

SCREEN TIME, SLEEP AND SOCIAL RELATIONSHIPS: A POPULATION-LEVEL
STUDY EXAMINING EMOTIONAL WELLBEING DURING EARLY ADOLESCENCE

by

Muthuthantrige Savithri Cooray

BSc., Simon Fraser University, 2018

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

The Faculty of Graduate and Postdoctoral Studies

(Population and Public Health)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

July 2020

©Muthuthantrige Savithri Cooray, 2020

The following individuals certify that they have read, and recommend to the Faculty of Graduate and Postdoctoral Studies for acceptance, a thesis entitled:

Screen Time, Sleep and Social Relationships: A Population-Level Study Examining Emotional Wellbeing During Early Adolescence

submitted by Muthuhantrige Savithri Cooray in partial fulfillment of the requirements for the degree of Master of Science
in Population & Public Health

Examining Committee:

Dr. Eva Oberle, School of Population & Public Health, UBC

Supervisor

Dr. Martin Guhn, School of Population & Public Health, UBC

Supervisory Committee Member

Dr. Jenna Shapka, Department of Educational and Counselling Psychology, and Special Education, UBC

Dr. Louise Mâsse, School of Population & Public Health, UBC

Additional Examiner

Abstract

BACKGROUND: This study explored the role of early adolescents' relationships with peers and adults, recreational screen time, and quality of sleep in relation to optimism, satisfaction with life, depressive symptoms and anxiety. Understanding the ways in which social experiences and health behaviors are associated with the emotional wellbeing of early adolescents is important because it can help pave the way for interventions and programs that support thriving.

METHOD: The present study draws from data collected with the Middle Years Development Instrument (MDI), a population-level self-report survey implemented annually in British Columbia. Survey data from grade 7 students ($N = 28,172$; 49.1% female), collected between 2014-2018, were examined. Hierarchical regression analyses were used to investigate whether social relationships (with peers, adults in school and adults at home) and health behaviors (screen time, sleep) were associated with indicators of positive and negative emotional wellbeing, controlling for gender and English language background.

RESULTS: Main findings were that lower levels of peer belonging and adult support at home and at school, higher levels of screen time, and poorer sleep quality were associated with high levels of depressive symptoms and anxiety, and lower levels of optimism and satisfaction with life. There was a significant interaction between screen time and gender in relation to the emotional wellbeing outcomes. Specifically, the association between more screen time and poorer emotional wellbeing outcomes was significantly larger for girls than for boys.

CONCLUSION: The present study indicates that high levels of peer belonging, adult support, sleep quality and low levels of screen time are important for the emotional wellbeing of emerging adolescents. These findings highlight the various behavioral and social factors that can be actively nurtured to promote emotional wellbeing during the early adolescent years.

Lay Summary

Early adolescence, a transitional period between childhood and adolescence is a time of various biological, social and emotional changes. Experiences during early adolescence can play a fundamental role in development as they have a profound impact on young people's immediate and long-term emotional wellbeing. Among a multitude of ecological and interpersonal factors, social relationships (e.g., with friends and adults) and health behaviors (e.g., screen time, sleep habits) play a key role for emotional wellbeing. This study investigated the role of sleep, screen time, peer belonging and adult support in predicting positive emotional wellbeing (optimism, satisfaction with life) and negative emotional wellbeing (depressive symptoms and anxiety) among more than 28,000 early adolescents in British Columbia. Statistical analyses indicated that high levels of screen time and low levels of sleep were associated with poor emotional wellbeing in early adolescents, while high levels of peer belonging, and adult support played a protective role.

Preface

This thesis is the original intellectual product of the author, Muthuthantrige Savithri Cooray, and was written under the supervision and guidance of a supervisory committee consisting of Dr. Eva Oberle, Dr. Martin Guhn and Dr. Jenna Shapka. Chapters 2 and 3 were based on data collected with the Middle-years Development Instrument (MDI) from 2014 – 2018. All data analyses were analyses of secondary data available to the author. Access to and analyses of data were approved by the UBC Behavioral Research Ethics Board (Project title “MDI Afterschool Time Study”, #H17-01723). Sections of this thesis may be submitted for publication in peer reviewed journals.

Table of Contents

Abstract.....	iii
Lay Summary.....	iv
Preface.....	v
Table of Contents.....	vi
List of Tables.....	viii
List of Figures.....	ix
List of Abbreviations.....	x
Acknowledgements.....	xi
Dedication.....	xii
Chapter 1. Introduction and Literature Review.....	1
1.1 Introduction.....	1
1.2 Early adolescence as a developmental period.....	2
1.3 Theoretical frameworks for early adolescent development.....	6
1.4 Emotional wellbeing during early adolescence.....	9
1.4.1 Optimism.....	10
1.4.2 Satisfaction with life.....	12
1.4.3 Anxiety.....	13
1.4.4 Depressive symptoms.....	15
1.5 Social relationships during early adolescence.....	17

1.6 Screen time and sleep as central health behaviors in early adolescence.....	20
1.7 The current study	26
Chapter 2. Method	28
2.1 Participants.....	28
2.2 Measures	30
2.2.3 Health-behaviors	31
2.2.4 Social relationships	32
2.3 Data analytic approach.....	32
Chapter 3. Results	35
3.1 Preliminary analyses	35
3.2 Hierarchical linear regressions predicting positive and negative emotional wellbeing.....	36
Chapter 4: Discussion	47
4.1 Social relationships, health behaviors, and positive emotional wellbeing.....	47
4.2 Social relationships, health behaviors, and negative emotional wellbeing.....	51
4.3 Study implications and future directions	57
4.4 Conclusion	58
References.....	59
Appendix.....	93

List of Tables

Table 1. Distribution, reliability and missing data for all variables.....	33
Table 2. Intercorrelations among all variables in the present study.	38
Table 3. Hierarchical linear regression model predicting optimism.....	39
Table 4. Hierarchical linear regression model predicting satisfaction with life	93
Table 5. Hierarchical linear regression model predicting anxiety	94

List of Figures

Figure 1. Association between screen time and optimism separate for males and females.....	43
Figure 2. Association between screen time and depressive symptoms separate for males and females.....	43
Figure 3. Association between screen time and depressive symptoms separate for sleep categories	43
Figure 4. Association between screen time and satisfaction with life separate for males and females.....	95
Figure 5. Association between screen time and anxiety separate for males and females.....	95
Figure 6. Association between screen time and anxiety separate for sleep categories.....	96

List of Abbreviations

ESL English as second language

MDI Middle Years Development Instrument

PYD Positive Youth Development

SWL Satisfaction with Life

Acknowledgements

I am deeply grateful for all the people who guided and supported me throughout my journey at the School of Population and Public Health. First, I would like to thank Dr. Eva Oberle for her mentorship, encouragement and guidance since day one. I am thankful for her joyful spirit, kindness and patience as I navigated through the ups and downs of this project- none of this would have been possible without her excellent supervisory style.

I am so grateful for all the feedback, suggestions and encouragement I received from Dr. Martin Guhn and Dr. Jenna Shapka who were part of my thesis committee. I am grateful for all the friends, colleagues and staff I met through my program at SPPH- thank you for making my experience at UBC a wonderful one. I would like to thank my dear friends Christina, Shinelle and Sujani for always lifting me up and having my back through it all- your friendship is truly a blessing.

Lastly, I am thankful for my parents and my brother for their everlasting love and unconditional support throughout the years. Thank you for standing alongside my dreams, thank you for letting me spread my wings and thank you for catching me when I fall- this thesis is a celebration of all your selfless sacrifices. And Thulith, thank you for being the inspiration that drove me to work harder in the last 3 months than the last 2 years combined- I am so grateful for your love.

*To my loving grandparents, without whom my childhood would have been void of its magic
and wonder*

Chapter 1. Introduction and Literature Review

1.1 Introduction

Marked by various biological, social and emotional changes, early adolescence represents a developmentally sensitive period between childhood and adolescence (Gestsdóttir & Lerner, 2007). Experiences during early adolescence can have a profound impact on the immediate as well as long term emotional wellbeing of individuals (Faught et al., 2017). Emotional wellbeing is a crucial aspect of early adolescent health because it is intricately related to adjustment and functioning in life and to thriving in and outside of school (Bond et al., 2007). Previous research has demonstrated that social relationships (e.g., with peers and adults) change during early adolescence and that peers and mentors outside of the family begin to play an increasingly important role for young people's wellbeing and positive development (Metzger et al., 2009). Also, research has shown that as early adolescents become more independent and gain more autonomy in their decision making, health behaviors such as sleep habits and screen time begin to change (Busch et al., 2013; Laberge et al., 2001; Raja et al., 1992).

While previous studies have investigated the role of social relationships (e.g., peers, adults) and health behaviors (e.g., sleep and screen time) on emotional wellbeing of young people, there is a lack of research that cohesively investigated these variables in association to emotional wellbeing in early adolescence. This is a valuable area to explore because it incorporates an ecological perspective with a behavioral perspective to jointly understand emotional wellbeing. Furthermore, while health-behaviors have been studied extensively in relation to negative emotional wellbeing, there is lack of research that has also considered positive emotional wellbeing (e.g., optimism, satisfaction with life).

Motivated by these knowledge gaps, the current study investigates the role of health behaviors (i.e., screen time, sleep) and social relationships (i.e., peer belonging, adult support at home and at school) in predicting positive and negative indicators of emotional wellbeing of early adolescents (i.e., optimism, satisfaction with life, depressive symptoms, anxiety). Given that previous research has found gender differences in emotional wellbeing (Bolognini et al., 1996) and gender differences in screen time (Straatmann et al., 2016), this study also examines possible interactions between gender and screen time in relation to emotional wellbeing. This study is also of practical relevance as it can inform programs and interventions for promoting positive youth development. Since new habits are adopted and formed during early adolescence, it is an ideal time for programs and interventions that support positive youth development (Damon, 2004).

1.2 Early adolescence as a developmental period

Early adolescence, the developmental period from approximately age 10 to 14, is a time in young people's lives that captures the transition from childhood to adolescence (Moilanen et al., 2010). Early adolescence is considered a critical period in development because a multitude of changes occur on physiological, cognitive, social, and emotional domains (Deardorff et al., 2007; Eccles, 1999; Gestsdóttir & Lerner, 2007). Scholars have also described early adolescence as an exploratory phase in development because during this time period, young people gain increasing autonomy in making decisions about their lives, including who they socialize with and what activities they engage in during out-of-school hours (Schwartz, 2008; Steinberg, 2005; Arain et al., 2013). While there are a broad range of developmental changes in early adolescence, of specific interests in the context of this master thesis are early adolescents' emotional wellbeing (i.e., indicators of positive and negative aspects of wellbeing) in relation to their social

relationships (i.e., peer belonging, adult support) and health behavior habits (i.e., sleep and engagement in active and passive recreational screen-based activities during afterschool hours).

Understanding what factors protect and jeopardize emotional wellbeing in early adolescence is important because research has demonstrated early adolescent years to be a time during which young people commonly experience emotional turbulences (Ragelienė, 2016). For example, many early adolescents tend to experience a mix of positive and negative emotions as they are adjusting to various changes in their lives (e.g., onset of puberty, moving from elementary school to middle school, changes in friendship groups) (Larson et al., 2002). With these transitions from childhood to early adolescence, young people are faced with new emotional and social challenges that can make this a vulnerable time for developing internalizing symptoms (e.g., anxiety, depression) (Theurel & Gentaz, 2018). Emotional wellbeing during these years is crucial because it is related to young people's overall health and signals thriving in young people (Moilanen et al., 2010).

When considering factors that contribute to emotional wellbeing in early adolescence, social relationships are central to consider. Many social changes occur during early adolescence, such as an increasing social focus of young people on their peers (Cuadros & Berger, 2016) and an increasingly widening social circle that includes adults outside family (Nickerson & Nagle, 2005; Laitinen-Krispijn et al., 1999). In fact, whereas during earlier stages of development, parents tend to play a central role in children's social lives and be involved in the day-to-day planning of their children's social schedules, most early adolescents begin to take own initiative in forming and maintaining relationship with peers and adult mentors (Allison & Schultz, 2001). A multitude of studies have shown that these social relationships have a notable effect on the emotional wellbeing and health related behaviors early adolescents develop during this time

(Crean, 2012; Woolley & Bowen, 2007; Blaskova & McLellan, 2018; Chong et al., 2006). For example, in a US-based cross-sectional study with young people aged 10-13, self-reported peer acceptance was significantly associated with teacher's assessment of young people's socio-emotional adjustment (Waldrip et al. 2008). In a cross-sectional study, Raja and colleagues (1991) observed that adult relationships are equally as important as peer relationships for adolescent's psychological wellbeing. Similarly, in a self-reported study by Newman and colleagues (2007), negative associations between peer belonging and internalizing behaviors were observed among 11-18-year olds after controlling for age, gender, ethnicity, parent's education level, and family structure.

In addition to the changes in social domains of development, early adolescence has been identified as a time when health behaviors – including patterns of sleep and time spent in screen-based activities during out-of-school hours (e.g., playing video games, streaming videos, browsing the internet) – change (Cain & Gradisar, 2010; Mireku et al., 2019). Understanding to what degree emotional wellbeing is associated with the two health behaviors of sleep and screen time is valuable, because health behaviors can easily convert into routines and have a long-term impact on the emotional wellbeing (Babic et al., 2017; Boone et al., 2007; Hayley et al., 2015). Previous research has shown that the quality of sleep is positively associated with the emotional wellbeing of young people. Scholars have argued that when not properly rested for extended periods of time, lack of sleep can hinder young people's ability to thrive in their daily activities, thus contributing to low emotional wellbeing (Falbe et al., 2015; Hayley et al., 2015; McMakin & Alfano, 2015). A large study European study ($N=11,788$, *mean age=14.9*) by Sarchiapone and colleagues (2014) reported that low levels of sleep are associated with increased levels of anxiety and emotional problems with peers among young people.

In addition to sleep, the engagement in screen-based activities is a health-behavior that is important to investigate in the context of understanding emotional wellbeing in early adolescence. Over the past decade, screen time has become an increasingly common and popular out of school activity that has transformed the way early adolescents spend their free time, communicate and express themselves (Busch et al., 2013; Lissak, 2018). Screen time is often associated with sleep behaviors and social relationships, therefore is known to influence early adolescents' social and emotional development (Stiglic & Viner, 2019; Marks et al., 2015; Sirard et al., 2013). In a longitudinal study based in Australia, Babic and colleagues (2017) followed a cohort of 12-year old early adolescents over 6 months and observed higher levels of psychological difficulties (i.e., emotional symptoms, hyperactivity/inattention, peer relationship problems, conduct problems and prosocial behavior) with increases in recreational screen time (i.e., TV/DVD use). Some researchers have argued that due to early adolescents' increased eagerness for experimentation and testing boundaries, they are particularly vulnerable for developing unhealthy screen time patterns, such as excessive engagement in screen-based activities and addictions to gaming (Kuss & Griffiths, 2012). Therefore, early adolescence remains an ideal time for interventions that support healthy screen and sleep related behaviors since it becomes difficult to modify these behaviors as young people grow older (Wu et al., 2016).

The rationale for jointly examining social relationships, screen time, and sleep in relation to emotional wellbeing in early adolescence is based on previous research emphasizing a relation between emotional wellbeing and the social relationships young people have (Blaskova & McLellan, 2018; Woolley & Bowen, 2007), a relation between number of hours spent in screen-time and wellbeing (Khouja et al., 2019; Maras et al., 2015), a relation between screen time and

sleep (Cabr -Riera et al., 2019; McMakin & Alfano, 2015), and a link between sleep and emotional wellbeing in early adolescence (Sarchiapone et al., 2013; Gregory & Eley, 2005). While substantial research has examined each of these factors separately in relation to emotional wellbeing in early adolescence, there is a lack of large-scale studies that have integrated these variables in research on early adolescent wellbeing. Such research is valuable because it can highlight the interrelation between social relationships, health behaviors, and wellbeing during the emerging adolescent years. Findings from such research can also inform interventions and programs for early adolescents, as well as recommendations for parents, educators and health care providers.

1.3 Theoretical frameworks for early adolescent development

The present research is informed by a Positive Youth Development (PYD) framework and views early adolescent development through a bioecological context model. PYD is a theoretical framework that views child and youth development through a strength-based lens (Lerner et al., 2005). In PYD, the focus lies on understanding the internal (e.g., sense of purpose, self-esteem) and external assets (e.g., constructive use of time, positive peer influence) that are present in young people's lives and is founded on the belief that all children and youth can thrive (Lopez et al., 2015; Phelps et al., 2009). The PYD framework emphasizes that when assets are recognized and supported, every young person has the potential to achieve success in life (Phelps et al., 2009; Damon et al. 2004).

Assets that scholars have emphasized as critical for PYD include the presence of supportive relationships and constructive use of time after school (Shek et al., 2019; Catalano et al., 2019; Benson et al., 2011). Supportive relationships include being accepted by and belonging to a prosocial peer group, and safe and healthy relationships with nurturing adults in and outside

of the family (Blaskova & McLellan, 2018; Woolley & Bowen, 2007). Constructive use of after-school time is an important part of PYD because the structured and unstructured activities young people explore allow them to identify and pursue their own interests beyond the academic focus taken in school (Benson et al., 2011). When out-of-school time is use constructively, early adolescents' development is often enriched (Vance, 2018).

Researchers and educators have adopted the PYD framework in several ways. It has been employed by researchers to examine the ways in which assets in young peoples' lives (e.g., connections with family, school and community) are associated with their social and emotional wellbeing (Phelps et al., 2009). Furthermore, the PYD framework has informed programs and interventions designed to enhance young people's internal and external assets with the goal of promoting thriving (Catalano et al., 2019). For instance, community based PYD mentoring programs such as Big Brother have been designed to provide social and emotional support to young people struggling with forming a positive identity and establishing positive peer relationships (Lopez & DuBois, 2005). Further, Robinson and colleagues (1999) found that participation in an 18-lesson PYD-based classroom curriculum on reducing screen time significantly lowered weekday television viewing among 8-9-year olds. In summary, the PYD framework emphasizes the importance of enhancing internal and external assets in young people to support thriving in early adolescence and promote positive future development (Damon, 2004).

The present research is also informed by Bronfenbrenner's bioecological contexts model that views early adolescent development as embedded within multiple systems that interact with each other and shape the course of development (Bronfenbrenner, 2005; Onwuegbuzie et al., 2013). The model specifies 5 distinct systems that contribute to children's growth and wellbeing:

the microsystem (i.e., home, school, community), the mesosystem (i.e., interactions between multiple microsystems, such interactions between home and school environment), the exosystem (i.e., indirect influences on children's development, such as parents' workplace), the macrosystem (i.e., cultural beliefs and values), and the chronosystem (i.e., transitions occurring with time, such as a parental divorce) (Eriksson et al., 2018; Bronfenbrenner, 1979).

Given the focus on social relationships in relation to emotional wellbeing, the microsystem is of particular relevance in the present study. While the original bioecological contexts model did not specifically make reference to screen-based activities, a more recent article (Boxer et al., 2015) has applied the model to technology use in society and has suggested that screen-oriented activities permeate all the ecological layers that contribute to the growth and development of young people. For example, in the microsystem, screen-based activities have become a notable component of adolescents' interactions with peers and adults (e.g., playing video games, watching movies). Additionally, young people's cultural views and beliefs shaped through the macrosystem are profoundly influenced by the messages they are exposed via screen-based activities (e.g., web content exposed to through the internet) (Arsenijević et al., 2015). Therefore, screen time can shape early adolescents' wellbeing through different ecological layers by transforming the ways in which young people interact with each other and with adults- and the ways in which they understand societal norms and evaluate their own lives.

In summary, early adolescent development can be understood through both a PYD and a bioecological contexts perspective. Ecological contexts identify important niches into which development and wellbeing are embedded, and PYD can identify the presence/absence of assets in those contexts that can hinder or support positive youth development (Vance, 2018; Bronfenbrenner, 2005; Damon, 2004).

