.002	0.05	0.05
Total $R^2 / \Delta R^2$			.23***			.25/ = .02

*Note.* Stage = pre-or-post high school; PRO = positive relations with others; GEC = general executive composite, a measure of executive dysfunction experienced by an individual; PRO x GEC, Stage x PRO, Stage x GEC = interaction terms.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\* $p < .001$  (two-tailed)

**Table 7**

*Modelling Psychological Distress as a Function of Gender, School Stage, Social Relationships, and EFs*

Model	Step 1			Step 2		
	B	SE	t	B	SE	t
1 Gender	0.26	0.11	2.28*	0.26	0.11	2.31*
1 Stage	0.01	0.12	0.09	0.01	0.12	0.04
1 PRO	-0.01	0.01	-3.03**	-0.02	0.01	-2.24*
1 GEC	0.01	0.002	3.21**	0.01	0.003	2.54*
2 PRO x GEC				0.000	0.000	0.58
2 Stage x PRO				0.001	0.010	0.15
2 Stage x GEC				-0.002	0.004	-0.37
Total $R^2 / \Delta R^2$			.31***			.32/ = .005

*Note.* Stage = pre-or-post high school; PRO = positive relations with others; GEC = general executive composite, a measure of executive dysfunction experienced by an individual; PRO x GEC, Stage x PRO, Stage x GEC = interaction terms.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\* $p < .001$  (two-tailed)

**Table 8**

*Modelling Life Satisfaction as a Function of Gender, School Stage, Social Relationships, and EFs*

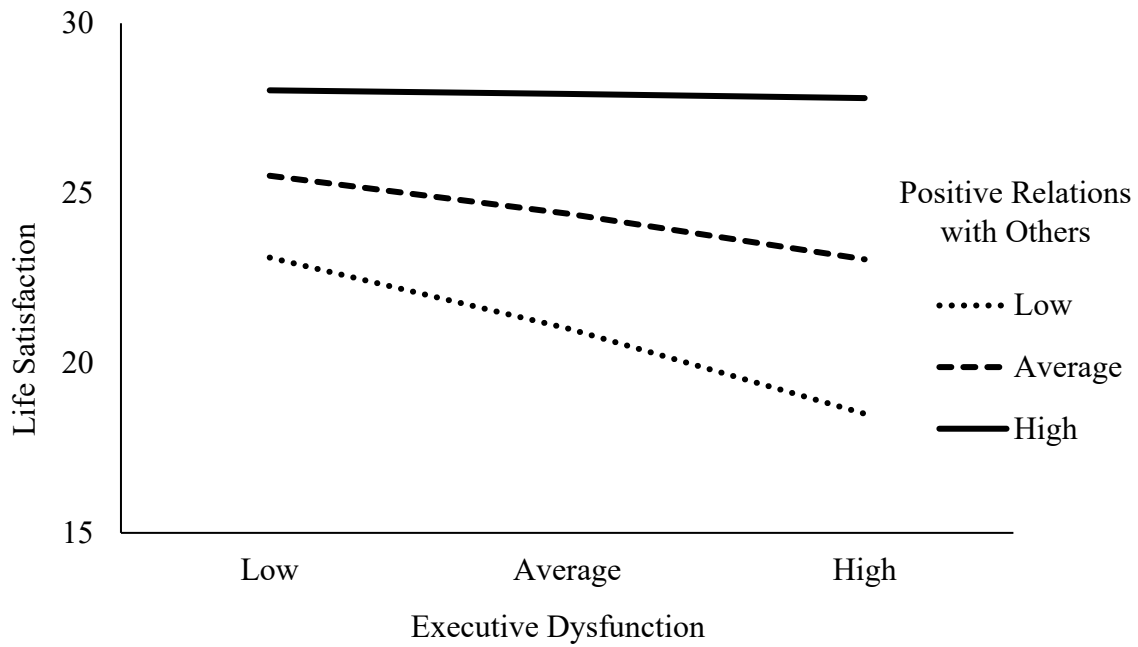
Model	Step 1			Step 2		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>
1 Gender	-1.66	0.90	-1.85	-1.45	0.89	-1.63
1 Stage	-1.56	0.93	-1.68	-1.20	0.94	-2.14*
1 PRO	0.23	0.04	6.05***	0.24	0.05	4.70***
1 GEC	-0.04	0.02	-2.43*	-0.04	0.02	-1.74
2 PRO x GEC				0.003	0.001	2.55*
2 Stage x PRO				-0.01	0.08	-0.16
2 Stage x GEC				0.01	0.03	0.42
Total $R^2 / \Delta R^2$			.48***			.51/.03

*Note.* PRO = positive relations with others; GEC = general executive composite, a measure of executive dysfunction experienced by an individual; PRO x GEC = interaction term.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$  (two-tailed)

**Figure 1**

*Life Satisfaction at Varying Degrees of Positive Relations with Others and EFs*



*Note.* Generally, the more EF difficulties teenagers’ experience, the lower their life satisfaction. However, this relationship is moderated by the strength of their positive relations with others.