1.4 Emotional wellbeing during early adolescence

Emotional wellbeing has been defined as the “emotional quality of an individual's everyday experience—the frequency and intensity of experiences of joy, stress, sadness, anger, and affection that make one's life pleasant or unpleasant” (Kahneman & Deaton, 2010, p. 1). The World Health Organization identifies emotional wellbeing as a major component of mental and overall health; emotional wellbeing encompasses positive and negative dimensions and contributes to young people’s ability to recognize their abilities and cope with everyday stressors (WHO, 1948). For instance, positive emotions (e.g., optimism, satisfaction with life) can promote creative thinking and effective problem solving, whereas negative emotions (e.g., depressive symptoms, anxiety) – often provoked by circumstances that are unfavorable for oneself – can narrow attention and hinder effective responses to situations (Fredrickson, 2013; Spring et al., 2008; Aspinwall, 1998).

According to the 2017 report by the World Health Organization, 10-20% of children and adolescents worldwide experience mental illnesses and of 50% of mental disorders start at the age of 14 (WHO, 2017). In Canada, 14% of children between the ages of 9 to 12 experience mental health problems that impede their ability to thrive in daily activities (Waddell et al., 2005). Accordingly, in a retrospective study with adults, Kessler and colleagues (2005) found that the first signs of mental disorders (i.e., anxiety, mood, impulse control and substance use disorders) occurred during childhood or adolescence. Understanding the factors that contribute to young people’s emotional wellbeing is a critical first step in providing them with the necessary resources and support to secure and enhance their immediate and long-term wellbeing (Bluth et al., 2014; Lancet, 2014). In fact, in a longitudinal study, Kansky and colleagues (2016) reported positive and negative affect at the age of 14 to be significant predictors of health, work

performance and social relationships at the age of 25. Mental wellbeing is not only an individual goal; given the significant costs associated with mental illnesses, protecting and enhancing emotional wellbeing from early on is also important for the society at large (Vigo et al., 2016). In 2010, the Mental Health Commission of Canada stated that more than 6.7 million people in Canada experience mental illnesses and that society's financial burden of mental health problems and illness surpassed 2.8% of Canadian Gross Domestic Product (Mental Health Commission of Canada, 2010; Burton et al., 2008).

In summary, emotional wellbeing during early adolescence is a key marker of positive development and thriving in young people (Jones et al., 2015; Beesdo et al., 2009), and is equally related to their physical wellbeing and overall health (WHO, 1948). Supporting emotional wellbeing during early adolescence is essential because it can have a lasting impact on developmental trajectories (Allison & Schultz, 2001; Gestsdóttir & Lerner, 2007). In the context of the present study, both positive (i.e., optimism, satisfaction with life) and negative (i.e., anxiety, depressive symptoms) indicators of emotional wellbeing during early adolescence are of specific interest.

1.4.1 Optimism

Optimism is defined as the belief that the future is positive and encompasses the tendency to expect positive outcomes in life (Conversano et al., 2010; Thomson et al., 2015). Early adolescents with typically higher levels of optimism tend to believe that good things will happen to them, whether through their own personal effort or through a higher form of universal power acting upon their best interests, and that positive events are more frequent than negative ones (Thomson et al., 2015; Carver et al., 2010). Optimism is a valuable personal asset in

development because young people with high levels of optimism also tend to display high levels of resilience during times of adversity (Fogle et al., 2002; Gillham & Reivich, 2004).

Scholars have reported changes in optimism as young people move into early adolescence. For instance, a longitudinal study with children in Sweden found that levels of optimism significantly dropped from early to mid-adolescence (Hägström Westberg et al., 2019). The authors speculated that the decrease in optimism could be a cumulative effect of pubertal challenges, transition from elementary to middle school, and the heightened subjective awareness of how one compares to others (Hägström Westberg et al., 2019). The association between social relationships and optimism during early adolescence has been supported in prior research (Chong et al., 2006; Orejudo et al., 2012). For example, a longitudinal study based in Germany that followed 14-year old youth over 5 months found that over and above parental socio-economic status and academic achievement, peer acceptance was positively related to youth optimism (Tetzner & Becker, 2019). In another study that focused on relationships with parents, Orejudo and colleagues (2012) observed that a strong relationship with parents increased levels of optimism among boys and girls (*mean age*=14). These findings are in line with a large-scale study based in Singapore, which identified support from parents, peers and school as important predictors of optimism among adolescents (Chong et al., 2006).

Optimism is a key indicator of positive youth development for several reasons. Higher levels of optimism are associated with a stronger sense of purpose (Cunningham et al., 2002). Gillham and Reivich (2004) note that young people with high levels of optimism experience less anxiety and depression and are more likely to gain success in and out of school. A five -year-long longitudinal study by Nolen-Hoeksema and colleagues (1992) reported that children displaying low levels of optimism were more likely to develop depressive symptoms than their

highly optimistic counterparts. Carver (2010) notes that early adolescents with high levels of optimism are more likely to adopt proactive coping mechanisms during adversity than those reporting low levels of optimism. For instance, they are more likely to reevaluate their circumstances and adopt a healthy action plan instead of switching over to an unhealthy lifestyle during times of challenge (Derker et al., 2001). While previous research has explored optimism among early adolescents in relation to social experiences (e.g., support by the family, school, and neighborhood) (Thomson et al., 2015; Oberle et al., 2018; Orejudo et al., 2012) lesser is known about the link between optimism and health-behaviors habits, such as sleep and screen time.

1.4.2 Satisfaction with life

Satisfaction with life reflects the evaluation of one's life as a whole and is an aspect of subjective wellbeing that encompasses cognitive evaluations of one's life, over and above judgments about family, friends, and school (Huebner et al., 1991; Diener, 2000; Seligman & Csikszentmihalyi, 2000). High levels of satisfaction with life have been linked to positive development during childhood and adolescence (Proctor et al., 2009). In a review of literature on this topic, Proctor and colleagues (2009) describe life satisfaction as a fundamental marker of wellbeing because it improves young people's ability to adapt to novel situations and thrive in their daily activities.

Certain interpersonal factors have been identified as buffers for the decline in life satisfaction. Specifically, supportive peer and adult relationships have been known to act as protective factors against low levels of life satisfaction during early adolescence (Angeles & Angeles, 2010; Proctor et al., 2009). Additionally, several studies have also identified risk factors associated with lower levels of life satisfaction. For instance, high levels of screen time have been associated with low subjective wellbeing among young people (Twenge et al., 2018).

Researchers have considered several explanations for this finding. For instance, excessive screen time can be socially isolating and result in fewer interpersonal interactions, and subsequently lower the levels of life satisfaction (Babic et al., 2017). Furthermore, exposure to unattainable digital images (e.g., unrealistic beauty standards portrayed in media) have been known to trigger unhealthy comparisons among young people and contribute to low levels of satisfaction with life (Twenge et al., 2018; Durkin et al., 2002). Moreover, increased levels of screen time can reduce face-to-face interactions that facilitate emotional support from peers and adults at times of adversity, and consequently lead to low satisfaction with life (Heffer et al., 2019).

Satisfaction with life during early adolescence is important for various reasons. First, it promotes feelings of gratitude which can improve a young person's immediate mood and sense of wellbeing (Hoy et al., 2013). Second, early adolescents who view their lives under positive light tend to gain more social support with their goals and aspirations (Angeles & Angeles, 2010). In contrast, low satisfaction with life can have various implications on early adolescents' sense of wellbeing (Fogle et al., 2002). For instance, low satisfaction with their school life may lead to decreased interest for academics as well as school participation, which can add on to the negative evaluations of life (Proctor et al., 2009). Low satisfaction with life can also diminish early adolescents' sense of motivation, therefore preventing from being proactive in their choices (Angeles & Angeles, 2010).

1.4.3 Anxiety

Anxiety is an indicator of compromised wellbeing as it reflects a tendency to worry or fear excessively of an anticipated event. Anxiety is often accompanied by periods of intense stress and excessive nervousness that prevent an individual from partaking and enjoying normal activities of life (Craske & Stein, 2016; Rapee et al., 2009). Anxiety disorders remain as the most

prevalent form of mental health disorder between the ages 11 to 18 years in the US (Merikangas et al., 2010). A population level study conducted with US adolescents indicated that 1 out of 3 adolescents report signs of an anxiety disorder (Merikangas et al., 2010). Gender differences in anxiety have also been found among early adolescents, with girls scoring higher on measures of anxiety on average than boys (Carter et al., 2011; Marsee et al., 2008). For example, among 12-17-year olds in the US, the prevalence rate of anxiety disorders among males was 13.8% compared to a rate of 21.8% among females (Essau et al., 2000). Chaplin (2009) suggests that gender differences may be due to girls being more likely to openly express their thoughts of anxiety and discuss emotions with close friends, whereas many boys tend to internalize worries, keep them to themselves, and display passive behavior. For both boys and girls, supportive peer relationships have been identified as a valuable protective factor against anxiety; conversely social anxiety has been related to having fewer positive peer relationships (Erath et al., 2007; Grills & Ollendick, 2002).

Regarding the link between anxiety and health behavior, previous studies have indicated an association between higher levels of anxiety, poor sleep and sleep deprivation among early adolescents (Talbot et al., 2010). At least two explanations are viable – anxiety can interfere with sleep, and poor sleep can further exacerbate wellbeing and trigger symptoms of anxiety. In a self-reported study based in the UK, Gregory and colleagues describe correlations between various forms of anxiety (e.g., social anxiety, school anxiety) and sleep disturbances (e.g., difficult falling and staying asleep) (Gregory & Eley, 2005). Sleep deprivation in particular has been associated with increased vulnerability for anxiety-specific symptoms such as obsessive thoughts and excessive nervousness (McMakin & Alfano, 2015).

High levels of engagement in recreational screen-based activities have also been related to anxiety. In a cross-sectional study with Canadian adolescents, Maras and colleagues (2015) found associations between anxiety symptoms and video game playing among 12-18-year olds. In a similar study conducted with adolescents in China, Cao and colleagues observed positive associations between anxiety and Chinese adolescents who engage in more than 2 hours of daily screen time (Cao et al., 2011). High levels of anxiety during early adolescence are detrimental for wellbeing because anxiety can interfere with young people's schoolwork, peer relationships and can have a lasting impact on their well-being. (Erath et al., 2007; Vernberg et al., 1992). Researchers have argued that when the roots of anxiety are not mitigated during early adolescence, anxiety symptoms can manifest into more severe anxiety-related behaviors and disorders (e.g., phobias, obsessive compulsive behaviors) and jeopardize individuals' future wellbeing (Rapee et al., 2009; McLaughlin et al., 2015).

1.4.4 Depressive symptoms

Depressive symptoms encompass the recurring experience of emotional heaviness, loneliness, grief or sadness, and rumination (Bellamy et al., 2015). Previous research reports that depressive symptoms tend to increase between childhood to adolescence, particularly among girls (Bellamy & Hardy, 2014). This finding is in line with Peled's (2007) understanding of adolescence as a time during which young people become vulnerable to recurring experiences of sadness in an attempt to understand the meaning behind unpleasant experiences, making it difficult to escape a cycle of negative thoughts.

Depressive symptoms during early adolescences are a concern for young people's positive adjustment and wellbeing, because the associated experiences (e.g., worries) can produce detrimental effects on young people's ability to socially connect, engage in constructive

activities, and pursue new opportunities (MacPhee & Andrews, 2006). Poor social relationships have been found to be a key predictor of depressive symptoms. In a longitudinal study that followed children over the course of eight years, Qualter and colleagues found an association between perceived loneliness at ages 5-9 and depressive symptoms at the age of 13 (Qualter et al., 2010). The role of social support – particularly support from peers and close adults – in buffering symptoms of depression among young people has been highlighted in research (Cutrona, 1989; Stice et al., 2004). In a socio-economically diverse study based in the US, Newman and colleagues (2007) observed that adolescents who self-reported a positive sense of belonging within their peer groups also reported lesser depressive symptoms. Additionally, a study with middle school students by Rueger and colleagues (2011) demonstrated that parental support act as a protective factor against depressive symptoms among girls, regardless of their reported levels of stress. A yearlong prospective study conducted in the US reported that friend, teacher and parental support was predictive of changes in depressive symptoms and self-esteem among adolescents (Colarossi & Eccles, 2003). In a US based longitudinal study, Brenner and colleagues (2017) reported that when students received stable parental support during their transition from middle to high school, they displayed fewer depressive symptoms (Benner et al., 2017).

Research has also suggested that health-behaviors – such as sleep and screen time – are related to depressive symptoms among young people. In a longitudinal study conducted in Western Canada, chronic sleep deprivation (defined as the lack of adequate levels of sleep for an extended period of time) was associated with higher levels of depressive symptoms among adolescent girls (Conklin et al., 2018). In another large-scale cross-sectional study with 12-18-year old adolescents in Canada, Maras and colleagues (2015) observed that the time spent

playing video games and symptoms of depression were positively correlated. The authors speculated that excessive screen time may expose young people to inappropriate content, displace time spent on sleeping, physical activity and interpersonal interactions, consequently, increase the risk of negative emotions such as depressive symptoms (Maras et al., 2015). Findings from studies on depressive symptoms in early adolescents highlight the need for research that investigates the joint effect of multiple potential risks and protective factors during early adolescence, thus informing ways in which emotional wellbeing can be supported during young people's transition into adolescence (Thurman et al., 2018).

1.5 Social relationships during early adolescence

From a social developmental perspective, early adolescence has been emphasized as a time when relationships with peers and close friends become increasingly important to young people (Cuadros & Berger, 2016). However, in addition to peer relationships, early adolescents still continue to benefit from positive and supportive relationships with adults, such as parents, adult family members, and adults at school (Crean, 2012). Together, experiencing a strong sense of peer belonging and adult support are notable social assets that support the emotional wellbeing of early adolescents (Woolley & Bowen, 2007).

A large number of studies support the notion that belonging to a group plays an important role in early adolescents' positive development and wellbeing (Erdley et al. 2001). For instance, in a population-level study based in Canada, Gaderman and colleagues (2016) found that peer belonging was a significant predictor of life satisfaction among 9-year-olds. In a further cross-sectional study with first year high school students, Heaven and colleagues (2005) found that belonging to a peer group in which early adolescents shared similar interests was related to better adaptation to the high school environment, whereas lack of belonging to peer group was related

to signs of withdrawal and lower levels of satisfaction with life (Ragelienė, 2016). Similarly, peer belonging was related to optimism cross sectionally, and longitudinally between grades 4 and 7 (Oberle et al., 2018). A cross-sectional study following children from age 11 to 18, Kingery and colleagues (2011) found lower levels of internalizing (e.g., anxiety and depression) and externalizing behaviors (e.g., aggression and substance use) among those who reported high levels of peer belonging compared to those who reported low levels of peer belonging. Scholars have reasoned that when peer relationships are characterized with trust, intimacy and stability, early adolescents have an opportunity for connection; in contrast, the absence of a supportive peer network can provoke negative emotions such as anxiety and loneliness (Caprara et al. 2006). In a study by Lopez (2005), the authors reported high levels of negative self-evaluations and depressive symptoms among middle school children who reported high perceived peer rejection. Additionally, among vulnerable young people, peer rejection may contribute to social anxiety which can further jeopardize their chance of establishing stable relationships (Erath, Flanagan, & Bierman, 2007).

Despite the importance of peer belonging, it also needs to be acknowledged that peer belonging can have a negative component in development, specifically when young people experience peer pressure about engaging in unhealthy or maladaptive behaviors (Armsden & Greenberg, 1987). For instance, research has found that belonging to a group of peers that regularly engage in risk taking behaviors such as substance use was associated with higher levels of substance use and other forms of risk-taking behaviors in early adolescents (Tomé et al., 2012; Chein, 2011). In the context of the present study, peer belonging is recognized as early adolescents' sense of belonging to prosocial and nurturing peers, which is understood as an asset for positive youth development.

In addition to peer relationships, positive relationships with adults remain key for early adolescents' positive development and wellbeing (Crean, 2012). Since early adolescents spend a majority of their time at school or home, the adults at school and home can have a notable impact on their wellbeing (Metzger et al., 2009). Previous studies have identified the presence of caring adults at school as predictors of higher academic achievement and higher sense of school membership among early adolescents (Wentzel, 1993; Pianta & Hamre, 2009; Kjellström et al., 2017). Feeling connected to a supportive adult at school has also been associated with young people's motivation and engagement in school (Woolley & Bowen, 2007). In a cross-sectional study with adolescents in Sweden, Kjellostrom and colleagues (2017) observed fewer psychosomatic complaints among adolescents who reported higher levels parental and teacher support.

Similarly, supportive family environments have been negatively associated with externalizing behaviors and depressive symptoms among early adolescents (Stadler et al., 2010; Ronald D. Taylor, 2010). Specifically, Stadler and colleagues (2010) identified parental support as a protective factor for early adolescents who experienced peer-victimization in middle school. Research has also indicated that a secure attachment relationship with parents provides a base for seeking other positive interpersonal relationships – such as with peers (Nickerson & Nagle, 2005). These findings reflect the significant impact adult support can have on the social emotional wellbeing of early adolescents. In addition to emotional support, early adolescents also tend to turn to adults for modeling behaviors. In a cross-sectional study with children aged 6-12, De Lapeleere (2017) observed that when parents limited parental gaming time and encouraged physical activity, children also reported lower screen time and increased physical activity.

Additionally, parental control regarding screen time and dinner practices have been associated with sleeping habits among early adolescents (Martinez et al., 2019).

In summary, although peer relationships are of great importance to early adolescents, young people continue to benefit from strong and positive relationships with adults for emotional and social support (Metzger et al., 2009). The health-behaviors that close adults and mentors model are quite influential as they can shape young people's health habits and attitudes as well (Kjellström et al., 2017; Woolley & Bowen, 2007).

1.6 Screen time and sleep as central health behaviors in early adolescence

Since the frequent use of electronics among young people has become a normative part of development, many scholars have been interested in exploring the effects screen time may have on youth development (Domingues-Montanari, 2017; Babic et al., 2017; Beyens et al., 2018; Stiglic & Viner, 2019). Screen time has been defined as the time spent interacting with devices such as TV, computers and mobile devices (Schoeppe et al., 2016). Screen time is viewed as a health behavior because high levels of screen time have been related to a range of physical (e.g., increased risk of obesity due to increased sedentary behavior, interference with sleep) and psychosocial health outcomes (e.g., increased feelings of loneliness, poor self-esteem) in children and youth (Busch et al., 2013; Stiglic & Viner, 2019).

For today's early adolescents, television, online streaming, and video games are among the most popular forms of screen activities, whereas social media and smart phone use are predominantly found among older adolescents and young adults (Tremblay et al., 2011). Given the large number of developmental changes and the formation of health behaviors during early adolescence, it is worthwhile to understand screen time use during this time and how it is linked to emotional wellbeing in early adolescence. For the purpose of this thesis, screen time will be

referred to as the time spent on television, watching videos and playing video games. This definition focuses on recreational screen time and excludes educational screen time, whether as part of schoolwork or as directed by parents.

Electronic devices, such as television, computers, tablets, and smart phones, have become ubiquitous in Canadian households in recent years, which has resulted in increased screen use among early adolescents (Carson et al., 2013; Jancey et al., 2017). Influenced by their increasing sense of independence and desire to explore technology and popular culture, early adolescence is often the first-time young people make autonomous decisions regarding screen time (Lissak, 2018). Additionally, the addictive and instant gratifying nature of screen activities have contributed to the increasing popularity of screens among young people (Randler et al., 2016; Holstein et al., 2014). Both the Canadian Pediatric Society and American Academy of Pediatrics recommend no more than 2 hours of recreational screen time daily for children and youth between the ages 5-17 (Buchanan et al., 2016). However, according to Canadian Health Measures Survey 2016/17, only 26% of children between the ages of 12-17 meet these guidelines (Statistics Canada, 2016/17). In a similar large cross-sectional study in the US, Walsh and colleagues (2016) observed that only 37% of their sample between the ages of 8-11 met the 2 hours of recreational daily screen time recommendation.

The rising levels of screen time in the past decade among young people have been observed both in Canada and worldwide. A study with 51,922 Canadian students indicated that children in grades 6-12 spend an average of 7.8 hours of daily screen time (Saunders & Vallance, 2017). This finding is similar to a study conducted in 2009 which stated that US children between the ages 8-18 spent an average of 4.5 hours watching TV and 1.5 hours on computer for recreational activities and 1.2 hours on video games daily (Ramsey Buchanan et al., 2016). High

levels of screen time have also been observed among children in youth outside of the North American context. For example, British children at the age of 10 self-reported to have access to an average of 5 household screens with adolescents spending 6.1h/d with screens (Sigman, 2012). Additionally, close to 50% of Australian children and youth exceed the 2-hour daily screen time recommendation, and in a study with school aged children in Brazil, 80% of students reported excessive use of screens in 2012 (Straatmann et al., 2016).

Emerging research has explored excessive screen time in relation to its immediate effects (e.g., interference with sleep) as well as accumulated effects (e.g., feelings of social isolation) among young people (Babic, 2016; Busch et al., 2013). Additionally, research has observed gender differences in the type of screen activities early adolescents engage in (Funk et al., 2000). For example, in a cross-sectional study with US children aged 10-15, Homer and colleagues (2012) reported that boys spend an average of 13 hours a week playing video games more than girls. The implications of excessive screen time during early adolescence can be physical, social or emotional. For instance, Domingues-Montanari (2007) reported higher incidence of backache and headaches among children who engaged in more than 3 hours of TV and video games. In another study, Gortmaker and colleagues (2016) observed highest odds of obesogenic health behaviors (e.g., high intake of sugar, fast food and lack of physical movement) among children who exceed the 2-hour recommendation. The 2014 Canadian Health Behavior in School-Aged Children study ($n=28,608$) found associations between high levels of recreational screen time and poor academic achievement (Faught et al., 2017). Furthermore, multitasking and over-exposure to fast paced media have been linked to hyperactivity and lack of concentration among school aged children (Lusted & Joffe, 2018).

During early adolescence, when social connectedness becomes critically important, a sense of peer belonging, or lack thereof may contribute to the screen time habits of this age group (Suchert et al., 2016). The negative emotional effects of screen time on early adolescents has been attributed to the lack of social interactions and increased feelings of isolation as a result of excessive daily screen activity. For example, Ianotte (2009) hypothesizes that when young people spend extended amounts of time on screen activities, they are losing opportunities to practice social emotional skills (e.g., problem solving, sharing experiences, interacting with peers) that improve their subjective wellbeing. Conversely, Twenge and colleagues (2018) argue that early adolescents who experience negative emotions such as anxiety and depressive symptoms may seek excessive screen activities as means of coping with their emotions. In a sample of 2482 Canadian youth in grades 7-12, Maras and colleagues (2015) reported associations between screen time duration and the severity of depression and anxiety, with video game playing and computer use being responsible for more severe depressive symptoms. Ohannessian and colleagues (2009) observed that girls watching the highest level of TV reported that highest depressive symptoms while boys watching the highest level of TV reported the lowest level of depressive symptoms. A study in North America with 3461 girls between ages 8-12 demonstrated negative associations between screen time, media multitasking and psychosocial wellbeing (Sigman, 2012). A Canadian study with 2500 participants reported positive associations between the length of screen time and the intensity of depressive and anxiety symptoms among 12-18-year olds (Domingues-Montanari, 2017).

High levels of solitary screen time in particular have been associated with increased feelings of loneliness, anxiety and depression as per the lack of social interaction (Maras et al., 2015). Conversely, early adolescents who feel isolated and anxious to begin with may turn to

screens even more to cope with those negative emotions (Twenge et al., 2018). It must be noted that these psychological associations between screen time were not observed to be linear, rather they demonstrate a curvilinear relationship (Saunders & Vallance, 2017). For example, in a study, Saunders and colleagues report that less than 1 hour of screen time per day was associated with reduced risk of depression whereas more than 2 hours exacerbated the risk (Saunders & Vallance, 2017). This phenomenon is described through the goldilocks hypotheses: at low and medium levels screen time can generate positive outcomes such as relaxation and happiness through escapism and humor, whereas at high levels screen time contribute to negative emotional wellbeing (Przybylski & Weinstein, 2017). Early adolescents who have lower sense of wellbeing or feel disconnected with the outside world tend to experience more negative emotional outcomes when daily screen time limits are surpassed (Suchert et al., 2015). Previous studies have also explored the implications of screen time on sleep among young people, since the quality and quantity of sleep plays a critical role for youth' health and wellbeing.

Sleep plays an important role for role in early adolescent positive development because it supports healthy growth, development, and wellbeing (Wolf, Wolf, Weiss, & Nino, 2018). The American Academy of Sleep Medicine recommends that young people between the ages 6-12 get at least 9 hours of nighttime sleep to maintain optimal health (Paruthi et al., 2016). However, according to the Sleep in America Poll in 2011, 60% of adolescents get less than 8 hours of sleep on a school night (Hale & Guan, 2015). Sleep deprivation has a notable effect on young people's emotional wellbeing and can jeopardize their positive functioning in school and life in general (Noland, Price, Dake, & Telljohann, 2009). In reviewing the existing research on sleep and mental wellbeing among young people, McMakin and colleagues (2015) state that when children and early adolescents are deprived of quality sleep, they tend to display lower states of well-

being and be disconnected with their peers and teachers (McMakin & Alfano, 2015). In a cross-sectional study based in the US, Lemola and colleagues (2015) reported that the frequency of electronic media use before bed is correlated with sleep difficulties as well as depressive symptoms among 12-17-year olds (Lemola et al., 2015).

Studies have also identified having electronic devices in the bedroom as a factor contributing to poor sleeping habits among youth. Gozal and colleagues (2017) reported in a US based study that two-thirds of school aged children have a television set, one-half had a VCR, DVD player or video-game console, and >30% had Internet access or a computer in their bedroom. Previous scholars have observed connections between lack of high-quality sleep and screen time use (e.g., TV or video games, browsing the internet, social media use) among young people in the later evening hours until bedtime (Cain & Gradisar, 2010; Kenney & Gortmaker, 2016). Research has shown that screen use close to bedtime tends to overstimulate the psychological and physiological systems by interfering with the circadian rhythms (Wolf et al., 2018). In a literature review, Cabre`-Riera (2019) states that the adverse effects of screen time can be due to the delaying of bedtime as well as due to the overstimulation of the senses, which can interfere with young minds ability to become calm and fall asleep. Additionally, the blue light emitted by portable screen devices is known to suppress the release of melatonin, the hormone that induces that sleep-awake cycle (Cabr -Riera et al., 2019). Given these physiological implications of screen time near bedtime, the US national sleep foundation recommends turning off screens 1 hour before sleep to ensure restful sleep (Hale & Guan, 2015).

Some research has also linked screen time to long-term sleep outcomes. For example, a longitudinal study conducted with school-ages children in Spain revealed that increases in TV viewing from less than 1.5 hours to 1.5 or more hours led to reduced sleep duration at a follow-

up 2–3 years (Marinelli et al., 2014). When the quality and length of sleep is compromised for extended periods of time, sleep deprivation can have a lasting impact on the social and emotional wellbeing of early adolescents (Noland et al., 2009).

Overall, previous research has shown that supportive social relationships are an asset for early adolescent wellbeing (Crean, 2012; Cuadros & Berger, 2016), and that high levels of screen time (Busch et al., 2013; Stiglic & Viner, 2019), and poor quality of sleep (Conklin et al., 2018; Laberge et al., 2001) put emotional wellbeing at risk. However, there is a lack of studies that have integrated both social relationships and health behaviors when examining early adolescent emotional wellbeing. Furthermore, specifically in regards to screen time and sleep, majority of research has focused on the negative emotional outcomes in relation to poor health behaviors; there is lack of studies that have also incorporated positive indicators of emotional wellbeing such as optimism and satisfaction with life. An additional gap in research is that while most studies have controlled for gender in their analyses, there is a lack of research that has examined whether the relationship between screen time and emotional wellbeing, for example, differs between boys and girls.

1.7 The current study

The current study examines early adolescents' social relationships (i.e., peer belonging, adult support at school, adult support at home) and health related behaviors (i.e., screen time, sleep) in relation to their positive (i.e., optimism, satisfaction with life) and negative (i.e., anxiety, depressive symptoms) emotional wellbeing. Based on previous research that has identified positive social relationships as an asset in early adolescence (e.g., Armsden & Greenberg, 1987; Nickerson & Nagle, 2004), it was expected that having supportive adults in the family, supportive adults in the school, and experiencing higher levels of peer belonging would

be positively related to early adolescents' optimism and satisfaction with life, and negatively related to indicators of anxiety and depressive symptoms (Hypothesis 1). Based on research that recognized longer hours of screen time as a risk factor for young people's mental health, screen time was expected to be negatively associated with optimism and satisfaction with life, and positively associated with anxiety and depressive symptoms in this study (Hypothesis 2). Similarly, based on research that has shown sleep plays an important role in health and wellbeing (e.g., Parent et al., 2016), it was expected that better quality sleep would be related to higher levels of positive and lower levels of negative emotional wellbeing (Hypothesis 3). In addition to the hypotheses, three exploratory research questions were formulated in this study. First, does the hypothesized effect of screen time on emotional wellbeing vary by gender?; second, does the hypothesized effect of screen time on emotional wellbeing vary by sleep quality?; and third, when considering all predictor variables (gender, social relationships, health behaviors) together, what is the relative importance of each predictor variable in relation to emotional wellbeing? The research questions in the present study were examined by conducting hierarchical linear regression analyses with main effects and interaction terms, and computing PRATT indices to indicate the relative importance of each variable in the full model. I draw from a large population-level data set that was collected with early adolescents in British Columbia (BC).

Chapter 2. Method

2.1 Participants

This study draws from data collected with the Middle Years Development Instrument (MDI) from grade 7 students between 2014 to 2018 ($N= 28,712$; 50.9 % male; *mean age* = 12.25, $SD = 0.52$). A total of 391 public schools in 31 public school districts (12 rural, 19 urban school districts) participated with their grade 7 students. A total of 80.1% of participants reported English as their first language learned at home; other frequently reported languages were Mandarin (6.6%), Cantonese (4.2%), Korean (3.5%), Filipino/Tagalog (3.2%) and Spanish (2.3%). The student participation rate in participating school districts ranged from 80% to 87% across districts.

Data for this study were drawn from a population-level implementation of the MDI, a student self-report survey that assesses students' wellbeing and experiences at school and in their communities. The MDI is implemented annually by the Human Early Learning Partnership in participating school districts in British Columbia (BC). The MDI was developed based on the theoretical frameworks of resilience and positive youth development (Schonert-Reichl et al., 2013). One of the MDI's contributions is that it allows early adolescents to voice their experiences and feelings about their lives at school, at home, and in their communities. This information can be used by researchers, policy makers, and stakeholders for child and youth development to design services and support systems that meet the needs of this age group.

The development of MDI began in 2006 and was led by a research team at the University of British Columbia in collaboration with stakeholders in school districts and communities. During the initial stages of developing the MDI, the survey was administered to different groups of children and revisions were made based on the feedback from focus group discussions with

the children and teachers (Schonert-Reichl et al., 2013). The MDI survey was finalized over the course of three pilot studies (Schonert-Reichl et al., 2013). MDI pilot studies have been also implemented in Ontario, Northwest Territories and Nova Scotia (Thomson et al., 2018). Additionally, the survey has been piloted internationally in Peru, Switzerland, UK, Croatia and Australia (Thomson et al., 2018). Validation studies of the MDI have been conducted in BC (Schonert-Reichl et al., 2013), Italy (Castelli et al., 2018), and Australia (Gregory et al., 2019). In developing the MDI, confirmatory factor analyses (CFA) were used to assess the model fit of each of the developmental domain and convergent and discriminant validity patterns were used to assess the validity (Schonert-Reichl et al., 2013). The resulting CFA values suggested satisfactory model fit and the Cronbach alpha's ranging from .65 to .87 indicated strong psychometric validity of the measures (Schonert-Reichl et al., 2013). The MDI is implemented in grade 4 and grade 7 in the participating schools throughout BC. The present study draws from data collected with grade 7 students.

The MDI survey is administered by school staff (e.g., teachers, principal) with the support of implementation manuals and videos. Passive consent is obtained from parents and guardians (i.e., they are provided with information about the project, and given the opportunity to withdraw their child if they do not wish for them to participate). Students are invited to provide verbal assent after having been informed about confidentiality, the voluntary nature of participation and that they can choose to withdraw from the study at any point in time. The MDI is administered electronically during one to two 40-minute class periods during the school day. During implementation, the survey is read out loud to control for different reading levels. Implementation took place annually in schools in November/December for the 2014 to 2017 data collections, and in January/February for the 2018/19 data collection. The shift in implementation

months was due to conflicting schedules with the implementation of provincial standardized academic assessments.

2.2 Measures

The grade 7 MDI survey contains 8 demographic questions (birth date, gender, siblings, family and household members, languages spoken at home, first languages learnt, English proficiency) and 101 questions addressing 5 development areas (physical health and wellbeing, connectedness, social emotional development, school experiences, use of after school time). The complete MDI survey can be found at

http://earlylearning.ubc.ca/media/mdi_parent_letters_and_surveys_2019/e-

[mdi_instructional_survey_grade_4_2019-20_bc_en_watermarked.pdf](http://earlylearning.ubc.ca/media/mdi_parent_letters_and_surveys_2019/e-mdi_instructional_survey_grade_4_2019-20_bc_en_watermarked.pdf). For the present study, I draw from measures in the physical health and wellbeing domain (i.e., optimism, satisfaction with life, anxiety, depressive symptoms, and sleep), after school time use (i.e., recreational screen time), and connectedness (peer belonging, supportive relationships with adults at home, and supportive relationships with adults at school). An overview of the descriptives for each measure, reliability, skewness and kurtosis, and data missingness is presented in Table 1.

Early adolescents' gender was obtained from school records. Male gender was coded as 1; female gender was coded as 0. Participants self-reported their first language learnt at home (English was coded as 1, a language other than English was coded as 0). This variable was used as a proxy for students' cultural background.

Optimism was measured with an adapted 3-item version of the Resiliency Inventory Optimism Subscale (Noam, 1998). Items measuring optimism were assessed on a scale ranging from 1 ("disagree a lot") to 5 ("agree a lot"). Sample item: "I have more good times than bad times". *Satisfaction with life* was measured with a 5-item adapted version of the Satisfaction with

Life Scale (Diener, 1985), developed by Gaderman and colleagues (2010). Scores on the satisfaction with life scale ranged from 1 (“disagree a lot”) to 5 (“agree a lot”). Sample item: “In most ways my life is close to the way I would want it to be”. *Anxiety* was measured with a 3-item version of the Seattle Personality Questionnaire (Kusche, 1988). The rating scale for anxiety ranged from 1 (“disagree a lot”) to 5 (“agree a lot”). Sample item: “I worry about what other kids might be saying about me”. *Depressive symptoms* were measured with a 3-item version of the Seattle Personality Questionnaire (Kusche, 1988). The rating scale for anxiety ranged from 1 (“disagree a lot”) to 5 (“agree a lot”). “I feel unhappy a lot of the time”. The reliability for all emotional wellbeing indicators was satisfactory (see Table 1).

2.2.3 Health-behaviors

Screen time was assessed via two items. Participants were asked how much time during the last week from after school (3 p.m.) to dinner time (6 p.m.), they spent doing the following activities: 1. Watch TV, Netflix, YouTube, streaming videos, or something else, and 2. Play video or computer games (for example, PlayStation, Wii, Xbox, multiuser, online games, or something else). Responses to both questions were 1 (“I did not do this activity”), 2 (“less than 30 minutes”), 3 (“30 minutes to 1 hour”), 4 (“1-2 hours”) and 5 (“2 or more hours”). Given that total time in recreational screen-based activities was the focus of this study, a total screen time variable was created using the composite sum of these 2 variables. *Sleep* was assessed using a single item on the MDI (how often did you get a good night’s sleep?). The responses ranged from 1 (“never”) to 8 (“Everyday”). The reliability for the relationship variables was satisfactory (see Table 1).

2.2.4 Social relationships

Peer belonging was measured with a 3-item version of the Relational Provisional Loneliness Questionnaire (Hayden-Thomson., 1989). The rating scale for peer belonging ranged from 1 (“Disagree a lot”) to 5 (“Agree a lot”). Sample item: “I feel part of a group of friends that do things”. *Adult support at school* was measured with a 3-item version of the California Healthy Kids Survey (Constantine et al., 2001). The rating of the scale for adult support at school ranged from 1 (“Not at all true”) to 4 (“Very much true”). Sample item: “At my school, there is a teacher or another adult who really cares about me”. *Adult support at home* was measured with a 3-item version of the California Healthy Kids Survey (Constantine et al., 2001). The rating of the scale for adult support at home ranged from 1 (“Not at all true”) to 4 (“Very much true”). Sample item: “In my home, there is a parent or another adult who believes that I will be a success”.

2.3 Data analytic approach

Data were accessed through Population Data BC via a Secure Research Environment. IBM SPSS Statistics 26 was used for all analyses. First, descriptives (means, ranges, standard deviations, skewness, kurtosis) were generated and missing responses to items were inspected. In a second step, Cronbach’s alphas were calculated for multi-item measures (i.e., emotional wellbeing indicators, peer belonging, adult support indicators) as indicators of reliability and intercorrelations among all variables were examined. In a final step, four separate multiple hierarchical linear regression analysis were conducted to predict positive (optimism and satisfaction with life) and negative (anxiety and depressive symptoms) emotional wellbeing indicators from demographics (Block 1), social relationship variables (Block 2), health behavior variables (Block 3), and interactions (Block 4).

Table 1. Distribution, reliability and missing data for all variables

	Min	Max	Mean (SD)	Skewness (SE)	Kurtosis (SE)	Cronbach's alpha	% missing responses
Gender ¹	0	1	n/a	n/a	n/a	n/a	0
ESL ²	0	1	n/a	n/a	n/a	n/a	1.2
Sleep	0	7	4.64(2.14)	-0.67(0.02)	-0.62(0.03)	n/a	1.7
Passive screen time (e.g., watching videos)	0	4	2.58(1.23)	-0.40(0.02)	-0.90(0.03)	n/a	2.9
Active screen time (e.g., video games)	0	4	1.71(1.51)	0.29(0.02)	-1.36(0.03)	n/a	2.9
Total screen time	0	8	4.25(2.27)	0.15(0.02)	-0.91(0.03)	n/a	1.9
Optimism	1	5	3.80(0.89)	-0.78(0.02)	0.25(0.03)	0.77	2.5
Satisfaction with life	1	5	3.92(0.89)	-0.91(0.02)	0.28(0.03)	0.86	3.5
Depressive symptoms	1	5	2.67(1.02)	0.23(0.02)	-0.74(0.03)	0.77	2.0
Anxiety	1	5	2.89(1.26)	0.02(0.02)	-1.17(0.03)	0.87	2.2
Adults at school	1	4	3.06(0.73)	-0.59(0.02)	-0.26(0.03)	0.80	3.0
Adults at home	1	4	3.46(0.69)	-1.35(0.02)	1.21(0.03)	0.81	2.8
Peer belonging	1	5	4.03(0.94)	-1.13(0.02)	0.83(0.03)	0.82	2.5

¹ Gender (1 = Male, 0 = Female); ² ESL status (1 = English, 0 = languages other than English)

Coefficient of determination (R^2) values were used to determine the best model fit. R^2 indicates the percentage of variance in the dependent variable (i.e., emotional wellbeing indicators) explained by the independent variables. A PRATT index was calculated to determine how much contribution each variable made to the R^2 of that model (Thomas et. al., 1998). A PRATT index for a variable can take a value from 0-1 and all PRATT-indices of add up to 1, explaining 100% of the R^2 for that model. A PRATT index for each variable was calculated using variable's β -weight, its correlation with the outcome variable (r_{xy}), and the total R^2 in the regression model [$d = (\beta * r_{xy})/R^2$] (Thomas et al., 1998). A predictor is considered relatively unimportant if $d < 1/(2*p)$ with p indicating the total number of predictors in the model (Thomas, 1992). Applying this principle to the present study, predictors with a PRATT index smaller than 0.06 [$d < 1/(2*9)$] could be considered relatively unimportant in explaining variance since they explain less than 6% of the R^2 in the model. Assumptions for multiple linear regression – linearity, normality, and equal variance assumptions – were also tested using residual graphs and Q-Q plots. The Durbin Watson test was examined to check for homoscedascity and the VIF was examined for multicollinearity of variables. A possible curvilinear relationship between screen time and emotional wellbeing was examined by adding a quadratic screen time term to the model. However, the quadratic term did not significantly improve the regression output, therefore analyses were continued with linear modeling.

Chapter 3. Results

3.1 Preliminary analyses

Missingness ranged from 1.2% to 3.5% across all variables. Prior research has indicated that when the missingness rate is less than 5%, the chance of results being biased is low (Schafer, 1999). Additionally, a Little MCAR's test was conducted; the result (MCAR, $p > 0.001$) suggested that the values were missing at random (Van Ness et al., 2007). Listwise deletion was used to handle missing data; the subsequent analyses are based on cases with complete data. Final sample sizes were 27,997 for analyses predicting optimism, 27,718 for analyses predicting satisfaction with life, 28,074 for analyses predicting anxiety and 28,128 for analyses predicting depressive symptoms. Further, all assumptions for linear regression analysis were met, except for the normal distributions of variables. As shown in Table 1, responses to several variables were positively or negatively skewed. The large sample size in the present study, however, supported the robustness of regression analyses in the present study (Lehmann et al., 1999)

Table 2 shows intercorrelations among all variables in the present study. For example, optimism, satisfaction with life were negatively correlated with active and passive screen time, and positively correlated with sleep, peer belonging, adult support at school and adult support at home. Anxiety and depressive symptoms were positively correlated with passive screen time, negatively correlated with sleep, peer belonging, adult support at school and adult support at home. Anxiety was negatively correlated with active screen time whereas there was a positive correlation between active screen time and depressive symptoms. Being female was related to higher levels of depressive symptoms and anxiety. Being male was associated with higher levels of optimism and satisfaction with life.

3.2 Hierarchical linear regressions predicting positive and negative emotional wellbeing

Hierarchical linear regression models were built to examine whether screen time, sleep, peer belonging, adult support at school, and adult support at home predicted the 4 emotional wellbeing outcomes, after controlling for the demographic variables (i.e., gender, ESL status). Demographic variables were entered as a 1st block, health related behaviors (i.e., screen time, sleep) as a 2nd block and social relationships (i.e., peer belonging, adult support at school, adult support at home) as a 3rd block. In block 4, interactions between screen time and gender, and between screen time and sleep were added. A more conservative significance level of p-value of 0.001 was used in regression analysis, given the large sample size.

Optimism

In Model 1 (see Table 3) being a male was significantly associated with higher levels of optimism ($\beta = .029$, $p < .001$). The overall model was statistically significant [adjusted $R^2 = .001$, $F(2, 25,326) = 10.79$, $p < .001$] though the variance explained in optimism was minimal (i.e., 0.1%). In Model 2, better quality sleep was related to higher levels of optimism ($\beta = .392$, $p < .001$) whereas more screen time was related to lower levels of optimism ($\beta = -.096$, $p < .001$). Gender also remained a significant variable in the model. The change in variance explained from Model 1 to 2 was significant [R^2 change = .172, $F(2, 25,324) = 2,628.0$]. Model 2 explained overall 17.2% of variance in optimism [adjusted $R^2 = .172$, $F(4, 25,324) = 1,320.5$, $p < .001$]. In Model 3, adult support at home ($\beta = .233$, $p < .001$), adult support in school ($\beta = .109$, $p < .001$) and peer belonging ($\beta = .286$, $p < .001$) were positively related to optimism. The direction and statistical significance of sleep, screen time, and gender remained similar to the previous model. The R^2 change from Model 2 to 3 was significant [R^2 change = .203, $F(3, 25,321) = 2,750.1$]. Model 3 explained 37.6% of variance in optimism [adjusted $R^2 = .376$, $F(7, 25,321) = 2,178.9$, $p < .001$].

In the last step, interaction terms between screen time and gender, and screen time and sleep were added to the model. Only the screen time by gender interaction term was statistically significant. The nature of the interaction is visualized in Figure 1. Specifically, at lower levels of screen time, females report higher levels of optimism, whereas at higher levels of screen time females report lower levels of optimism. As screen time increased, the rate at which optimism decreased was higher for females compared to males and the gap between males and females widened. The significance and direction of relationship for the remaining variables remained similar to the previous model, except for gender which was no longer a significant predictor in the model. The R^2 change from Model 3 to 4 was statistically significant [R^2 change = .001, $F(2, 25,319) = 13.6, p < .001$] but the additional variance explained was minimal. The final model explained 37.6% of variance in optimism scores [adjusted $R^2=.376, F(9, 25,319) = 1699.4, p < .001$]. Based on PRATT-indices for this model, 5 variables explained the most of early adolescents' variability in optimism. Peer belonging accounted for 35%, adult support at home accounted for 28%, sleep accounted for 25%, adult support at school accounted for 10%, and screen time accounted for 3% of the total variance explained in the model.

Table 2. Intercorrelations among all variables in the present study.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender ¹	1												
2. ESL status ²	-.016**	1											
3. Sleep	.049**	-.030**	1										
4. Passive ST	.018**	.032**	-.135**	1									
5. Active ST	.447**	.037**	-.077**	.371**	1								
6. Total ST	.305**	.042**	-.122**	.786**	.859**	1							
7. Peer belong.	.056**	.031**	.280**	-.054**	-.039**	-.054**	1						
8. Adults school	-.076**	.064**	.217**	-.071**	-.088**	-.097**	.321**	1					
9. Adults home	.015*	.069**	.303**	-.086**	-.070**	-.090**	.360**	.420**	1				
10. Optimism	.028**	0.004	.403**	-.116**	-.103**	-.130**	.470**	.350**	.453**	1			
11. SWL	.046**	.075**	.383**	-.108**	-.071**	-.104**	.475**	.352**	.508**	.671**	1		
12. Depr. Symp.	-.076**	-.019**	-.348**	.137**	.075**	.122**	-.393**	-.236**	-.359**	-.547**	-.518**	1	
13. Anxiety	-.168**	-.043**	-.170**	.089**	-.023**	.032**	-.291**	-.095**	-.165**	-.240**	-.265**	.477**	1

¹ Gender (0 = Female; 1 = Male); ² ESL status (0 = languages other than English; 1 = English)

** indicates statistically significant at a level of $p < 0.01$

ST = screen time; Peer belong. = peer belonging; SWL = Satisfaction with life; Depr. Symp. = Depressive Symptoms

Table 3. Hierarchical linear regression model predicting optimism

	Block 1			Block 2			Block 3			Block 4			Total		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	R^2	ΔR^2	<i>PRATT</i>
Block 1	3.771	.014		3.131	.019		.936	.030		.952	.036		.001	.001	
Gender	.051	.011	.029*	.070	.011	.039*	.042	.009	.023*	-.044	.020	-.024			<.01
ESL	.012	.014	.005	.049	.013	.022*	-.042	.011	-.019*	-.043	.011	-.019*			<.01
Block 2													.172	.172	
Sleep				.164	.002	.392*	.092	.002	.219*	.099	.005	.236*			0.253
Screen time				-.038	.002	-.096*	-.025	.002	-.063*	-.029	.005	-.075*			0.026
Block 3													.376	.203	
Peer belonging							.273	.005	.286*	.272	.005	.285*			0.356
Adults at school							.133	.007	.109*	.133	.007	.109*			0.102
Adults at home							.304	.008	.233*	.303	.008	.233*			0.281
Block 4													.376	.001	
Screen*Gender										.021	.004	.068*			>.01
Screen*Sleep										-.002	.001	-.025			>.01

¹ Gender (0 = Female; 1 = Male); ² ESL status (0 = languages other than English; 1 = English); * $p < 0.001$.

Satisfaction with life

In Model 1 (see Table 4, Appendix A) being a male ($\beta = .049, p < .001$) and English as a first language learned ($\beta = .076, p < .001$) were significantly associated with higher levels of satisfaction with life. The overall model was statistically significant [adjusted $R^2 = .008, F(2, 25,125) = 102.17, p < .001$]. The model, however, explained only .8% of variance in satisfaction with life. In Model 2, better quality sleep was related to higher levels of satisfaction with life ($\beta = .375, p < .001$) whereas more screen time ($\beta = -.079, p < .001$) was related to lower levels of satisfaction with life. Gender remained a significant predictor in the model. The change in variance explained from Model 1 to 2 was significant [R^2 change = .154, $F(2, 25,123) = 2,306.9$]. Model 2 explained overall 16.2% of variance in satisfaction with life [adjusted $R^2 = .162, F(4, 25,123) = 1,213.9, p < .001$]. In Model 3, adult support at home ($\beta = .308, p < .001$), adult support in school ($\beta = .089, p < .001$) and peer belonging ($\beta = .276, p < .001$) were positively related to satisfaction with life. The direction and significance of sleep, screen time, and gender remained similar to the previous model. The R^2 change from Model 2 to 3 was significant [R^2 change = .239, $F(3, 25,120) = 3,340.3$]. Model 3 explained 40.1% of variance in satisfaction with life [adjusted $R^2 = .401, F(7, 25,120) = 2,401.8, p < .001$].

When considering possible interactions, only the screen time by gender interaction term was statistically significant. The nature of the interaction is visualized in Figure 4 (see Appendix). Similar to the pattern for optimism, as screen time increased, the rate at which satisfaction with life decreased was higher for females compared to males, leading to a widening gap in satisfaction with life between boys and girls at the higher levels of screen time. The significance and direction of relationship for the remaining variables remained similar to the previous model, except for gender which was no longer a significant predictor in the model. The

R^2 change from Model 3 to 4 was statistically significant but small [R^2 change = .001, $F(2, 25,118) = 25.3, p < .001$]. The final model explained 40.2% of variance in satisfaction with life scores [adjusted $R^2=.402, F(9, 25,118) = 1877.3, p < .001$].

Similar to optimism, the PRATT-indices for this model suggested that adult support at home accounted for 39% of the variance in satisfaction with life, followed by peer belonging (33%), sleep (21%), adult support at school (8%) and screen time (1%).

Depressive symptoms

In Model 1 (see Table 5, Appendix A) being a male ($\beta = -.077, p < .001$) and having English as a first language learned ($\beta = -.020, p < .001$) were significantly associated with lower levels of depressive symptoms. The overall model was statistically significant [adjusted $R^2=.006, F(2, 25,433) = 80.25, p < .001$] but explained only .6% of variance in depressive symptoms. In Model 2, better quality sleep was related to lower levels depressive symptoms ($\beta = -.332, p < .001$) whereas more screen time ($\beta = .115, p < .001$) was related to higher levels of depressive symptoms. Gender and ESL status remained as significant predictors in the model. The change in variance explained from Model 1 to 2 was significant [R^2 change = .132, $F(2, 25,431) = 1953.2$]. Model 2 explained overall 13.8% of variance in depressive symptoms [adjusted $R^2=.138, F(4, 25,431) = 1022.9, p < .001$]. In Model 3, adult support at home ($\beta = -.188, p < .001$), adult support in school ($\beta = -.029, p < .001$) and peer belonging ($\beta = -.252, p < .001$) were negatively related to depressive symptoms. The direction and significance of sleep, screen time, and gender remained similar to the previous model. The R^2 change from Model 2 to 3 was significant [R^2 change = .261, $F(3, 25,428) = 1,410.2$]. Model 3 explained 40.1% of variance in depressive symptoms [adjusted $R^2=.401, F(7, 25,428) = 1,286.1, p < .001$].

When considering possible interactions, the screen time by gender interaction (Figure 2), and screen time by sleep interaction (Figure 3) terms were statistically significant. Sleep was categorized into low (*'never' to '2 times a week'*), medium (*'3 times per week' and '4 times per week'*), high (*'5 times per week' to 'everyday'*) for meaningful visualization. When screen time was completely absent, males indicated higher levels of depressive symptoms than females. However, as screen time increased, depressive symptoms for females increased at a higher rate than for males – leading to a widening gap in depressive symptoms between boys and girls at the higher levels of screen time. As for sleep and screen time, while there were slight fluctuations in depressive symptoms as screen time increased at different categories of sleep, the overall trend appeared to be that of a main effect – at higher levels of sleep, lower levels of depressive symptoms were observed and vice versa. A meaningful interaction could not be detected in the visualization of this effect.

The significance and direction of relationship for the remaining variables remained similar to the previous model, except for gender and ESL status which were no longer significant predictors in the model. The R^2 change from Model 3 to 4 was statistically significant [R^2 change = .002, $F(2, 25,426) = 33.3, p < .001$]. The final model explained 26.3% of variance in depressive symptoms scores [adjusted $R^2 = .263, F(9, 25,426) = 1,010.2, p < .001$]. The PRATT-indices for this model suggested that peer belonging accounted for (37%) of the variance in depressive symptoms, followed by sleep (32%), adult support at home (26%), screen time (4%), and adult support at school (3%).

Figure 1. Association between screen time and optimism separate for males and females

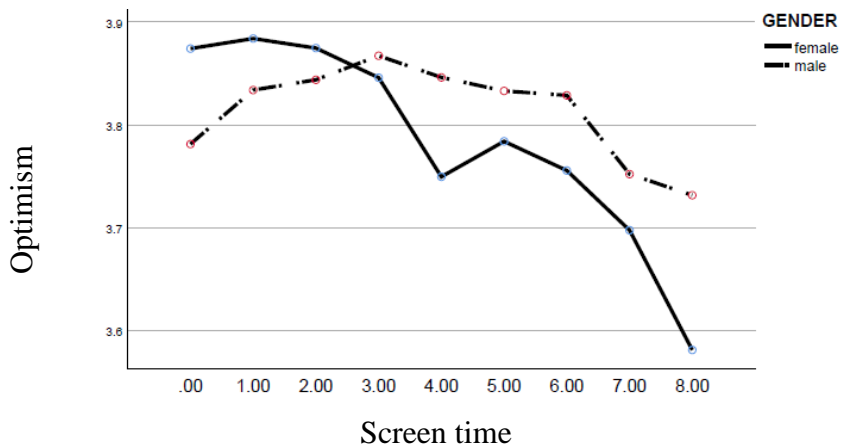


Figure 2. Association between screen time and depressive symptoms separate for males and females

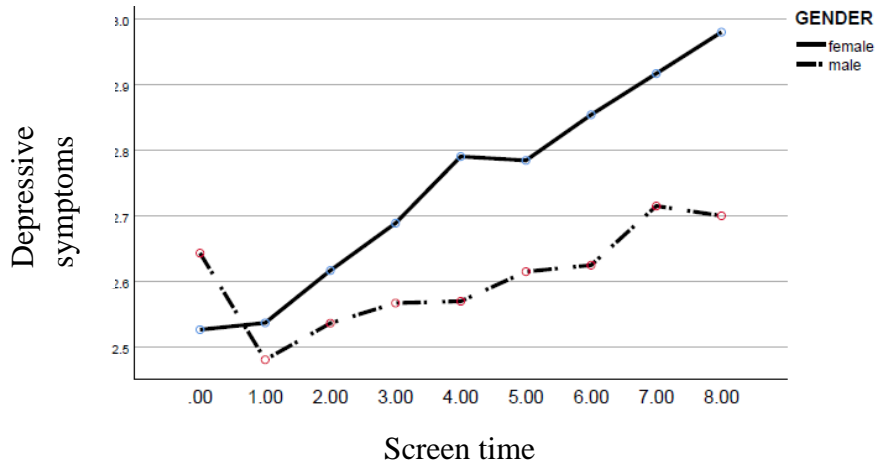


Figure 3. Association between screen time and depressive symptoms separate for sleep categories

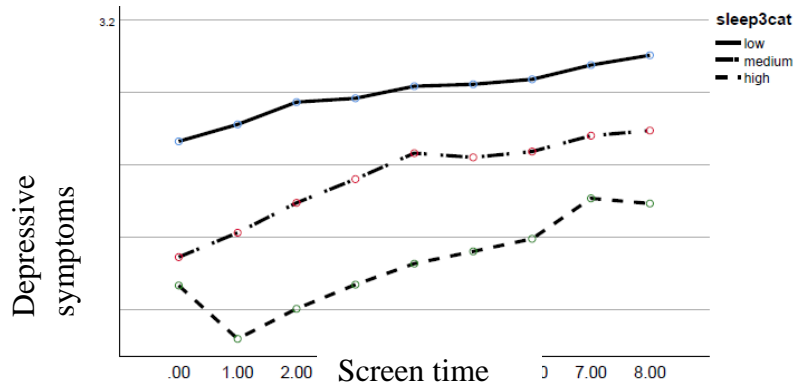


Table 5. Hierarchical linear regression model predicting depressive symptoms

	Block 1			Block 2			Block 3			Block 4			Total		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	R^2	ΔR^2	<i>PRATT</i>
Block 1	2.789	.016		3.356	.022		5.218	.037		5.224	.044		.006	.006	
Gender	-.156	.013	-.077*	-.194	.012	-.096*	-.158	.012	-.078*	-.007	.024	-.003			<.01
ESL	-.052	.016	-.020*	-.092	.015	-.036*	-.019	.014	-.007	-.018	.014	-.007			<.01
Block 2													.138	.132	
Sleep				-.158	.003	-.332*	-.095	.003	-.201*	-.115	.006	-.243*			0.322
Screen time				.051	.003	.115*	.040	.003	.090*	.041	.006	.091*			0.042
Block 3													.261	.123	
Peer belonging							-.272	.006	-.252*	-.271	.006	-.250*			0.374
Adults at school							-.040	.008	-.029*	-.040	.008	-.029*			0.026
Adults at home							-.278	.009	-.188*	-.276	.009	-.187*			0.255
Block 4													.263	.002	
Screen*gender										-.037	.005	-.107*			0.010
Screen*sleep										.004	.001	.063*			0.034

¹Gender (0=Female; 1=Male); ²ESL status (0=language other than English; 1=English); * p<0.001

Anxiety

In Model 1 (see Table 6) being a male ($\beta = -.168, p < .001$) and having English as a first language learned ($\beta = -.046, p < .001$) were significantly associated with lower levels of anxiety. The overall model was statistically significant [adjusted $R^2 = .030, F(2, 25,383) = 394.3, p < .001$]. and explained 3% of variance in anxiety. In Model 2, better quality sleep was related to lower levels anxiety ($\beta = -.155, p < .001$) whereas more screen time ($\beta = .074, p < .001$) was related to higher levels of anxiety. Gender and ESL status remained as significant predictors in the model. The change in variance explained from Model 1 to 2 was significant [R^2 change = $.032, F(2, 25,381) = 433.2$]. Model 2 explained overall 6.2% of variance in anxiety [adjusted $R^2 = .062, F(4, 25,381) = 420.5, p < .001$]. In Model 3, adult support at home ($\beta = -.051, p < .001$), adult support in school ($\beta = .019, p < .001$) and peer belonging ($\beta = -.247, p < .001$) were negatively related to anxiety. The direction and significance of sleep, screen time, and gender remained similar to the previous model. The R^2 change from Model 2 to 3 was significant [R^2 change = $.062, F(3, 25,378) = 594.3$]. Model 3 explained 12.3% of variance in anxiety [adjusted $R^2 = .123, F(7, 25,378) = 511.8, p < .001$].

When considering possible interactions, the screen time by gender interaction (see Figure 5, Appendix), and screen time by sleep interaction (see Figure 6, Appendix) terms were statistically significant. Sleep was categorized into low (*'never'* to *'2 times a week'*), medium (*'3 times per week'* and *'4 times per week'*), high (*'5 times per week'* to *'everyday'*) for meaningful visualization. Females indicated higher levels of anxiety across all levels of screen time, and as screen time increased, anxiety for females increased at a higher rate than for males- leading to a widening gap in anxiety at the higher levels of screen time. Similar to depressive symptoms, while there were slight fluctuations in anxiety as screen time increased at different categories of

sleep, the overall trend appeared to be that of a main effect; at higher levels of sleep, lower levels of anxiety were observed and vice versa. There was no clear visible interaction.

The significance and direction of relationship for the remaining variables remained similar to the previous model, except for adult support at school and screen time which were no longer significant predictors in the model. The R^2 change from Model 3 to 4 was statistically significant [R^2 change = .002, $F(2, 25,376) = 24.0, p < .001$]. The final model explained 12.5% of variance in anxiety scores [adjusted $R^2 = .125, F(9, 25,376) = 404.1, p < .001$]. The PRATT-indices for this model suggested that peer belonging accounted for (57%) of the variance in anxiety, followed by sleep (18%), gender (15%) and adult support at home (7%).

Chapter 4: Discussion

Motivated by the lack of research that explores emotional wellbeing during early adolescence through a joint ecological and behavioral lens, the present study investigated whether social relationships (with peers, adults in school, adults at home) and health behaviors (screen time, sleep) were associated with indicators of positive and negative emotional wellbeing in a population-level sample of grade 7 students in BC. The findings of the present study extend previous research that has investigated social relationships and health related behaviors in young adolescents. This study is also of practical relevance as it can inform programs and interventions designed to promote early adolescents' positive development and health by identifying specific supportive and risk factors that are related to wellbeing.

4.1 Social relationships, health behaviors, and positive emotional wellbeing

As hypothesized, peer belonging and adult support were positively associated with early adolescents' optimism and satisfaction with life in the present study. This finding was in accordance with previous research that has established a connection between young people reporting nurturing and supportive relationships, and their positive emotional wellbeing (Chong et al., 2006; Thomson et al., 2015). In the present study, the supportive relationship variables explained the most variance in optimism and satisfaction with life, indicating that they were most important for understanding differences in emotional wellbeing among early adolescents. This finding is consistent with previous research that has indicated that peer and adult support are critical social assets that promote emotional wellbeing in early adolescence (Blaskova & McLellan, 2018; Woolley & Bowen, 2007). One way of interpreting the significant role of supportive adults at home is through an attachment theory lens (Bowlby, 1969). Attachment theory emphasizes that secure, nurturing relationships with parents offer comfort and stability,

and are critical contributors to social and emotional functioning of young people during the transitional time of early adolescence (Nickerson & Nagle, 2005). In addition to the important of adult support at home, research has shown that support from an adult mentor at school (e.g., a teacher, an advisor) is an important social support resource in early adolescence (e.g., Kjellström et al., 2017; Thurman et al., 2018; Woolley & Bowen, 2007). Specifically, positive relationships with adults at school tend to be associated with early adolescents' positive school experiences and help young people feel safe and supported during school hours (Waters et al., 2014). The presence of adult mentors in school can also be critical for early adolescents with difficult relationships in the family (Davis & Lambie, 2005). Overall, a large cross-sectional study with middle school children in the US has found that when adult support is low, even at higher levels of peer support, the emotional well-being of young people remained low (Buchanan & Bowen, 2008). Thus, findings in the current study add to the existing literature that highlights the importance of supportive adult mentors during early adolescent years (Buchanan & Bowen, 2008; Oberle et al., 2011; Waters et al., 2014).

In line with previous literature, peer belonging was identified as an important predictor of positive emotional wellbeing (Drolet & Arcand, 2013; Oberle et al., 2010). The role of peer belonging in optimism and satisfaction with life specifically is intriguing because it confirms that during early adolescence social circles widen, and acceptance from peers becomes increasingly important for wellbeing (Allen & Bowles, 2012; Brown et al., 1986). This has also been found in research outside the North American and Western cultural context. For example, in a cross-sectional study based in Singapore early adolescents' levels of optimism were positively related to their perceived support from family and peers (Chong et al., 2006). Some scholars have also reasoned that peers play a fundamental role for identity formation during early adolescence and

that belonging to a peer group thus becomes an indicator of self-worth- and contributes to the degree to which early adolescents feel satisfied with their lives (Dew & Huebner, 1994; Elliot & Dweck, 2005).

Similar to previous research that has identified sleep quality as an important factor in psychological wellbeing, better quality of sleep was significantly related to positive emotional wellbeing in the present study, and explained more than 20% variance in positive emotional wellbeing in the final models (Gregory & Eley, 2005; McMakin & Alfano, 2015). This finding is in accordance with another cross-sectional study that found associations between inadequate sleep and emotional disturbances that diminish adolescents' cognitive abilities and quality of life (Sarchiapone et al., 2013). Although the underlying mechanism between sleep and positive emotional wellbeing has not been specifically investigated, it can be speculated based on research that has focused on sleep deprivation in young people. For example, results from a US-based study with youth indicated that chronic sleep deprivation during school nights was predictive of worsened moods and reduced ability to control negative emotions among adolescents (Baum et al., 2014). The present study expands on the existing literature that has typically focused on sleep deprivation and negative health outcomes, by highlighting the importance of good quality sleep for positive emotional wellbeing in early adolescents (Brand & Kirov, 2011; Tarokh et al., 2016).

As predicted, screen time was negatively related to indicators of positive emotional wellbeing. This finding is in line with those of a large cross sectional study, where reduced levels of happiness and life satisfaction among adolescents were associated with more time spent in screen activities (e.g., internet, gaming) than non-screen activities (e.g., exercise, in-person social interactions) (Twenge et al., 2018). However, for both optimism and satisfaction with life, the

effect of screen time on wellbeing differed significantly across boys and girls. Specifically, more time spent in screen-based recreational activities was related to lower levels of emotional wellbeing; but the effect was more pronounced for girls than for boys. In other words, it appears that the costs of high screen time were higher for girls than for boys. Similar findings were reported in a literature review by Costigan (2013) where significant correlations were observed between daily screen time and psychosocial health outcomes (e.g., poor self-perceived health) among adolescent girls, with more pronounced effects after 4 hours of daily screen time. It is possible that gender-specific social and emotional changes that early adolescents undergo during this time may explain this finding (Zimmermann & Iwanski, 2014). For instance, it is possible girls- particularly those who feel socially isolated- tend to turn to solitary activities such as screen time to cope with their negative emotions while boys are more likely to display externalizing behaviors Costigan (2013). Furthermore, gender differences may be related to the specific screen-based recreational activities boys and girls engage in. For instance, emerging research suggests that girls tend to engage in passive screen-based activities such as movies and TV while boys tend to prefer active screen activities such as video games (Straatmann et al., 2016). In addition, researchers have speculated that extended screen time has overwhelming pressures on self-image by provoking high scrutiny and unrealistic beauty comparisons, and that girls are more susceptible to these effects than boys (Durkin & Paxton, 2002; Hargreaves & Tiggemann, 2003).

Interestingly, a graphic examination of the gender-screen time interaction findings showed that for both boys and girls, optimism and satisfaction with life were slightly lower when they engaged in no screen time than when they reported low levels of screen time; this effect was more pronounced among boys than in girls. These observations may imply that having moderate

levels of screen time is better than having no screen time at all for emotional wellbeing. It is possible that these observations at zero screen time are a reflection of underlying socio-economic factor such as not having access to electronic devices at home or having very strict parental practices in the home (Carson et al., 2010; Samaha & Hawi, 2017). Moreover, it can be assumed that being able to enjoy screen activities at a moderate level can promote positive emotions through relaxation and escapism for early adolescents (Canadian Paediatric Society, 2017; LeBlanc et al., 2017; Przybylski & Weinstein, 2017).

4.2 Social relationships, health behaviors, and negative emotional wellbeing

As expected, the peer belonging and adult support play a protective role against depressive symptoms and anxiety among early adolescents in the present study. This finding is in line with previous research that has connected supportive relations to lower levels of emotional difficulties (Blaskova & McLellan, 2018; Crean, 2012; Woolley & Bowen, 2007). Similar to the findings for positive emotional wellbeing, peer belonging (37%) and adult support at home (26%) accounted for most of the variance explained by depressive symptoms in this study. In contrast, peer belonging (57%) was the single most important contributor for understanding differences in early adolescents' anxiety. This finding underscores the significant role of positive peer relationships for protecting early adolescents from emotional challenges (Cuadros & Berger, 2016). A possible reason for the quite large contribution of peer belonging to anxiety may be the nature of the anxiety measure itself. All three anxiety items in the present study were primarily focused on social anxiety and early adolescents often experience social anxiety in interactions with peers (Schonert-Reichl et al., 2013). This finding may explain the large contribution of peer belonging to the variability in anxiety, but also highlight the role peers play in this developmentally sensitive time.

Consistent with previous literature, adult support at home was significantly and negatively associated with depressive symptoms and anxiety (Kjellström et al., 2017; Patten et al., 1997). This suggests that even when early adolescents expand their social circle beyond family, the support and guidance from adults at home continue to play a critical role for their emotions. In fact, a 2-year longitudinal study that followed early adolescents through their transition to high school observed that depressive symptoms were significantly low among those who reported high levels of perceived parental support (Newman et al., 2007). In addition to adult support at home, supportive relationships with adults at school were also significantly related to lower levels of negative emotional wellbeing. Given that young people spend a majority of their day at school, the support they receive from adults at school can indeed have a notable impact on their emotional wellbeing. For instance, a cross sectional study with middle school children in the US reported a relation between higher levels of perceived teacher emotional support, and fewer internalizing problems, fewer emotional symptoms and higher levels of positive adjustment (Tennant et al., 2015).

As predicted, low sleep quality was significantly associated with higher levels of anxiety and depressive symptoms among early adolescents. This aligns with previous research that has identified poor sleep quality to be detrimental to young people's wellbeing as sleep deprivation can lower their ability to control and manage negative emotions (Baum et al., 2014; Gregory & Eley, 2005). It is also important to compare the size of depressive symptoms and sleep quality effects in the present study to those found in previous studies. For example, a cross sectional study by Lemola and colleagues reported a significant association ($\beta=.26$) between electronic use in bed before sleep and higher levels of depressive symptoms among adolescents after controlling for age and gender (2014). This implied an association of similar strength between

sleep and depressive symptoms as the present study. However, in another cross-sectional study ($N=242$), Pasch and colleagues reported a much stronger association ($\beta=-0.76$) between less weekday sleep and higher levels of depressive symptoms after controlling for gender, school grade, socio-economic status, BMI z-score, pubertal development, and parent's education among 10-16-year-olds (2010). The variability in effect sizes could be a reflection of the differences in control variables used in Pasch and colleagues' study and the present study. It could also be a reflection of the differences in sleep questions on the 2 surveys. Specifically, the present study used a single item question to assess the perceived sleep quality whereas the study in comparison used sleep duration as the sleep measure- sleep duration may not necessarily represent subjective sleep quality and vice versa.

The significant interaction term between sleep and screen time indicated that the effect of screen time on negative emotional wellbeing is dependent on sleep quality. Specifically, the early adolescents those who reported low sleep quality also reported high levels of depressive symptoms and anxiety irrespective of the level of screen time. Several explanations can be considered for this finding. It is possible that the lack of sleep aggravates the negative effects of screen time, thus contributing to poor emotional wellbeing. As explored in previous research, it is also possible for screen time to displace sleeping hours, reduce the quality of sleep, and consequently lead to high levels of anxiety and depressive symptoms (Li et al., 2019). However, unlike in some previous research, a mediating effect of screen time between sleep and wellbeing was not observed in the present study. A reason for this could be the difference in measures used for sleep and screen across different studies, making it hard to directly compare findings. Lastly, the current study measured sleep as a single item assessing the number of times early adolescents received quality sleep per week whereas in some studies sleep quality was measured using a

combination of questions that assessed the duration of sleep, sleep onset difficulties and perceived restfulness upon waking up, a limitation that needs to be addressed in future research (Vandendriessche et al., 2019; Cain & Gradisar, 2010).

In line with what scholars have observed previously, the present study revealed a direct association between high levels of screen time and negative emotional wellbeing (Domingues-Montanari, 2017). This finding is consistent with several other cross-sectional studies, including a Canadian study by Maras and colleagues (2015) that reported negative associations between screen time and severity of depressive symptoms among 12-18 year-old youths after controlling for a wide range of demographics (Babic et al., 2017; Lancet, 2019; Lissak, 2018). A possible explanation is that when early adolescents spend excessive amounts of time on screen activities, they lose opportunities for creative/outdoor activities, physical movement, and face to face interactions with friends and family that may help manage negative emotions and promote emotional wellbeing. However, it still needs to be considered that the present study cannot imply directionality in the relation between screen time and emotional wellbeing. For example, while it is possible for young people to experience high levels of negative emotions as a result of extended screen time, it is also possible that early adolescents experience high levels of anxiety and depressive symptoms and turn to screen activities a coping behavior (Gunnell et al., 2015). Additional longitudinal research is needed to establish causal effects. Lastly, it is important to consider the how these findings on screen time compare to those of the previous studies. For instance, in another Canadian study ($N=2482$), the researchers Maras and colleagues reported that daily screen time spent on TV, video games and computer as significantly and negatively associated with symptoms of depression ($\beta = 0.23, p < 0.001$) and anxiety ($\beta = 0.07, p < 0.01$) among adolescents after controlling for physical activity, sex, age, ethnicity, parental education

and BMI (2015). When compared to this study, the findings of the current study indicated a stronger association between screen time and depressive symptoms ($\beta=0.91$) and a weaker association between screen time and anxiety ($\beta =0.035$). These variations may be attributed to the differences in the psychometric scales used to measure the emotional wellbeing outcomes in the 2 studies. For instance, Maras and Colleagues used the Children's Depression Inventory which has 27 items which assess behavioral, affective and cognitive aspects of depression whereas the current study used a 3-item version of the Seattle Personality Questionnaire. It is possible that each of the scale measured a different interval on the spectrum of depressive symptoms. Additionally, the participants of the Maras and colleagues' study were between the grades 7-12, whereas the current study focused on participants in grade 7 only. It is possible that the older participants engage in screen activities that were not measured in the study such as texting, social media and internet hence, contributing to the weaker association demonstrated in Maras and colleagues' study.

Similar to the findings for positive emotional wellbeing indicators, the effect of screen time on depressive symptoms and anxiety significantly varied for girls and boys. Higher levels of screen time were related to an increase in depressive symptoms and anxiety for both genders; for girls', however, the increase is negative emotional wellbeing at higher levels of screen time was much larger. This suggests that high levels put girls' emotional wellbeing more at risk than boys' in the present study. These findings align with those of a previous study which observed increased levels of anxiety among adolescence girls, compared to boys at relatively high levels of television and video game use (Ohannessian, 2009). It has been speculated that compared to early adolescent boys, girls are more susceptible to the negative effects of media (e.g., constant comparing oneself with girls presented in social media) that in the absence of social interactions,

girls engaging in increased levels of screen activity are more likely to experience anxiety and depressive symptoms (Booker et al., 2018; Bickham & Rich, 200; Hoge et al., 2017).

Additional research is needed to understand how screen content (e.g., light-hearted programming vs. age-inappropriate content) and viewing habits (e.g., isolated TV vs watching with family) may influence negative emotions and how these implications may differ based on gender for this age group. Last, no screen time appeared to be slightly worse for emotional wellbeing than a little screen time in the present study, supporting the previously found “Goldilocks effect” where low amounts of screen time were found to be are “just right” for mental health (Przybylski & Weinstein, 2017).

A strength of the current study was based on a large data set that reflected population level data collected during a relatively recent and narrow time period (2014-2018). Data were self-reported responses that reflected early adolescents’ voices about their health behaviors, experiences and wellbeing. The large sample size supports a reliable insight into the health behaviors and social relationships as they are experienced by the early adolescents in BC. However, several limitations also need to be considered when evaluating the findings of this study. Given the cross-sectional nature of the data source, causality about the direction of the relationships between predictor and outcome variables cannot be inferred. The self-reported survey furthermore relied on early adolescents’ ability to accurately remember and report their sleep quality and screen time use, which made the study design susceptible to information bias. For example, screen time was measured by asking early adolescents about their screen time on a typical weekday between 3pm and 6pm during the last week. It is possible that it was difficult for participants to take into account the specific time range and decide what would be a typical day within their response. The MDI survey unfortunately does not investigate screen time use after

6pm on weekdays or during any time on weekends. These limitations may have under-represented early adolescent's use of screen activities in a given week. Also, given that technology and screen-based activities change rapidly, the present findings need to be understood within the time period during which data were collected. Also, regarding negative emotional wellbeing indicators, it must be noted that depressive symptoms and anxiety do not represent clinical diagnosis.

4.3 Study implications and future directions

There are several future directions for the research conducted in the current study. For instance, the specific contributions of individual screen-based activities can be further examined based on whether they have a social component (e.g., texting with someone, social media) or not (e.g., solitary TV). Additionally, future studies need to use innovative measurement tools to record screen time more accurately (e.g., using built in tracking apps on mobile devices) and get better insight into sleep quality (e.g., data from a daily sleep diary). It is also critical to examine the role of socio-economic background, given that it is intricately related to the resources accessible and to the experiences during early adolescence (McLeod & Owens, 2004).

In future research, it will be worthwhile to examine if the observed gender differences are consistent across different phases in development. This would also provide a valuable insight into the type of interventions and programs that need to be in place to meet the gender and age specific needs of young people. Also, it will be valuable to understand how these observations may compare between different subgroups (e.g., recently immigrated early adolescents, early adolescents of different socio-economic backgrounds) which can inform targeted interventions. Further research is needed to determine the directionality of the relationship between social relationships, health related behaviors and emotional wellbeing during early adolescence. Lastly,

additional research is needed to understand the joint effect of socio-economic background and screen time on positive emotional wellbeing among early adolescents.

4.4 Conclusion

In summary, this large cross-sectional study based in B.C. indicated that the early adolescents' emotional wellbeing is associated with both social and behavioral factors. Specifically, peer belonging, adult support at home and at school and sleep quality were positively associated with optimism and satisfaction with life, whereas screen time was inversely related to positive emotional wellbeing. The opposite pattern was found when examining the outcomes of anxiety and depressive symptoms. In general, the cost of higher levels of screen time on emotional wellbeing was higher for girls compared to boys. These findings can be used to understand social and behavioral factors that may exacerbate negative emotions during early adolescence, and also to understand ecological assets that can be actively nurtured to support a thriving early adolescence.

References

- Ahmed, W., Ahmed, W., Minnaert, A., Minnaert, A., van der Werf, G., van der Werf, G., Kuyper, H., & Kuyper, H. (2010). Perceived social support and early adolescents' achievement: The mediational roles of motivational beliefs and emotions. *Journal of Youth and Adolescence*, *39*(1), 36–46.
- Allison, B. N., & Schultz, J. B. (2001). Interpersonal identity formation during early adolescence. *Adolescence*, *36*(143), 509.
- Angeles, L., & Angeles, L. (2010). Children and life satisfaction. *Journal of Happiness Studies*, *11*(4), 523–538.
- Arain, M., Haque, M., Johal, L., Mathur, P., Nel, W., Rais, A., Sandhu, R., & Sharma, S. (2013). Maturation of the adolescent brain. *Neuropsychiatric Disease and Treatment*, 449–461.
- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, *16*(5), 427–454.
- Arsenijević, O., Mihailović, D., & Bulatović, L. (2015). The media culture of the young people. *International Journal of Economics Law*, *5*(15), 7–17.
- Babic, M. J., Smith, J. J., Morgan, P. J., Eather, N., Plotnikoff, R. C., & Lubans, D. R. (2017). Longitudinal associations between changes in screen-time and mental health outcomes in adolescents. *Mental Health and Physical Activity*, *12*, 124–131.
- Babic, M. J., Smith, J. J., Morgan, P. J., Lonsdale, C., Plotnikoff, R. C., Eather, N., Skinner, G., Baker, A. L., Pollock, E., & Lubans, D. R. (2016). Intervention to reduce recreational screen-time in adolescents: Outcomes and mediators from the 'Switch-Off 4 Healthy Minds' (S4HM) cluster randomized controlled trial. *Preventive Medicine*, *91*, 50–57.

- Batra, S. (2013). The psychosocial development of children: Implications for education and society—Erik Erikson in context. *Contemporary Education Dialogue, 10*(2), 249–278.
- Baum, K. T., Desai, A., Field, J., Miller, L. E., Rausch, J., & Beebe, D. W. (2014). Sleep restriction worsens mood and emotion regulation in adolescents. *Journal of Child Psychology and Psychiatry, 55*(2), 180–190.
- Beesdo, K., PhD, Knappe, S., Dipl-Psych, & Pine, D. S., MD. (2009). Anxiety and anxiety disorders in children and adolescents: Developmental issues and implications for DSM-V. *Psychiatric Clinics of North America, 32*(3), 483–524.
- Bellamy, S., Bellamy, S., Hardy, C., & Hardy, C. (2015). Factors predicting depression across multiple domains in a national longitudinal sample of Canadian youth. *Journal of Abnormal Child Psychology, 43*(4), 633–643.
- Bendayan, R., Blanca, M. J., Fernández-Baena, J. F., Escobar, M., & Victoria Trianes, M. (2012). New empirical evidence on the validity of the satisfaction with life scale in early adolescents. *European Journal of Psychological Assessment, 29*(1), 36–43.
- Benner, A. D., Boyle, A. E., & Bakhtiari, F. (2017). Understanding students' transition to high school: Demographic variation and the role of supportive relationships. *Journal of Youth and Adolescence, 46*(10), 2129–2142.
- Benson, P. L., Scales, P. C., & Syvertsen, A. K. (2011). The contribution of the developmental assets framework to positive youth development theory and practice. *Advances in Child Development and Behavior, 41*, 197–230.
- Beyens, I., Valkenburg, P. M., & Piotrowski, J. T. (2018). Screen media use and ADHD-related behaviors: Four decades of research. *Proceedings of the National Academy of Sciences of the United States of America, 115*(40), 9875–9881.

- Bickham, D. S., & Rich, M. (2006). Is television viewing associated with social isolation? Roles of exposure time, viewing context, and violent content. *Archives of Pediatrics & Adolescent Medicine*, *160*(4), 387–392.
- Blaskova, L. J., & McLellan, R. (2018). Young people's perceptions of wellbeing: The importance of peer relationships in Slovak schools. *International Journal of School & Educational Psychology*, *6*(4), 279–291.
- Blechman, E. A., & Culhane, S. E. (1993). Aggressive, depressive, and prosocial coping with affective challenges in early adolescence. *The Journal of Early Adolescence*, *13*(4), 361–382.
- Bluth, K., Bluth, K., Blanton, P. W., & Blanton, P. W. (2014). Mindfulness and self-compassion: Exploring pathways to adolescent emotional well-being. *Journal of Child and Family Studies*, *23*(7), 1298–1309.
- Bodenhausen, G. V., Sheppard, L. A., & Kramer, G. P. (1994). Negative affect and social judgment: The differential impact of anger and sadness. *European Journal of Social Psychology*, *24*(1), 45–62.
- Bond, L., Ph. D., Butler, H., B. A. (Hons), Dip. Ed. ,. G. Dip. in Adol. Health, Thomas, L., B. Sc. (Hons), Carlin, J., Ph. D., Glover, S., Ph. D., Bowes, G., Ph. D., & Patton, G., M. D. (2007). Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes. *Journal of Adolescent Health*, *40*(4), 357.
- Booker, C. L., Kelly, Y. J., & Sacker, A. (2018). Gender differences in the associations between age trends of social media interaction and well-being among 10-15 year olds in the UK. *BMC Public Health*, *18*(1), 321.

- Boone, J. E., Gordon-Larsen, P., Adair, L. S., & Popkin, B. M. (2007). Screen time and physical activity during adolescence: Longitudinal effects on obesity in young adulthood. *The International Journal of Behavioral Nutrition and Physical Activity*, 4(1), 26–26.
- Bowlby J. (1969) *Attachment and Loss: Vol. 1. Attachment*. New York: Basic Books.
- Boxer, P., Groves, C. L., & Docherty, M. (2015). Video games do indeed influence children and adolescents' aggression, prosocial behavior, and academic performance: A clearer reading of Ferguson. *Perspectives on Psychological Science*, 10(5), 671–673.
- Brand, S., & Kirov, R. (2011). Sleep and its importance in adolescence and in common adolescent somatic and psychiatric conditions. *International Journal of General Medicine*, 4, 425–442.
- Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge, MA: Harvard Press.
- Bronfenbrenner, U. (1989). Ecological system theories. *Annals of Child Development*, 6, 187-249
- Bronfenbrenner, U. (2005). *Making human beings human*. Thousand Oaks, CA: Sage
- Brown, B. B., Eicher, S. A., & Petrie, S. (1986). The importance of peer group (“crowd”) affiliation in adolescence. *Journal of Adolescence*, 9(1), 73–96.
- Buchanan, R. L., & Bowen, G. L. (2008). In the context of adult support: The influence of peer support on the psychological well-being of middle-school students. *Child and Adolescent Social Work Journal*, 25(5), 397–407.
- Burton, W. N., Schultz, A. B., Chen, C.-Y., & Edington, D. W. (2008). The association of worker productivity and mental health: A review of the literature. *International Journal of Workplace Health Management*, 1(2), 78–94.

- Busch, V., Manders, L. A., & de Leeuw, J. R. J. (2013). Screen time associated with health behaviors and outcomes in adolescents. *American Journal of Health Behavior*, *37*(6), 819–830.
- Busschaert, C., M. Sc, Cardon, G., Ph. D., Van Cauwenberg, J., M. Sc, Maes, L., Ph. D., Van Damme, J., M. Sc, Hublet, A., Ph. D., De Bourdeaudhuij, I., Ph. D., & De Cocker, K., Ph. D. (2015). Tracking and predictors of screen time from early adolescence to early adulthood: A 10-year follow-up study. *Journal of Adolescent Health*, *56*(4), 440–448.
- Cabr -Riera, A., Torrent, M., Donaire-Gonzalez, D., Vrijheid, M., Cardis, E., & Guxens, M. (2019). Telecommunication devices use, screen time and sleep in adolescents. *Environmental research*, *171*, 341–347.
- Cain, N., & Gradisar, M. (2010). Electronic media use and sleep in school-aged children and adolescents: A review. *Sleep Medicine*, *11*(8), 735–742.
- Canadian Paediatric Society, Digital Health Task Force, Ottawa, Ontario (2017). Screen time and young children: Promoting health and development in a digital world. *Paediatrics & child health*, *22*(8), 461–477.
- Cao, H., Qian, Q., Weng, T., Yuan, C., Sun, Y., Wang, H., & Tao, F. (2011). Screen time, physical activity and mental health among urban adolescents in China. *Preventive Medicine*, *53*(4), 316–320.
- Carson, V., Spence, J., Cutumisu, N., & Cargill, L. (2010). Association between neighborhood socioeconomic status and screen time among pre-school children: A cross-sectional study. *BMC Public Health*, *10*(1), 367.

- Carter, R., Silverman, W. K., & Jaccard, J. (2011). Sex variations in youth anxiety symptoms: effects of pubertal development and gender role orientation. *Journal of Clinical Child & Adolescent Psychology, 40*(5), 730–741.
- Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical Psychology Review, 30*(7).
- Castelli, L., Castelli, L., Marcionetti, J., Marcionetti, J., Crescentini, A., Crescentini, A., Sciaroni, L., & Sciaroni, L. (2018). Monitoring preadolescents' well-being: Italian validation of the Middle Years Development Instrument. *Child Indicators Research, 11*(2), 609–628.
- Catalano, R. F., Skinner, M. L., Alvarado, G., Kapungu, C., Reavley, N., Patton, G. C., Jessee, C., Plaut, D., Moss, C., Bennett, K., Sawyer, S. M., Sebany, M., Sexton, M., Olenik, C., & Petroni, S. (2019). Positive youth development programs in low- and middle-income countries: A conceptual framework and systematic review of efficacy. *Journal of Adolescent Health, 65*(1), 15–31.
- Chaplin, T. M. (2006). Anger, happiness, and sadness: Associations with depressive symptoms in late adolescence. *Journal of Youth and Adolescence, 35*(6), 977–986.
- Chaplin, T. M., Gillham, J. E., & Seligman, M. E. P. (2009). Gender, anxiety, and depressive symptoms: A longitudinal study of early adolescents. *The Journal of Early Adolescence, 29*(2), 307–327.
- Chein, J., Albert, D., O'Brien, L., Uckert, K., & Steinberg, L. (2011). Peers increase adolescent risk taking by enhancing activity in the brain's reward circuitry. *Developmental Science, 14*(2), 1-10.

- Chong, W. H., Huan, V. S., Yeo, L. S., & Ang, R. P. (2006). Asian adolescents' perceptions of parent, peer, and school support and psychological adjustment: The mediating role of dispositional optimism. *Current Psychology, 25*(3), 212–228.
- Conklin, A. I., Yao, C. A., & Richardson, C. G. (2018). Chronic sleep deprivation and gender-specific risk of depression in adolescents: a prospective population-based study. *BMC public health, 18*(1), 724-727.
- Constantine, Norm & Benard, Bonnie. (2001). *California Healthy Kids Survey Resilience Assessment Module: Technical Report*. Berkley, CA: Public Health Institute.
- Conversano, C., Rotondo, A., Lensi, E., Della Vista, O., Arpone, F., & Reda, M. A. (2010). Optimism and its impact on mental and physical well-being. *Clinical Practice and Epidemiology in Mental Health : CP & EMH, 6*, 25–29.
- Coyne, S. M., Padilla-Walker, L. M., Fraser, A. M., Fellows, K., & Day, R. D. (2014). Media time = family time: Positive media use in families with adolescents. *Journal of Adolescent Research, 29*(5), 663–688.
- Craske, M. G., Prof, & Stein, M. B., Prof. (2016). Anxiety. *The Lancet, 388*(10063), 3048–3059.
- Crean, H. F. (2012). Youth activity involvement, neighborhood adult support, individual decision-making skills, and early adolescent delinquent behaviors: Testing a conceptual model. *Journal of Applied Developmental Psychology, 33*(4), 175–188.
- Cuadros, O., & Berger, C. (2016). The protective role of friendship quality on the wellbeing of adolescents victimized by peers. *Journal of Youth and Adolescence, 45*(9), 1877–1888.
- Cunningham, E. G., Brandon, C. M., & Frydenberg, E. (2002). Enhancing coping resources in early adolescence through a school-based program teaching optimistic thinking skills. *Anxiety, Stress & Coping, 15*(4), 369–381.

- Cutrona, C. E. (1989). Ratings of social support by adolescents and adult informants: Degree of correspondence and prediction of depressive symptoms. *Journal of Personality and Social Psychology*, 57(4), 723–730.
- Damon, W. (2004). What is positive youth development? *The Annals of the American Academy of Political and Social Science*, 591(1), 13–24.
- Davis, K. M., & Lambie, G. W. (2005). Family engagement: A collaborative, systemic approach for middle school counselors. *Professional School Counseling*, 9(2), 144–151.
- De France, K., & Hollenstein, T. (2019). Emotion regulation and relations to well-being across the lifespan. *Developmental Psychology*, 55(8), 1768–1774.
- Deardorff, J., Ph. D., Hayward, C., M. D., M. P. H., Wilson, K. A., Ph. D., Bryson, S., M. S., Hammer, L. D., M. D., & Agras, S., M. D. (2007). Puberty and gender interact to predict social anxiety symptoms in early adolescence. *Journal of Adolescent Health*, 41(1), 102–104.
- Dew, T., & Huebner, E. S. (1994). Adolescents' perceived quality of life: An exploratory investigation. *Journal of School Psychology*, 32(2), 185–199.
- Di Giunta, L., Iselin, A.-M. R., Eisenberg, N., Pastorelli, C., Gerbino, M., Lansford, J. E., Dodge, K. A., Caprara, G. V., Bacchini, D., Uribe Tirado, L. M., & Thartori, E. (2017). Measurement invariance and convergent validity of anger and sadness self-regulation among youth from six cultural groups. *Assessment*, 24(4), 484–502.
- Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, 55(1), 34–43.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal Personality Assessment*, 49, 71-75.

- Dierker, L. C., Albano, A. M., Clarke, G. N., Heimberg, R. G., Kendall, P. C., Merikangas, K. R., Lewinsohn, P. M., Offord, D. R., Kessler, R., & Kupfer, D. J. (2001). Screening for anxiety and depression in early adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*(8), 929–936.
- Domingues-Montanari, S. (2017). Clinical and psychological effects of excessive screen time on children. *Journal of Pediatrics and Child Health, 53*(4), 333–338.
- Drolet, M., & Arcand, I. (2013). Positive development, sense of belonging, and support of peers among early adolescents: Perspectives of different actors. *International Education Studies, 6*(4), 29-39.
- DuBois, D. L., Burk-Braxton, C., Swenson, L. P., Tevendale, H. D., Lockerd, E. M., & Moran, B. L. (2002). Getting by with a little help from self and others: Self-esteem and social support as resources during early adolescence. *Developmental Psychology, 38*(5), 822–839.
- Durkin, S. J., & Paxton, S. J. (2002). Predictors of vulnerability to reduced body image satisfaction and psychological wellbeing in response to exposure to idealized female media images in adolescent girls. *Journal of Psychosomatic Research, 53*(5), 995–1005.
- Eccles, J. S. (1999). The development of children ages 6 to 14. *The Future of Children, 9*(2), 30–30.
- Elliot, A. J., & Dweck, C. S. (Eds.). (2005). *Handbook of competence and motivation*. New York: Guilford Publications.
- Erath, S. A., Flanagan, K. S., & Bierman, K. L. (2007). Social anxiety and peer relations in early adolescence: Behavioral and cognitive factors. *Journal of Abnormal Child Psychology, 35*(3), 405–416.

- Eriksson, M., Ghazinour, M., Hammarström, A. (2018). Different uses of Bronfenbrenner's ecological theory in public mental health research: What is their value for guiding public mental health policy and practice? *Social Theory & Health*, 16(4), 414-433.
- Esteban-Cornejo, I., Carlson, J. A., Conway, T. L., Cain, K. L., Saelens, B. E., Frank, L. D., Glanz, K., Roman, C. G., & Sallis, J. F. (2016). Parental and adolescent perceptions of neighborhood safety related to adolescents' physical activity in their neighborhood. *Research Quarterly for Exercise and Sport*, 87(2), 191–199.
- Falbe, J., Davison, K., Franckle, R., Ganter, C., Gortmaker, S., Smith, L., Land, T., & Taveras, E. (2015). Sleep duration, restfulness, and screens in the sleep environment. *Pediatrics*, 135(2), 367–375.
- Faught, E. L., Gleddie, D., Storey, K. E., Davison, C. M., & Veugelers, P. J. (2017). Healthy lifestyle behaviours are positively and independently associated with academic achievement: An analysis of self-reported data from a nationally representative sample of Canadian early adolescents. *Plos one*, 12(7). e0181938.
- Feldman, A. F., & Matjasko, J. L. (2005). The role of school-based extracurricular activities in adolescent development: A comprehensive review and future directions. *Review of Educational Research*, 75(2), 159–210.
- Flanagan, K. S., Erath, S. A., & Bierman, K. L. (2008). Unique associations between peer relations and social anxiety in early adolescence. *Journal of Clinical Child & Adolescent Psychology*, 37(4), 759–769.
- Flint, P., Dollar, T., & Stewart, M. A. (2019). Hurdling over language barriers: Building relationships with adolescent newcomers through literacy advancement. *Journal of Adolescent & Adult Literacy*, 62(5), 509–519.

- Fogle, L. M., Scott Huebner, E., & Laughlin, J. E. (2002). The relationship between temperament and life satisfaction in early adolescence: Cognitive and behavioral mediation models. *Journal of Happiness Studies*, 3(4), 373–392.
- Forrest-Bank, S. S., Nicotera, N., Anthony, E. K., & Jenson, J. M. (2015). Finding their way: Perceptions of risk, resilience, and positive youth development among adolescents and young adults from public housing neighborhoods. *Children and Youth Services Review*, 55, 147–158.
- Fredrickson, B. L. (2013). Chapter One—Positive Emotions Broaden and Build. In P. Devine & A. Plant (Eds.), *Advances in Experimental Social Psychology*, 47, 1–53.
- Funk, J. B., Buchman, D. D., & Germann, J. N. (2000). Preference for violent electronic games, self-concept, and gender differences in young children. *American Journal of Orthopsychiatry*, 70(2), 233–241.
- Furman, W., Simon, V. A., Shaffer, L., & Bouchey, H. A. (2002). Adolescents working models and styles for relationships with parents, friends, and romantic partners. *Child Development*, 73(1), 241–255.
- Gadernann, A. M., Guhn, M., Schonert-Reichl, K. A., Hymel, S., Thomson, K., & Hertzman, C. (2016). A population-based study of children’s well-being and health: The relative importance of social relationships, health-related activities, and income. *Journal of Happiness Studies*, 17(5), 1847.
- Gadernann, A. M., Schonert-Reichl, K. A., & Zumbo, B. D. (2010). Investigating validity evidence of the satisfaction with life scale adapted for children. *Social Indicators Research*. 96(2), 229–247.

- Gestsdóttir, S., & Lerner, R. M. (2007). Intentional self-regulation and positive youth development in early adolescence: Findings from the 4-h study of positive youth development. *Developmental Psychology, 43*(2), 508–521.
- Gillham, J., & Reivich, K. (2004). Cultivating optimism in childhood and adolescence. *The Annals of the American Academy of Political and Social Science, 591*(1), 146–163.
- Gladwin, T. E., Figner, B., Crone, E. A., & Wiers, R. W. (2011). Addiction, adolescence, and the integration of control and motivation. *Developmental Cognitive Neuroscience, 1*(4), 364–376.
- Glenn, C. R., & Klonsky, E. D. (2009). Social context during non-suicidal self-injury indicates suicide risk. *Personality and Individual Differences, 46*(1), 25–29.
- Gozal, D. (2017). Sleep and electronic media exposure in adolescents: The rule of diminishing returns. *Jornal de Pediatria, 93*(6), 545–547.
- Gregory, A. M., & Eley, T. C. (2005). Sleep problems, anxiety and cognitive style in school-aged children. *Infant and Child Development, 14*(5), 435–444.
- Gregory, T., Gregory, T., Engelhardt, D., Engelhardt, D., Lewkowicz, A., Lewkowicz, A., Luddy, S., Luddy, S., Guhn, M., Guhn, M., Gadermann, A., Gadermann, A., Schonert-Reichl, K., Schonert-Reichl, K., Brinkman, S., & Brinkman, S. (2019). Validity of the Middle Years Development Instrument for population monitoring of student wellbeing in Australian school children. *Child Indicators Research, 12*(3), 873–899.
- Grills, A. E., & Ollendick, T. H. (2002). Peer victimization, global self-worth, and anxiety in middle school children. *Journal of Clinical Child & Adolescent Psychology, 31*(1), 59–68.

- Gunnell, K. E., Flament, M. F., Buchholz, A., Henderson, K. A., Obeid, N., Schubert, N., & Goldfield, G. S. (2015). Examining the bidirectional relationship between physical activity, screen time, and symptoms of anxiety and depression over time during adolescence. *Preventive Medicine, 88*, 147–152.
- Häggsström Westberg, K., Wilhsson, M., Svedberg, P., Nygren, J. M., Morgan, A., & Nyholm, M. (2019). Optimism as a candidate health asset: Exploring its links with adolescent quality of life in Sweden. *Child Development, 90*(3), 970–984.
- Hamilton, J. L., Hamlat, E. J., Stange, J. P., Abramson, L. Y., & Alloy, L. B. (2014). Pubertal timing and vulnerabilities to depression in early adolescence: Differential pathways to depressive symptoms by sex. *Journal of Adolescence, 37*(2), 165–174.
- Hargreaves, D., & Tiggemann, M. (2003). The effect of “thin ideal” television commercials on body dissatisfaction and schema activation during early adolescence. *Journal of Youth and Adolescence, 32*(5), 367–373.
- Hayden-Thomson, L. K. (1989). The development of the relational provisions loneliness questionnaire for children. unpublished doctoral dissertation, University of Waterloo, Waterloo, Ontario, Canada. *Journal for Quality-of-Life Measurement, 45*, 253-275.
- Hayley, A. C., Skogen, J. C., Sivertsen, B., Wold, B., Berk, M., Pasco, J. A., & Øverland, S. (2015). Symptoms of depression and difficulty initiating sleep from early adolescence to early adulthood: A longitudinal study. *Sleep, 38*(10), 1599–1606.
- Heaven, P. C. L., Ciarrochi, J., Vialle, W., & Cechavicuite, I. (2005). Adolescent peer crowd self-identification, attributional style and perceptions of parenting. *Journal of Community & Applied Social Psychology, 15*(4), 313–318.

- Heffer, T., Good, M., Daly, O., MacDonell, E., & Willoughby, T. (2019). The longitudinal association between social-media use and depressive symptoms among adolescents and young adults: An empirical reply to Twenge et al. (2018). *Clinical Psychological Science*, 7(3), 462–470.
- Hoare, E., Milton, K., Foster, C., & Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 13(1), 108-130.
- Hoge, E., Bickham, D., & Cantor, J. (2017). Digital media, anxiety, and depression in children. *Pediatrics*, 140(2), 76–80.
- Holstein, B. E., Pedersen, T. P., Bendtsen, P., Madsen, K. R., Meilstrup, C. R., Nielsen, L., & Rasmussen, M. (2014). Perceived problems with computer gaming and internet use among adolescents: Measurement tool for non-clinical survey studies. *BMC Public Health*, 14(1), 361–361.
- Hoy, B. D., Suldo, S. M., & Mendez, L. R. (2013). Links between parents' and children's levels of gratitude, life satisfaction, and hope. *Journal of Happiness Studies*, 14(4), 1343.
- Huebner, E. S., Drane, W., & Valois, R. F. (2000). Levels and demographic correlates of adolescent life satisfaction reports. *School Psychology International*, 21(3), 281–292.
- Iannotti, R. J., Kogan, M. D., Janssen, I., & Boyce, W. F. (2009). Patterns of adolescent physical activity, screen-based media use, and positive and negative health indicators in the U.S. and Canada. *Journal of Adolescent Health*, 44(5), 493–499.
- Jelicic, H., Bobek, D. L., Phelps, E., Lerner, R. M., & Lerner, J. V. (2007). Using positive youth development to predict contribution and risk behaviors in early adolescence: Findings

- from the first two waves of the 4-H Study of Positive Youth Development. *International Journal of Behavioral Development*, 31(3), 263–273.
- Jewell, J. A., & Brown, C. S. (2014). Relations among gender typicality, peer relations, and mental health during early adolescence. *Social Development*, 23(1), 137–156.
- Jiang, X., Huebner, E. S., & Hills, K. J. (2013). Parent attachment and early adolescents' life satisfaction: The mediating effect of hope. *Psychology in the Schools*, 50(4), 340–352.
- Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health*, 105(11), 2283–2290.
- Kahneman, D., & Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences of the United States of America*, 107(38), 16489–16493.
- Kalak, N., Lemola, S., Brand, S., Holsboer-Trachsler, E., & Grob, A. (2014). Sleep duration and subjective psychological well-being in adolescence: a longitudinal study in Switzerland and Norway. *Neuropsychiatric disease and treatment*, 10, 1199–1207.
- Kansky, J., Allen, J. P., & Diener, E. (2016). Early adolescent affect predicts later life outcomes. *Applied Psychology: Health and Well-Being*, 8(2), 192–212.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, 62(6), 593–602.
- Khouja, J. N., Munafò, M. R., Tilling, K., Wiles, N. J., Joinson, C., Etchells, P. J., John, A., Hayes, F. M., Gage, S. H., & Cornish, R. P. (2019). Is screen time associated with

- anxiety or depression in young people? Results from a UK birth cohort. *BMC Public Health*, 19(1), 82–11.
- Kingery, J. N., Erdley, C. A., & Marshall, K. C. (2011). Peer acceptance and friendship as predictors of early adolescents' adjustment across the middle school transition. *Merrill-Palmer Quarterly*, 57(3), 215–243.
- Kjellström, J., Modin, B., & Almquist, Y. B. (2017). Support from parents and teachers in relation to psychosomatic health complaints among adolescents. *Journal of research on adolescence : the official journal of the Society for Research on Adolescence*, 27(2), 478–487.
- Kusche, C. A., Greenberg, M. T., & Bedke, R. (1988). *Seattle Personality Questionnaire for young school aged children*. Unpublished manuscript. University of Washington, Department of Psychology, Seattle.
- Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, 1(1), 3–22.
- L.G, C., & J.S, E. (2003). Differential effects of support providers on adolescents mental health. *Social Work Research*, 27(1), 19–30.
- Laberge, L., Petit, D., Simard, C., Vitaro, F., Tremblay, R. E., & Montplaisir, J. (2001). Development of sleep patterns in early adolescence. *Journal of Sleep Research*, 10(1), 59–67.
- Laitinen-Krispijn, S., Ende, J., Hazebroek-Kampschreur, A. A. J. M., & Verhulst, F. C. (1999). Pubertal maturation and the development of behavioural and emotional problems in early adolescence. *Acta Psychiatrica Scandinavica*, 99(1), 16–25.

- Lancet, T. (2014). Mental health and wellbeing in children and adolescents. *The Lancet*, 383(9924), 1183–1183.
- Lancet, T. (2019). Social media, screen time, and young people’s mental health. *The Lancet*, 393(10172), 611–611.
- Larson, R. W., Moneta, G., Richards, M. H., & Wilson, S. (2002). Continuity, stability, and change in daily emotional experience across adolescence. *Child Development*, 73(4), 1151–1165.
- LeBlanc, A. G., Gunnell, K. E., Prince, S. A., Saunders, T. J., Barnes, J. D., & Chaput, J.-P. (2017). The ubiquity of the screen: An overview of the risks and benefits of screen time in our modern world. *Translational Journal of the American College of Sports Medicine*, 2(17), 104-113.
- Lehmann, E. L. (1999). *Elements of large-sample theory*. Springer, New York. 2(17).
- Lemola, S., Lemola, S., Perkinson-Gloor, N., Perkinson-Gloor, N., Brand, S., Brand, S., Dewald-Kaufmann, J. F., Dewald-Kaufmann, J. F., Grob, A., & Grob, A. (2015). Adolescents’ electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age. *Journal of Youth and Adolescence*, 44(2), 405–418.
- Lerner, R. M., Lerner, J. V., Almerigi, J. B., Theokas, C., Phelps, E., Gestsdottir, S., Naudeau, S., Jelicic, H., Alberts, A., Ma, L., Smith, L. M., Bobek, D. L., Richman-Raphael, D., Simpson, I., Christiansen, E. D., & von Eye, A. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth-grade adolescents: Findings from the first wave of the 4-h study of positive youth development. *The Journal of Early Adolescence*, 25(1), 17–71.

- Li, X., Buxton, O. M., Lee, S., Chang, A. M., Berger, L. M., & Hale, L. (2019). Sleep mediates the association between adolescent screen time and depressive symptoms. *Sleep medicine, 57*, 51–60.
- Lissak G. (2018). Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental research, 164*, 149–157.
- Lobel, A., Engels, R. C. M. E., Stone, L. L., Burk, W. J., & Granic, I. (2017). Video gaming and children's psychosocial wellbeing: A longitudinal study. *Journal of Youth and Adolescence, 46*(4), 884–897.
- Lopez, A., Yoder, J. R., Brisson, D., Lechuga-Pena, S., & Jenson, J. M. (2015). Development and validation of a positive youth development measure: The bridge-positive youth development. *Research on Social Work Practice, 25*(6), 726–736.
- Lopez, C., & DuBois, D. L. (2005). Peer victimization and rejection: Investigation of an integrative model of effects on emotional, behavioral, and academic adjustment in early adolescence. *Journal of Clinical Child & Adolescent Psychology, 34*(1), 25–36.
- Lovato, N., & Gradisar, M. (2014). A meta-analysis and model of the relationship between sleep and depression in adolescents: Recommendations for future research and clinical practice. *Sleep Medicine Reviews, 18*(6), 521-529.
- MacPhee, A. R., & Andrews, J. J. W. (2006). Risk factors for depression in early adolescence. *Adolescence, 41*(163), 435.
- Malin, H., Liauw, I., & Damon, W. (2017). Purpose and character development in early adolescence. *Journal of Youth and Adolescence, 46*(6), 1200–1215.

- Maras, D., Flament, M. F., Murray, M., Buchholz, A., Henderson, K. A., Obeid, N., & Goldfield, G. S. (2015). Screen time is associated with depression and anxiety in Canadian youth. *Preventive medicine, 73*, 133–138.
- Marinelli, M., Sunyer, J., Alvarez-Pedrerol, M., Iñiguez, C., Torrent, M., Vioque, J., Turner, M. C., & Julvez, J. (2014). Hours of television viewing and sleep duration in children: A multicenter birth cohort study. *JAMA Pediatrics, 168*(5), 458–464.
- Marks, J., de la Haye, K., Barnett, L. M., & Allender, S. (2015). Friendship network characteristics are associated with physical activity and sedentary behavior in early adolescence. *PloS One, 10*(12).
- Marsee, M. A., Marsee, M. A., Weems, C. F., Weems, C. F., Taylor, L. K., & Taylor, L. K. (2008). Exploring the association between aggression and anxiety in youth: A look at aggressive subtypes, gender, and social cognition. *Journal of Child and Family Studies, 17*(1), 154–168.
- Marshall, S. J., Gorely, T., & Biddle, S. J. H. (2006). A descriptive epidemiology of screen-based media use in youth: A review and critique. *Journal of Adolescence, 29*(3), 333–349.
- Martinez, S. M., Tschann, J. M., Butte, N. F., Gregorich, S. E., Penilla, C., Flores, E., Pasch, L. A., Greenspan, L. C., & Deardorff, J. (2019). Sleep duration in Mexican American children: Do mothers' and fathers' parenting and family practices play a role? *Journal of Sleep Research, 28*(4).12784-12792.
- McLaughlin, K. A., McLaughlin, K. A., King, K., & King, K. (2015). Developmental trajectories of anxiety and depression in early adolescence. *Journal of Abnormal Child Psychology, 43*(2), 311–323.

- McLeod, J. D., & Owens, T. J. (2004). Psychological well-being in the early life course: Variations by socioeconomic status, gender, and race/ethnicity. *Social Psychology Quarterly*, 67(3), 257–278.
- McMakin, D. L., & Alfano, C. A. (2015). Sleep and anxiety in late childhood and early adolescence. *Current Opinion in Psychiatry*, 28(6), 483–489.
- Mental Health Commission of Canada. (2010). *Making the Case for Investing in Mental Health in Canada*. https://www.mentalhealthcommission.ca/sites/default/files/2016-06/Investing_in_Mental_Health_FINAL_Version_ENG.pdf.
- Merikangas, K. R., He, J. P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L., Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, 49(10), 980–989.
- Metzger, A., Crean, H. F., & Forbes-Jones, E. L. (2009). Patterns of organized activity participation in urban, early adolescents: Associations with academic achievement, problem behaviors, and perceived adult support. *The Journal of Early Adolescence*, 29(3), 426–442.
- Milam, A. J., Furr-Holden, C. D. M., & Leaf, P. J. (2010). Perceived school and neighborhood safety, neighborhood violence and academic achievement in urban school children. *The Urban Review*, 42(5), 458–467.
- Mireku, M. O., Barker, M. M., Mutz, J., Dumontheil, I., Thomas, M., Rösli, M., Elliott, P., & Toledano, M. B. (2019). Night-time screen-based media device use and adolescents' sleep and health-related quality of life. *Environment international*, 124, 66–78.

- Moilanen, K. L., Shaw, D. S., & Maxwell, K. L. (2010). Developmental cascades: Externalizing, internalizing, and academic competence from middle childhood to early adolescence. *Development and Psychopathology*, *22*(3), 635–653.
- Montague, M., Enders, C., Dietz, S., Dixon, J., & Cavendish, W. M. (2008). A longitudinal study of depressive symptomology and self-concept in adolescents. *The Journal of Special Education*, *42*(2), 67–78.
- Monzani, D., Steca, P., & Greco, A. (2013). Brief report: Assessing dispositional optimism in adolescence – factor structure and concurrent validity of the life orientation test – revised. *Journal of Adolescence*, *37*(2), 97–101.
- Moran, P., Coffey, C., Romaniuk, H., Degenhardt, L., Borschmann, R., & Patton, G. C. (2015). Substance use in adulthood following adolescent self-harm: A population-based cohort study. *Acta Psychiatrica Scandinavica*, *131*(1), 61–68.
- Mota, J., Gomes, H., Almeida, M., Ribeiro, J., & Santos, M. (2007). Leisure time physical activity, screen time, social background, and environmental variables in adolescents. *Pediatric exercise science*, *19*(3), 279–290.
- Murberg, T. A. (2012). The influence of optimistic expectations and negative life events on somatic symptoms among adolescents: a one-year prospective study. *Psychology*, *3*(2), 123–127.
- Newman, B. M., Newman, P. R., Griffen, S., O'Connor, K., & Spas, J. (2007). The relationship of social support to depressive symptoms during the transition to high school. *Adolescence*, *42*(167), 441.

- Ngantcha, M., Janssen, E., Godeau, E., Ehlinger, V., Le-Nezet, O., Beck, F., & Spilka, S. (2018). Revisiting factors associated with screen time media use: A structural study among school-aged adolescents. *Journal of Physical Activity and Health, 15*(6), 448–456.
- Nickerson, A. B., & Nagle, R. J. (2004). The influence of parent and peer attachments on life satisfaction in middle childhood and early adolescence. *Social Indicators Research, 66*(1/2), 35–60.
- Nickerson, A. B., & Nagle, R. J. (2005). Parent and peer attachment in late childhood and early adolescence. *The Journal of Early Adolescence, 25*(2), 223–249.
- Noam, G. G., & Goldstein, L. S. (1998). *The Resiliency Inventory*. Unpublished Protocol.
- Noland, H., Price, J. H., Dake, J., & Telljohann, S. K. (2009). Adolescents' sleep behaviors and perceptions of sleep. *Journal of School Health, 79*(5), 224–230.
- Nolen-Hoeksema, S., Girgus, J. S., & Seligman, M. E. (1992). Predictors and consequences of childhood depressive symptoms: A 5-year longitudinal study. *Journal of Abnormal Psychology, 101*(3), 405–422.
- Oberle, E., Guhn, M., Gadermann, A. M., Thomson, K., & Schonert-Reichl, K. A. (2018). Positive mental health and supportive school environments: A population-level longitudinal study of dispositional optimism and school relationships in early adolescence. *Social Science & Medicine, 214*, 154–161.
- Oberle, E., Ji, X. R., Guhn, M., Schonert-Reichl, K. A., & Gadermann, A. M. (2019). Benefits of extracurricular participation in early adolescence: Associations with peer belonging and mental health. *Journal of Youth and Adolescence, 48*(11), 2255–2270.
- Oberle, E., Schonert-Reichl, K. A., & Thomson, K. C. (2010). Understanding the link between social and emotional well-being and peer relations in early adolescence: Gender-

- specific predictors of peer acceptance. *Journal of Youth and Adolescence*, 39(11), 1330–1342.
- Oberle, E., Schonert-Reichl, K. A., & Zumbo, B. D. (2011). Life satisfaction in early adolescence: Personal, neighborhood, school, family, and peer influences. *Journal of Youth and Adolescence*, 40(7), 889–901.
- Ohannessian, C. M. (2009). Media use and adolescent psychological adjustment: An examination of gender differences. *Journal of Child and Family Studies*, 18(5), 582–593.
- Onwuegbuzie, A. J., Collins, K. M., & Frels, R. K. (2013). Using Bronfenbrenner's ecological systems theory to frame quantitative, qualitative, and mixed research. *International Journal of Multiple Research Approaches*, 7(1), 2-8.
- Orejudo, S., Puyuelo, M., Fernández-Turrado, T., & Ramos, T. (2012). Optimism in adolescence: A cross-sectional study of the influence of family and peer group variables on junior high school students. *Personality and Individual Differences*, 52(7), 812–817.
- Parent, J., Sanders, W., & Forehand, R. (2016). Youth screen time and behavioral health problems: The role of sleep duration and disturbances. *Journal of Developmental and Behavioral Pediatrics : JDBP*, 37(4), 277–284.
- Parker, G., Paterson, A., & Hadzi-Pavlovic, D. (2015). Emotional response patterns of depression, grief, sadness and stress to differing life events: a quantitative analysis. *Journal of affective disorders*, 175, 229–232.
- Paruthi, S., Brooks, L. J., D'Ambrosio, C., Hall, W. A., Kotagal, S., Lloyd, R. M., Malow, B. A., Maski, K., Nichols, C., Quan, S. F., Rosen, C. L., Troester, M. M., & Wise, M. S. (2016). Recommended amount of sleep for pediatric populations: A consensus statement of the

- American academy of sleep medicine. *Journal of Clinical Sleep Medicine : JCSM : Official Publication of the American Academy of Sleep Medicine*, 12(6), 785–786.
- Pasch, K., Laska, M., Lytle, L., & Moe, S. (2010). Adolescent sleep, risk behaviors, and depressive symptoms: Are they linked? *American Journal of Health Behavior*, 34(2), 237-248.
- Patten, C. A., Gillin, J. C., Farkas, A. J., Gilpin, E. A., Berry, C. C., & Pierce, J. P. (1997). Depressive symptoms in California adolescents: Family structure and parental support. *Journal of Adolescent Health*, 20(4), 271–278.
- Pavot, W., & Diener, E. (2008). The Satisfaction with Life Scale and the emerging construct of life satisfaction. *The Journal of Positive Psychology*, 3(2), 137–152.
- Peled, M., & Moretti, M. M. (2007). Rumination on anger and sadness in adolescence: Fueling of fury and deepening of despair. *Journal of Clinical Child & Adolescent Psychology*, 36(1), 66–75.
- Perry-Parrish, C., & Zeman, J. (2011). Relations among sadness regulation, peer acceptance, and social functioning in early adolescence: The role of gender: Sadness regulation in early adolescence. *Social Development*, 20(1), 135–153.
- Phelps, E., Zimmerman, S., Warren, A. E. A., Jeličić, H., von Eye, A., & Lerner, R. M. (2009). The structure and developmental course of Positive Youth Development (PYD) in early adolescence: Implications for theory and practice. *Journal of Applied Developmental Psychology*, 30(5), 571–584.
- Pianta, R. C., & Hamre, B. K. (2009). Classroom processes and positive youth development: Conceptualizing, measuring, and improving the capacity of interactions between teachers and students. *New Directions for Youth Development*, 2009(121), 33–46.

- Pine, D. S., Cohen, P., Gurley, D., Brook, J., & Ma, Y. (1998). The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *Archives of General Psychiatry*, *55*(1), 56–64.
- Proctor, C., Linley, P., & Maltby, J. (2009). Youth life satisfaction: A review of the literature. *Journal of happiness studies*, *10*(5), 583–630.
- Przybylski, A. K., & Weinstein, N. (2017). A large-scale test of the goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science*, *28*(2), 204–215.
- Qualter, P., Brown, S. L., Munn, P., & Rotenberg, K. J. (2010). Childhood loneliness as a predictor of adolescent depressive symptoms: An 8-year longitudinal study. *European Child & Adolescent Psychiatry*, *19*(6), 493–501.
- Ragelienė, T. (2016). Links of adolescents identity development and relationship with peers: a systematic literature review. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, *25*(2), 97–105.
- Raja, S. N., McGee, R., & Stanton, W. R. (1992). Perceived attachments to parents and peers and psychological well-being in adolescence. *Journal of Youth and Adolescence*, *21*(4), 471–485.
- Ramsey Buchanan, L., Rooks-Peck, C. R., Finnie, R. K. C., Wethington, H. R., Jacob, V., Fulton, J. E., Johnson, D. B., Kahwati, L. C., Pratt, C. A., Ramirez, G., Mercer, S. L., & Glanz, K. (2016). Reducing recreational sedentary screen time: A community guide systematic review. *American Journal of Preventive Medicine*, *50*(3), 402–415.

- Randler, C., Wolfgang, L., Matt, K., Demirhan, E., & Beşoluk, Ş. (2016). Smartphone addiction proneness in relation to sleep and morningness–eveningness in German adolescents. *Journal of Behavioral Addictions, 5*(3), 465–473.
- Rapee, R. M., Schniering, C. A., & Hudson, J. L. (2009). Anxiety disorders during childhood and adolescence: Origins and treatment. *Annual Review of Clinical Psychology, 5*(1), 311–341.
- Rikkers, W., Lawrence, D., Hafekost, J., & Zubrick, S. R. (2016). Internet use and electronic gaming by children and adolescents with emotional and behavioural problems in Australia—results from the second child and adolescent survey of mental health and wellbeing. *BMC Public Health, 16*(1), 399–16.
- Robinson, T. N. (1999). Reducing children’s television viewing to prevent obesity: A randomized controlled trial. *JAMA, 282*(16), 1561–1567.
- Rueger, S. Y., & Malecki, C. K. (2011). Effects of stress, attributional style and perceived parental support on depressive symptoms in early adolescence: A prospective analysis. *Journal of Clinical Child & Adolescent Psychology, 40*(3), 347–359.
- Samaha, M., & Hawi, N. S. (2017). Associations between screen media parenting practices and children’s screen time in Lebanon. *Telematics and informatics, 34*(1), 351–358.
- Santiago-Menendez, M., & Campbell, A. (2013). Sadness and anger: Boys, girls, and crying in adolescence. *Psychology of Men & Masculinity, 14*(4), 400–410.
- Sarchiapone, M., Mandelli, L., Carli, V., Iosue, M., Wasserman, C., Hadlaczky, G., Hoven, C. W., Apter, A., Balazs, J., Bobes, J., Brunner, R., Corcoran, P., Cosman, D., Haring, C., Kaess, M., Keeley, H., Keresztény, A., Kahn, J.-P., Postuvan, V., Wasserman, D. (2013).

- Hours of sleep in adolescents and its association with anxiety, emotional concerns, and suicidal ideation. *Sleep Medicine*, *15*(2), 248–254.
- Saunders, T. J., & Vallance, J. K. (2017). Screen time and health indicators among children and youth: Current evidence, limitations and future directions. *Applied Health Economics and Health Policy*, *15*(3), 323–331.
- Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology*, *1*, 607–628.
- Schoeppe, S., Rebar, A. L., Short, C. E., Alley, S., Van Lippevelde, W., & Vandelanotte, C. (2016). How is adults' screen time behaviour influencing their views on screen time restrictions for children? A cross-sectional study. *BMC Public Health*, *16*(1), 201–205.
- Schonert-Reichl, K. A., Guhn, M., Gadermann, A. M., Hymel, S., Sweiss, L., & Hertzman, C. (2013). Development and validation of the Middle Years Development Instrument (MDI): Assessing children's well-being and assets across multiple contexts. *Social Indicators Research*, *114*(2), 345–369.
- Schwartz, S. J. (2008). Self and identity in early adolescence: Some reflections and an introduction to the special issue. *The Journal of Early Adolescence*, *28*(1), 5–15.
- Séguin, D. G., & Hipson, W. (2016). Unravelling the complex associations between emotional intelligence and personality in later childhood and early adolescence. *Early Child Development and Care*, *186*(8), 1212–1226.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*(1), 5–14.

- Shek, D. T., Dou, D., Zhu, X., & Chai, W. (2019). Positive youth development: Current perspectives. *Adolescent Health, Medicine and Therapeutics, 10*, 131–141
- Sirard, J. R., PhD, Bruening, M., PhD, MPH, RD, Wall, M. M., PhD, Eisenberg, M. E., ScD, MPH, Kim, S. K., PhD, & Neumark-Sztainer, D., PhD, MPH, RD. (2013). Physical activity and screen time in adolescents and their friends. *American Journal of Preventive Medicine, 44*(1), 48–55.
- Spring, Miriam & Wagener, Dietrich & Funke, Joachim. (2005). The role of emotions in complex problem solving. *Cognition and Emotion, 19*. 1252-1261.
- Stadler, C., Feifel, J., Rohrmann, S., Vermeiren, R. R. J. M., & Poustka, F. (2010). Peer-victimization and mental health problems in adolescents: Are parental and school support protective? *Child Psychiatry and Human Development, 41*(4), 371–386.
- Steinberg, L. (2005). Cognitive and affective development in adolescence. *Trends in Cognitive Sciences, 9*(2), 69–74.
- Stice, E., Ragan, J., & Randall, P. (2004). Prospective relations between social support and depression: Differential direction of effects for parent and peer support? *Journal of Abnormal Psychology, 113*(1), 155–159.
- Stiglic, N., & Viner, R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open, 9*(1), e023191.
- Stotsky, M. T., & Bowker, J. C. (2018). An examination of reciprocal associations between social preference, popularity, and friendship during early adolescence. *Journal of Youth and Adolescence, 47*(9), 1830–1841.

- Straatmann, V. S., Oliveira, A. J., Rostila, M., & Lopes, C. S. (2016). Changes in physical activity and screen time related to psychological well-being in early adolescence: findings from longitudinal study ELANA. *BMC Public Health, 16*, 977-1011.
- Suchert, V., Hanewinkel, R., & Isensee, B. (2015). Sedentary behavior and indicators of mental health in school-aged children and adolescents: A systematic review. *Preventive Medicine, 76*, 48–57.
- Tahmassian, K., & Jalali Moghadam, N. (2011). Relationship between self-efficacy and symptoms of anxiety, depression, worry and social avoidance in a normal sample of students. *Iranian Journal of Psychiatry and Behavioral Sciences, 5*(2), 91–98.
- Talbot, L. S., McGlinchey, E. L., Kaplan, K. A., Dahl, R. E., & Harvey, A. G. (2010). Sleep deprivation in adolescents and adults: Changes in affect. *Emotion (Washington, D.C.), 10*(6), 831–841.
- Tandon, P. S., Zhou, C., Sallis, J. F., Cain, K. L., Frank, L. D., & Saelens, B. E. (2012). Home environment relationships with children's physical activity, sedentary time, and screen time by socioeconomic status. *The International Journal of Behavioral Nutrition and Physical Activity, 9*(1), 88–88.
- Tarokh, L., Saletin, J. M., & Carskadon, M. A. (2016). Sleep in adolescence: Physiology, cognition and mental health. *Neuroscience and Biobehavioral Reviews, 70*, 182–188.
- Taylor, Rebecca D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting positive youth development through school-based social and emotional learning interventions: A meta-analysis of follow-up effects. *Child Development, 88*(4), 1156–1171.

- Taylor, Ronald D. (2010). Risk and resilience in low-income African American families: Moderating effects of kinship social support. *Cultural Diversity and Ethnic Minority Psychology, 16*(3), 344–351.
- Tennant, J. E., Demaray, M. K., Malecki, C. K., Terry, M. N., Clary, M., & Elzinga, N. (2015). Students' ratings of teacher support and academic and social-emotional well-being. *School Psychology Quarterly : The Official Journal of the Division of School Psychology, American Psychological Association, 30*(4), 494–512.
- Tetzner, J., & Becker, M. (2019). Why are you so optimistic? Effects of sociodemographic factors, individual experiences, and peer characteristics on optimism in early adolescents. *Journal of Personality, 87*(3), 661–675.
- Theurel, A., & Gentaz, E. (2018). The regulation of emotions in adolescents: Age differences and emotion-specific patterns. *PloS One, 13*(6), e0195501–e0195501.
- Thomas, D. R., Hughes, E., & Zumbo, B. D. (1998). On variable importance in linear regression. *Social Indicators Research 45*, 253–275
- Thomson, K. C., Oberle, E., Gadermann, A. M., Guhn, M., Rowcliffe, P., & Schonert-Reichl, K. A. (2018). Measuring social-emotional development in middle childhood: The Middle Years Development Instrument. *Journal of Applied Developmental Psychology, 55*, 107–118.
- Thomson, K. C., Schonert-Reichl, K. A., & Oberle, E. (2015). Optimism in early adolescence: Relations to individual characteristics and ecological assets in families, schools, and neighborhoods. *Journal of Happiness Studies, 16*(4), 889–913.

- Thomson, K. C., Schonert-Reichl, K. A., & Oberle, E. (2015). Optimism in early adolescence: Relations to individual characteristics and ecological assets in families, schools, and neighborhoods. *Journal of Happiness Studies, 16*(4), 889–913.
- Thurman, W., Johnson, K., Gonzalez, D. P., & Sales, A. (2018). Teacher support as a protective factor against sadness and hopelessness for adolescents experiencing parental incarceration: Findings from the 2015 Texas alternative school survey. *Children and Youth Services Review, 88*, 558.
- Tillery, R., Cohen, R., Parra, G. R., Kitzmann, K. M., & Katianna M. Howard Sharp. (2015). Friendship and the socialization of sadness. *Merrill-Palmer Quarterly, 61*(4), 486–508.
- Tomé, G., Matos, M., Simões, C., Diniz, J. A., & Camacho, I. (2012). How can peer group influence the behavior of adolescents: Explanatory model. *Global Journal of Health Science, 4*(2), 26–35.
- Totland, T. H., Bjelland, M., Lien, N., Bergh, I. H., Gebremariam, M. K., Grydeland, M., Ommundsen, Y., & Andersen, L. F. (2013). Adolescents' prospective screen time by gender and parental education, the mediation of parental influences. *International Journal of Behavioral Nutrition and Physical Activity, 10*(1), 89.
- Tremblay, M. S., LeBlanc, A. G., Kho, M. E., Saunders, T. J., Larouche, R., Colley, R. C., Goldfield, G., & Connor Gorber, S. (2011). Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *The International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 98–98.
- Twenge, J. M., Martin, G. N., & Campbell, W. K. (2018). Decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion (Washington, D.C.), 18*(6), 765–780.

- Van Ness, P. H., Murphy, T. E., Araujo, K. L. B., Pisani, M. A., & Allore, H. G. (2007). The use of missingness screens in clinical epidemiologic research has implications for regression modeling. *Journal of Clinical Epidemiology*, *60*(12), 1239–1245.
- Vance, F. (2018). Understanding adolescents' skill-building in the after-school context. *Youth & Society*, *50*(7), 966–988.
- Vandendriessche, A., Ghekiere, A., Van Cauwenberg, J., De Clercq, B., Dhondt, K., DeSmet, A., Tynjälä, J., Verloigne, M., & Deforche, B. (2019). Does sleep mediate the association between school pressure, physical activity, screen time, and psychological symptoms in early adolescents? A 12-country study. *International Journal of Environmental Research and Public Health*, *16*(6), 1072.
- Vernberg, E. M., Abwender, D. A., Ewell, K. K., & Beery, S. H. (1992). Social anxiety and peer relationships in early adolescence: A prospective analysis. *Journal of Clinical Child Psychology*, *21*(2), 189–196.
- Vigo, D., MD, Thornicroft, G., Prof, & Atun, R., Prof. (2016). Estimating the true global burden of mental illness. *The Lancet Psychiatry*, *3*(2), 171–178.
- Vilhjalmsson, R., & Thorlindsson, T. (1992). The integrative and physiological effects of sport participation: A study of adolescents. *The Sociological Quarterly*, *33*(4), 637–647.
- Waldrip, A. M., Malcolm, K. T., & Jensen-Campbell, L. A. (2008). With a little help from your friends: The importance of high-quality friendships on early adolescent adjustment. *Social Development*, *17*(4), 832–852.
- Waters, S., Ph. D., Lester, L., Ph. D., & Cross, D., Ed. D. (2014). How does support from peers compare with support from adults as students transition to secondary school? *Journal of Adolescent Health*, *54*(5), 543–549.

- Wentzel, K. R. (1993). Motivation and achievement in early adolescence: The role of multiple classroom goals. *The Journal of Early Adolescence, 13*(1), 4–20.
- Wentzel, K. R., & Erdley, C. A. (1993). Strategies for making friends: Relations to social behavior and peer acceptance in early adolescence. *Developmental Psychology, 29*(5), 819–826.
- Woods, H. C., & Scott, H. (2016). Sleepy teens: Social media use in adolescence is associated with poor sleep quality, anxiety, depression and low self-esteem. *Journal of Adolescence, 51*, 41-49.
- Woolley, M. E., & Bowen, G. L. (2007). In the context of risk: Supportive adults and the school engagement of middle school students. *Family Relations, 56*(1), 92–104.
- Wu, L., Sun, S., He, Y., & Jiang, B. (2016). The effect of interventions targeting screen time reduction: A systematic review and meta-analysis. *Medicine, 95*(27), e4029.
- You, S., Lee, J., Lee, Y., & Kim, E. (2018). Gratitude and life satisfaction in early adolescence: The mediating role of social support and emotional difficulties. *Personality and Individual Differences, 130*, 122–128.
- Zapata Roblyer, M. I., & Grzywacz, J. G. (2015). Demographic and parenting correlates of adolescent sleep functioning. *Journal of Child and Family Studies, 24*(11), 3331–3340.
- Zeman, J., & Shipman, K. (1997). Social-contextual influences on expectancies for managing anger and sadness, depressive symptoms: The transition from middle childhood to adolescence. *Developmental Psychology, 33*(6), 917–924.
- Zimmermann, P., & Iwanski, A. (2014). Emotion regulation from early adolescence to emerging adulthood and middle adulthood: Age differences, gender differences, and emotion-

specific developmental variations. *International Journal of Behavioral Development*,
38(2), 182–194.

Appendix

Table 4. Hierarchical linear regression model predicting satisfaction with life

	Block 1			Block 2			Block 3			Block 4			Total		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	R^2	ΔR^2	<i>PRATT</i>
Block 1	3.746	.014		3.119	.020		.741	.029		.749	.035		.008	.008	
Gender ¹	.088	.011	.049*	.099	.011	.056*	.066	.009	.037*	-.043	.019	-.024			<.01
ESL ²	.169	.014	.076*	.202	.013	.091*	.101	.011	.045*	.100	.011	.045*			<.01
Block 2													.162	.154	
Sleep				.156	.002	.375*	.078	.002	.188*	.090	.004	.216*			0.206
Screen time				-.031	.002	-.079*	-.017	.002	-.043*	-.020	.005	-.050*			0.013
Block 3													.401	.239	
Peer belonging							.263	.005	.276*	.262	.005	.275*			0.325
Adults at school							.109	.007	.089*	.109	.007	.089*			0.078
Adults at home							.399	.007	.308*	.398	.007	.307*			0.388
Block 4													.402	.001	
Screen*gender										.027	.004	.088*			<.01
Screen*sleep										-.003	.001	-.042			0.019

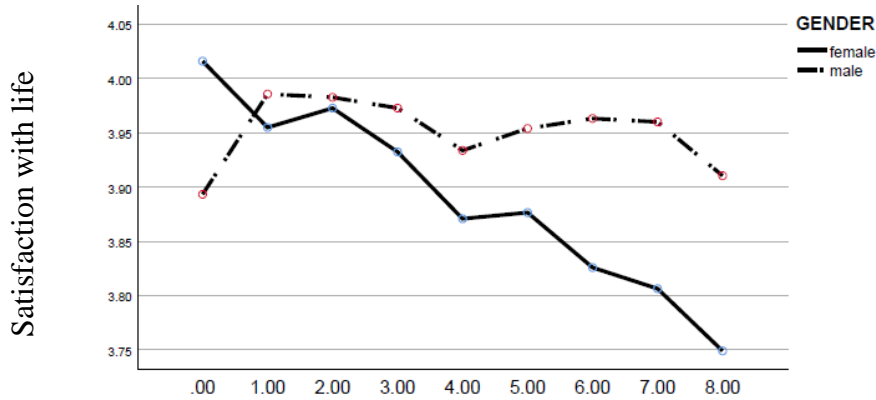
¹ Gender (0 = Female, 1 = Male.); ² ESL status (0 = languages other than English, 1 = English); * $p < 0.001$.

Table 5. Hierarchical linear regression model predicting anxiety

	Block 1			Block 2			Block 3			Block 4			Total		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	R^2	ΔR^2	<i>PRATT</i>
Block 1	3.225	.019		3.516	.029		4.835	.050		4.911	.060		.030	.030	
Gender	-.425	.016	-.168*	-.463	.016	-.183*	-.421	.016	-.167*	-.282	.033	-.112*			0.151
ESL	-.145	.020	-.046*	-.172	.019	-.054*	-.130	.019	-.041*	-.129	.019	-.041*			0.014
Block 2													.062	.032	
Sleep				-.092	.004	-.155*	-.045	.004	-.077*	-.079	.008	-.133*			0.181
Screen time				.041	.004	.074*	.034	.003	.061*	.020	.008	.035			<.01
Block 3													.124	.062	
Peer belonging							-.331	.009	-.246*	-.330	.009	-.245*			0.570
Adults at school							.033	.012	.019	.033	.012	.019			0.044
Adults at home							-.094	.013	-.051*	-.092	.013	-.050*			0.066
Block 4													.125	.002	
Screen*gender										-.034	.007	-.080*			0.077
Screen*sleep										.007	.001	.084*			0.056

¹ Gender (0 = Female; 1 = Male); ² ESL status (0 = languages other than English; 1 = English); * $p < 0.001$.

Figure 4. Association between screen time and satisfaction with life separate for males and



females

Figure 5. Association between screen time and anxiety separate for males and females

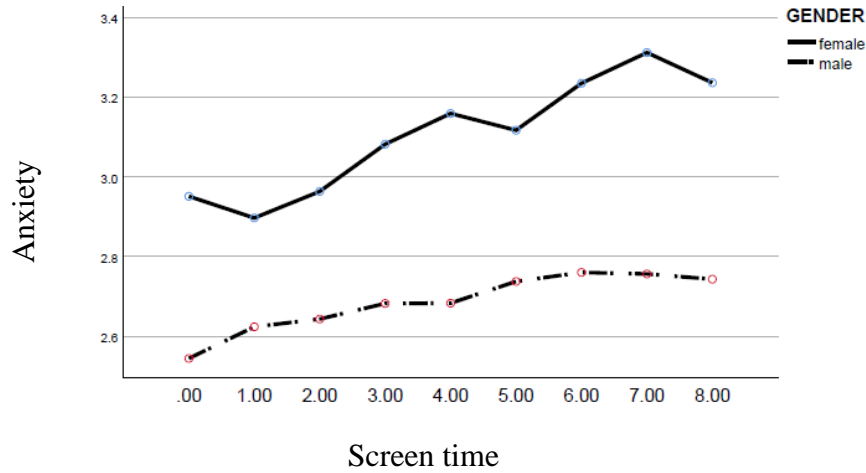


Figure 6 Association between screen time and anxiety separate for sleep categories

